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The Evolution of Large Technical Systems in the Waterberg Coalfield of South Africa:

From Apartheid to Democracy

Faeeza Ballim

A thesis submitted to the Faculty of Humanities, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the Degree of Doctor of Philosophy. Johannesburg, March 2017.

Declaration

I declare that this thesis is my own unaided work. It has been submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted for any degree or examination at any other university.

Signed: Faeeza Ballim, 24 March 2017.

Abstract

This thesis follows the development of a particular set of large technical systems in South Africa from the late apartheid era into the age of democracy. During apartheid technological prowess, upheld by the network of state corporations or parastatals, bolstered the authoritarian rule of the white minority government in South Africa. The economic and political liberalisation of the late 1980s challenged the power of the parastatals and altered the underlying rationale of infrastructure development. In particular I describe the transformation of Iscor and Eskom, two of the country's major parastatals, and their activities in the Waterberg coalfields, an isolated region on the country's north-western border. While Eskom's activities in the region began in the 1980s they gained public notoriety with the construction of the Medupi power station two decades later. The obstacles that Eskom faced at Medupi represent the main challenge of developing large technological infrastructures in the democratic, post-colonial order, where the fruits of infrastructure development demand to be spread beyond the bounds of an elite minority. But the eventual completion of some power generating units in 2015 at Medupi demonstrates that failure is not inevitable. I argue that this success is due to the fact that the autonomous parastatal network negotiated the political and economic liberalisation of the early 1990 by incorporating the changing socio-political conditions into its operations. The parastatal network retained a momentum, in the sense first described by the historian of technology Thomas Hughes, which was also a product of the "locked-in" nature of investment in the infrastructure project. Because of the large capital investment required for the infrastructure development, proceeding tenaciously against the odds to see the project to completion was cheaper than retreat for those involved.

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Introduction

Key Themes

In October 2016, South African president Jacob Zuma sought to convince a group of visiting foreign dignitaries that the country's evident political turmoil at the time signified its democratic well-being. He had just returned from a visit to the United Arab Emirates (UAE) and Oman and recounted his impressions of these countries in his address:

> I saw in UAE, in the sea, an impression of a palm tree being a settlement [Dubai's Palm Jumeirah, a man-made island built in the shape of a palm]. You can't build it in [a] democracy. Because they will say we are wasting taxpayers' money, and correctly so. Why do you make an impression of a palm tree there? But once the ruler says do it, it is done, there's no debate. Much as you can say there is development without debate, generally people in those places have got no voice. Whether you like it or not you just take it. [But] Democracy is a debate, people argue. SA is one of the countries that puts this example in, perhaps at times, an exaggerated way. At times we debate over and over. But that is democracy. You can't go wrong."[1]

President Zuma's statement encapsulates what is presumed to be the difficulty of infrastructure development in the age of democracy. Despite his insistence that there are particular features inherent to the democratic order that thwart infrastructural development, this thesis suggests that failure is not inevitable. The organisations and engineers responsible for infrastructure development, through their historic autonomy from government, have adjusted to the changing prerogatives occasioned by the political transition of the 1990s. There have been significant changes in the challenges infrastructure projects face, between the 1980s and the 2010s, such as the changed financing climate, the greater clout of labour and environmental organisations, and the de-industrialisation of the 1990s. But the periodisation of these changes does not coincide with that of the transition from apartheid to democracy. The tale of Medupi, currently under construction by South Africa's national electricity utility Eskom, demonstrates that while difficult, such infrastructure projects are not doomed to failure. At the time of writing the completion of Medupi has been postponed by four years. But with two out of its six planned generating units already operational, it appears to be on track for completion. When it eventually operates at its full capacity the Medupi

[1] "Zuma's Message to Diplomats: This Is Democracy, Deal with It," *Daily Maverick*, October 18, 2016.

power station will be one of the world's largest power stations, with a generating capacity of 4800 MW. To place this amount in perspective, Kenya, the economic powerhouse of East Africa, had a total electricity generating capacity of 1916 MW in 2010 by World Bank estimates.[2]

The small town of Lephalale (previously called Ellisras) lies close to the South African border with Botswana and is an arid, remote and altogether unlikely setting for a power station of Medupi's size. However the location is less surprising when one considers that Eskom's Matimba power station, built during the 1980s, and the open cast Grootgeluk coal mine stand in Medupi's vicinity. In its totality, these developments constitute five decades of sophisticated engineering and massive investment by South Africa's state corporations towards creating the large technical systems (LTS) that Thomas Hughes has described.[3] I explore in this thesis the inner workings of a historic parastatal network that attained a developmental trajectory of its own, independent of government machinations. The network consisted of interconnected large technical systems. Due to its large-scale nature the large technical systems described here necessarily involve a mingling of the technical and political. They managed the political prerogatives of colonial and post-colonial governments by absorbing over-arching political prerogatives into its own inner workings.[4] Because of the "locked in" nature of the investment, in the sense described by Albert Hirschman, the interested parties have a vested interest in seeing the project to completion. [5] The fact that their activities encompassed various social and political facets meant that government had to play a facilitating role. The relationship between the government and the parastatals was at best one of mutual assistance and co-operation.

South Africa shares with other post-colonial African states the challenge of achieving inclusive development amid stark demographic and spatial economic inequality. The developmental burden has been a particularly pressing one for governments that sought to expand the fruits of infrastructure development outside of the enclaves. Colonial governments

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[2] The World Bank, "Turning the Lights on Across Africa: An Action Agenda for Transformation," *Sustainable Development Series*, p53. https://openknowledge.worldbank.org/bitstream/handle/10986/16623/769910WP0SDS0Energy0Box374393B00PUBLIC0.pdf;sequence=1.

[3] Thomas Parke Hughes, *Networks of Power: Electrification in Western Society, 1880-1930*, Reprint edition (Baltimore, Md.: Johns Hopkins University Press, 1993).

[4] Hughes, *Networks of Power*; Thomas Hughes, "Technological Momentum," in *Does Technology Drive History? The Dilemma of Technological Determinism*, ed. Michael L Smith and Leo Marx (Cambridge MA: MIT Press, 1994), 101–13.

[5] Albert O. Hirschman, *Exit, Voice, and Loyalty: Responses to Decline in Firms, Organizations, and States* (Harvard University Press, 1970).

in Africa directed infrastructure development to the resource exporting enclave, creating a political order that Fred Cooper has dubbed the "gatekeeper state".[6] Road and railway builders followed the well-worn paths that led from the sites of resource extraction- the mines or plantations- to the coastal ports for export to the European metropole. In South Africa the economic primacy of resource exports is encapsulated in Ben Fine and Zavareh Rustomjee's concept of the Minerals-Energy Complex (MEC).[7] They emphasise the inter-connected nature of the mining sector with the country's electricity network. I argue, however, that while it is true that the Minerals-Energy Complex drove much of South Africa's industrial development, the presumed hegemony of the MEC eclipses other, equally urgent, drivers of large technical systems. Parastatals worked to satisfy the requirements of the MEC but they also had their own institutional prerogatives to uphold. Thus they were not wholly or directly subservient to the demands of the MEC.

Following the Sharpeville massacre of 1960 the apartheid government confronted rising hostility to its racist order from the international community. The South African economy grew increasingly insular over the ensuing decades in response to the opprobrium. The decolonisation of neighbouring Southern African countries during the 1970s also forced the South African government onto the defensive. Due to its fear of foreign invasion it invested heavily in securing the country's borders. Technological prowess was an important weapon in the battle for national survival and the government allowed the parastatals a large amount of operational autonomy. The combination of autonomy and desperation endowed the parastatals with a high appetite for risk. Motivated by the need to attain national economic self-sufficiency the parastatals, in this case Iscor and Eskom, forged ahead with remarkable perseverance. They placed large technical systems in the form of power plants, mines and manufacturing plants across the countryside. The political context described above set the scene for Iscor's arrival in Ellisras. Driven by an ambitious plan to secure its coking coal supply, Iscor's engineers turned their attention to the expansive and largely untouched Waterberg coalfields during the 1970s.

I argue that in the case of Ellisras, state power was enacted through the engineers of the large technical systems, who became political agents in their own right. In light of Jeffrey Herbst's description of the uneven coercive capacity of the African state it is important to consider the

[6] Frederick Cooper, *Africa since 1940: The Past of the Present*, New Approaches to African History (Cambridge, U.K. ; New York, NY: Cambridge University Press, 2002).
[7] Ben Fine and Zavareh Rustomjee, *The Political Economy of South Africa: From Minerals-Energy Complex to Industrialisation* (C. Hurst & Co. Publishers, 1996).

local level configuration of politics.[8] In considering the relationship between politics and technology the techno-politics literature has demonstrated that despite some of the best rhetorical efforts of politicians, infrastructure is not politically neutral. Gabrielle Hecht, for instance, has described techno-politics as one among many other political instruments, operating for instance in the same vein as political party systems.[9] Similarly, in the Waterberg, the parastatals and the industrial networks they developed operated in techno-political ways. However, parastatal engineers should not be equated with state officials. Rather, parastatal engineers were nominally autonomous from the official organs of the state and mediated the state's presence in these regions. This is demonstrated across periods throughout the thesis, where the parastatals frequently enacted their infrastructural visions with only the reluctant consent of the government.

Techno-politics arguably became the main mode of governance from the late 1970s.[10] The apartheid government transformed its domestic economic and social policies in the aftermath of the student uprisings of 1976.[11] It adopted a new "language of legitimation,"[12] in a departure from the rigid ideological commitment to separate development earlier espoused by Prime Minister Hendrik Verwoerd. In this reformulation of authoritarian governance, the government approached its racial segregationist policies pragmatically to quell black protest. Antina von Schnitzler has described the government's efforts to depoliticise its interventions during this period through the material spread of infrastructural development. Neo-liberal ideas, that saw the African subject as a consumer began to filter into the policy thinking of the *verligte* government circles.[13] The Riekert Commission of 1979 urged government and industry to recognise the permanency of an urban African working class. But the Commission's recommendations proved unworkable when revolts in black townships intensified from 1984. Von Schnitzler argues that this political reform failed to prevent unrest in the townships because it continued to deny Africans political rights.[14] Thus attempts to encourage African stabilisation in urban areas, which emphasised decentralisation and local

[8]Jeffrey Herbst, *States and Power in Africa: Comparative Lessons in Authority and Control* (Princeton University Press, 2000).
[9] M.T. Allen and G. Hecht, *Technologies of Power: Essays in Honour of Thomas Parke Hughes and Agatha Chipley Hughes* (The MIT Press, 2001).
[10] Antina von Schnitzler, *Democracy's Infrastructure: Techno-Politics and Protest after Apartheid* (Princeton University Press, 2016).
[11]ibid.
[12]Deborah Posel, "Language, Legitimation and Control: The South African State after 1978," *Social Dynamics* 10, no. 1 (June 1, 1984): 1–16.
[13]von Schnitzler, *Democracy's Infrastructure*, 56.
[14]ibid, 63.

political autonomy, did not create the acquiescence government hoped for. I argue that the formal recognition of independent black trade unions in the early 1990s at the Matimba power station in Ellisras signalled a sea change in the nature of reform in the district. From the late 1980s the parastatals' unfettered drive for national economic self-sufficiency had begun to stumble. This period marked an important turning point in the history of South African parastatals, as public dissatisfaction with parastatals' levels of capital expenditure drew the era of heavy power station and steel manufacturing investment to a close. This investment had been based on mistaken demand forecasts. Iscor was wholly privatised and "unbundled" while Eskom escaped privatisation but underwent a process of far-reaching commercial reform. At the Matimba power station, independent black trade unions played an important role in negotiating the neo-liberal transition. They oversaw the gradual withdrawal of the paternalist regime of labour management to one in which the free market nominally prevailed. The techno-political project was thus refracted through a democratic prism that trade unions helped negotiate. It is however important to note that while the trade unions assisted in navigating the transition, labour relations assumed a life of their own. Along with the emphasis on stabilisation or the recognition of a permanent urban black population, demands increased for local development in a rural, peripheral region. Thus the large technical system had to absorb the pressure of racial transformation in a context of stark economic inequality.

Eskom's emphasis on cost cutting prevented any new capital investment until 2007, when the country's looming electricity supply crisis became apparent. In 2008, driven once again by desperation, Eskom began the construction of the Medupi power station in the Limpopo province and the Kusile power station in Mpumalanga. Medupi's completion has been tied in the popular imagination to the end of the country's electricity supply crisis and the resurgence of its economic growth. But its completion has taken longer than hoped, with Eskom constantly shifting the completion goalposts. The construction delay and cost overruns have raised the ire of opposition politicians, newspaper columnists and political commentators, who attributed the failure to the post-apartheid government's inability to prioritise technical efficiency. Critics argued that rent-seeking compromised Medupi's technical standards and curtailed its ability to become operational. In October 2015 Mmusi Maimane, the leader of the opposition party, the Democratic Alliance, wrote that:

> Corruption is one of the greatest enemies of our democracy and certainly not a victimless crime. The victims of this crime are millions of people who have been

> profoundly affected by the ANC's decision to get into bed with Hitachi[15] for personal enrichment. Medupi and Kusile have been plagued by cost overruns and delays, and Eskom is on record as having admitted that faults with Hitachi's boilers are the main reason for these delays. This has led to load-shedding, crippling tariff hikes and, ultimately, an economic slowdown that has cost thousands of South Africans their jobs.[16]

Against this background of the frustrated hopes that the Medupi power station embodies, I consider the conditions under which infrastructure projects are successfully developed in post-apartheid, democratic South Africa. Under the democratic order infrastructure developers have to manage the numerous expectations loaded onto the development of a multi-billion rand infrastructure project such as Medupi.

This thesis also considers the frailty of infrastructural and technological development and their proneness to failure. I argue that the scholarly field of science and technology studies (STS) has failed to effectively account for the interaction between the political prerogatives of state and that of technology or engineers. A significant limitation of the existing literature on science and technology studies is its failure to account for processes of technological change on the African continent. Scholars have treated the state analytically as a "black box", ignoring its role in technological development. By contrast the predominant image of infrastructural projects across the African continent is one of narrowly inclusive infrastructure geared towards the gatekeeper state.[17] Failure is attributed in large part to political interference that ranges from predatory patronage politics to misguided projects designed to serve political leaders' conception of "development".

Literature Review

Allure of infrastructure

Social anthropologists have demonstrated the multi-faceted nature of infrastructure projects, which encapsulate fantasies of transformation held by both their designers and the citizens who chance to engage with them. As such, they mean different things to different people, and

[15]Hitachi is the contractor responsible for manufacturing the boilers for the two power stations.
[16]Mmusi Maimane, "It's Our Job to Fight Corruption, No Matter What the Odds," *Daily Maverick*, October 5, 2015.
[17] Frederick Cooper, *Africa since 1940: The Past of the Present*, New Approaches to African History (Cambridge, U.K. ; New York, NY: Cambridge University Press, 2002); Herbst, *States and Power in Africa*; Walter Rodney, *How Europe Underdeveloped Africa* (Black Classic Press, 2011).

achieve a lasting autonomy from the original intentions of their designers.[18] While the allure of infrastructure has ebbed and flowed in global discourses of development, its appeal has grown as the driver of the economic growth in the 2010's. China's spectacular rise in recent years has seen the country's massive investment in infrastructure development that has drawn raw materials from mineral exporting countries all over the world. The World Bank has bemoaned the failure of infrastructure developments across the African continent. In 2010, it published a series of reports describing the dire state of Africa's "infrastructure deficit", concerned that the absence particularly of transport and communications infrastructure boded ill for the continent's economic growth. In 2012 President Jacob Zuma launched the Presidential Infrastructure Co-ordinating Commission (PICC) in South Africa. The PICC was to be directly controlled by the office of the Presidency avowedly to streamline the cumbersome bureaucratic processes that infrastructure development requires.

In South Africa large-scale construction projects also fulfilled a particular vision of transformation in a starkly differentiated social context characterised by high levels of inequality. In 1996, Mbeki first spoke of the country's "dual" economy, containing a first economy that is "modern" and a second economy in which people are unskilled and unemployable in the first. [19] Because of its tiered nature, a blanket and universal economic transformation policy would have unfairly benefitted those already advantaged members of the "first economy". For this reason, Gillian Hart writes, government considered the Expanded Public Works programme a more reliable pathway to poverty alleviation and upliftment than the Basic Income Grant (BIG). Expanding the network of public infrastructure was thus a suitable route to social development because it would improve service provision and because the construction work would create employment.[20] Job creation was an explicit prerogative of the Expanded Public Works Programme (EPWP) that began in 2003. But this was not a sustainable path to reducing unemployment because of the short-term nature of these construction projects, which generally relied on low-skilled labour.

[18] Brian Larkin, "The Politics and Poetics of Infrastructure," *Annual Review of Anthropology* 42, no. 1 (2013): 329.
[19] Gillian Hart, 'Post-Apartheid Developments in Historical and Comparative Perspective,' in Vishnu Padayachee, ed., *The Development Decade?: Economic and Social Change in South Africa, 1994-2004* (Cape Town, South Africa: Human Sciences Research Council, 2007).
[20] ibid.

African States and the Burden of Development

Ineffective social control is a profound problem for African states. Saul Dubow has described the apartheid regime as "autocratic" but not "totalitarian",[21] pointing to its inability to completely overpower autonomous institutions. In a similar vein, Nic Cheeseman argues that democratisation in Africa has a long historical pedigree, with "fragments of democracy" present during periods of "authoritarian" rule.[22] Drawing on Jeffrey Herbst, he attributes this to African rulers' "uneven" coercive capacity, which diminished as the distance from the state capital grew. [23] Where state presence reached the peripheral regions, state power was mediated by local actors. This is highlighted for instance in Catherine Boone's analysis of the roots of the differential distribution of state power, conditioned by the receptivity of local elites.[24] Rather than exerting a deliberate, hegemonic force, state power was transmitted in a halting, incremental manner. While African rulers at times harboured pretensions to totalitarian rule they were hamstrung by practical constraints to the exercise of control. In *Politics of the Belly,* Jean Francois Bayart writes:

> The majority of African politicians have, however, yearned for a total, well-policed State, not very different from the absolutist dreams of Campanella during the Renaissance. It should be said that up until now they have not achieved this ideal...[25]

State weakness and the failure of the transmission of state power in Africa are partly an infrastructural failure. Herbst describes the absence of road and communication networks linking the capital to the peripheral areas as a key constraint on the transmission of state power. [26] While technology and infrastructure have in some cases served as the handmaiden of authoritarian rule, South African historians have highlighted the constraints on the technological power of the apartheid state, of the failure of the technological systems it marshalled to implement control, and of the considerable autonomy engineers enjoyed from

[21] Saul Dubow, *Apartheid, 1948-1994* (Oxford: Oxford University Press, 2014), 120.
[22] Nic Cheeseman, *Democracy in Africa: Successes, Failures, and the Struggle for Political Reform* (New York, NY: Cambridge University Press, 2015).
[23] Jeffrey Herbst, *States and Power in Africa: Comparative Lessons in Authority and Control* (Princeton, N.J: Princeton University Press, 2000).
[24] Catherine Boone, *Political Topographies of the African State: Territorial authority and Institutional Choice*, Cambridge Studies in Comparative Politics (Cambridge, UK ; New York: Cambridge University Press, 2003).
[25] Jean-François Bayart, *The State in Africa: The Politics of the Belly* (London; New York: Longman, 1993), 261.
[26] Herbst, *States and Power in Africa*, 2000.

the dictates of the state.[27] These have exposed the limits of technology as an instrument of state power and the difficulties of the machine age.

These failures have a spatial character. Cooper suggests that both colonial and post-colonial states have struggled to extend the fruits of development outside the bounds of the resource exporting enclave. When Britain and France tried, during the period immediately preceding decolonisation, to re-make African societies in their own image, mass resistance forced them to retreat. Post-colonial governments inherited the burden of unfinished development. Their failure to ensure an egalitarian spread of development, both spatially and demographically, hastened the onset of authoritarian methods of rule to temper dissent in the neglected regions. Their duty was thus to retain a fragile and fractious political control while introducing some semblance of industrial development. This was a particularly crushing prerogative for the post-colonial Congo state. As Crawford Young has shown, industrialisation under the despotic rule of Mobutu sese Seko failed not for want of state investment, capital or political will.[28] It was rather a failure of the large technical systems he hoped would dramatically transform the Zairian economy. One of the grand testaments to his modernising project was the Inga dam hydroelectric Scheme, the construction of which began in 1968. He imagined that the dam would provide cheap electricity to emerging industrial plants, particularly an iron ore smelting plant situated at the mineral-rich borderland of the Katanga region. But the dam's construction difficulties led to massive cost overruns that were transferred on to the price of electricity, rendering it too high to attract a reliable clientele.[29] Since the main source of state revenue was copper exports, once copper earnings fell in 1974, so did the state's ability to keep afloat the mega projects it had initiated. The result was large-scale state indebtedness and the looting of established commercial and political institutions, as they fell to the predatory pressures of patronage politics.

The inability of the mega projects to fund themselves is related not only to the costs of the construction but also to the difficulties of finding customers to purchase the final product. Lack of consumer demand is a running theme through many of the descriptions of white

[27] Keith Breckenridge, *Biometric State: The Global Politics of Identification and Surveillance in South Africa, 1850 to the Present* (Cambridge University Press, 2014); Stephen Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town." (PhD Thesis, University of Michigan, 2012); Nancy L. Clark, *Manufacturing Apartheid: State Corporations in South Africa* (New Haven: Yale University Press, 1994).
[28] Crawford Young, *The Rise and Decline of the Zairian State: Crawford Young and Thomas Turner* (Madison: University of Wisconsin Press, 1985).
[29] Ibid., 301.

elephants littered across the continent, which epitomised the high modernist fantasies of post-colonial governments that "bigger was better". This is tied to the extent of inclusivity that the construction project allows. In the contemporary era the combination of "high modernism" and extensive exclusion is best exemplified in the case of Angola. The country comes close to Jean Francois Bayart's ideal type of "extraversion", a model in which elite hegemony is assured by virtue of its control of export revenues.[30] In 1979, Jose Eduardo dos Santos succeeded Agostinho Neto as the President of Angola having won the trust of fellow heavy weights in the ruling party (the MPLA) by his apparent lack of grandiose political ambitions.[31] Dos Santos has been in power ever since; the longevity of his rule assured by the steady flow of oil revenues. As d'Oliveira argues, in contrast to the relatively chaotic system of oil management of Nigeria, the MPLA has tightly controlled the Angolan oil trade. The hegemony of the oil sector is illustrated in the emergence of a "parallel state" centred on the sophisticated state-controlled oil marketing entity Sonangol. Sonangol is directly controlled by the office of President Dos Santos.[32]

This thesis is inspired by a rising tide in African studies that challenges the assumption inherent in the characterisation of African polities as "neo-patrimonial" and thereby dysfunctional, that governments act on purely utilitarian motives and disregard the valence of ideology.[33] In their study of African "illiberal state builders" William Jones *et al* describe the emergence of a form of government that relies on infrastructural prowess to assert its otherwise precarious control over the general population.[34] The authors write that: "high-modernist ideology underpins the belief that bureaucratic enclaves of excellence and huge infrastructure projects can qualitatively reconfigure domestic political-economic systems."[35] Rwanda, Ethiopia, Angola[36] and Sudan[37] are grouped into this category because they all emerged from prolonged periods of civil war to the authoritarian rule of the military victors. The governments in these countries uphold enclave development by a combination of coercion and co-option. For instance, the MPLA's strong party structure and its tight control

[30] J.-F. Bayart, "Africa in the World: A History of Extraversion," *African Affairs* 99, no. 395 (April 1, 2000): 217–67.
[31] Ricardo Soares de Oliveira, *Magnificent and Beggar Land: Angola Since the Civil War* (London: C Hurst & Co Publishers Ltd, 2015), 33.
[32] ibid., 44.
[33] Thandika Mkandawire, "Neopatrimonialism and the Political Economy of Economic Performance in Africa: Critical Reflections," *World Politics*, 2013, 1–50.
[34] Will Jones, Ricardo Soares de Oliveira, and Harry Verhoeven, "Africa's Illiberal State-Builders," *Working Paper Series* (Refugee Studies Centre, Oxford University, 2012).
[35] ibid., 6.
[36] d'Oliveira, *Magnificent and Beggar Land.*
[37] Harry Verhoeven, *Water, Civilisation and Power in Sudan* (Cambridge University Press, 2015).

of oil revenues, which it distributed to a few strategic allies, allowed it to temper dissent outside of the developed enclave. A heavy police force protects the lavish enclave of Luanda from the rural poor. The exclusionary ethic goes hand in hand with the securitisation impulse of authoritarian rule and allows the Angolan government to ignore the "burden of development" altogether. In addition, the persistent stream of oil revenues meant that the elite conflict Robert Bates describes as following the drying up of mineral export revenues, has not occurred.[38] In Bates's formulation, elite conflict typically took the form of regional fragmentation or in the case of Rwanda in 1994, tragic fragmentation on ethnic lines.

The Minerals-Energy Complex in South Africa

South Africa has been equally vulnerable to the developmental challenges of the resource dependent economy and exhibits certain key features of the 'gatekeeper' state. Fine and Rustomjee describe South African infrastructure as having developed to serve the interests of the Minerals-Energy Complex (MEC).[39] This idea assumes its explanatory power from the fact that gold exports have historically constituted the lion's share of the country's export earnings, allowing the treasury to maintain a stable balance of payments. This stability enabled the importation of specialised machinery to support the country's industrial and agricultural sectors. The South African government also levied extra charges on the gold mines to subsidise commercial agriculture and manufacturing.[40] Mineral exports thus played a foundational role in the diversification of productive activities in the South African economy. For Fine and Rustomjee, South Africa's manufacturing sector remained dependent on mining capital for its survival. Manufacturing exports largely consisted of beneficiated raw materials.[41] I do not attempt to refute the hegemonic role of the mining sector in the historical development of the South African economy or its role in encouraging the electricity network to meet its needs. Rather I consider the other, occluded consequences of parastatal activities and their development of large technical systems.

Systems-builders

One defining feature of the term "infrastructure" that is used here is that its normal operations are hidden from view. Infrastructures are "embedded" or "sunk into other structures, social or

[38] Robert Bates, *When Things Fell Apart: State Failure in Late-Century Africa* (Cambridge: Cambridge University Press, 2008).
[39] Fine and Rustomjee, *The Political Economy of South Africa*.
[40] Charles H. Feinstein, *An Economic History of South Africa : Conquest, Discrimination, and Development* (Cambridge ; New York: Cambridge University Press, 2005), 106.
[41] Bill Freund, "The Significance of the Minerals-Energy Complex in the Light of South African Economic Historiography," *Transformation: Critical Perspectives on Southern Africa* 71, no. 1 (2010): 3–25.

technical"[42]. Only during times of breakdown do their inner workings become visible and targets of public consternation.[43] Infrastructure is also a complex "system" in which the technical is intertwined with the socio-economic organisational structures necessary to ensure its effective functioning.[44] Paul Edwards provides a typology of infrastructure that distinguishes "systems" from "networks". Networks are "linked systems" that are composed of the various systems necessary for the technological development. While systems are characterised by strong centralised control, networks are more diffuse and are "co-ordinated" rather than "controlled". For instance a "system" could describe a power station or power company while a "network" would refer to the inter-connecting electricity grid.[45]

This concept of infrastructure utilises elements of Thomas Hughes's classic description of the large technical system, as one containing an inter-connected web of parts that combines the social and technical. Hughes's seminal contribution to scholarly understandings of the history of technology was to dissolve the dichotomy between the human and technical and focus instead on their mutual shaping. The idea that technological developments were enacted through systems development challenged the idea that technological artefacts operated in isolation. In this sense the collectivism imbued within the systems building technology differed fundamentally from the conception of pre-war technological development, which is classically posited as the province of the lone inventor fortuitously befriended by a visionary financier.[46]

In particular, I borrow the idea of "technological momentum" from Hughes's formulation of large technical systems. Technological momentum arises when the technological system is insulated from social and political pressures to a sufficient degree. It is more commonly found at the latter stages of a system's development as the system reaches a technologically normative status. This is demonstrated in the growth in standardisation of the system which enables it to potentially dominate other technological networks. Paul Edwards describes the idea of technological momentum as follows:

[42] Susan Leigh Star and Karen Ruhleder, "Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces," *Information Systems Research* 7, no. 1 (March 1, 1996): 111–34.
[43] ibid.
[44] Paul N. Edwards, "Understanding Infrastructure: Dynamics, Tensions, and Design," Final Report of the workshop, *History and Theory of Infrastructure: Lessons for New Scientific Cyberinfrastructures*, 2007, 6.
[45] Ibid., 12.
[46] The story of James Watt and the steam engine epitomises this classic image: F. M. Scherer, "Invention and Innovation in the Watt-Boulton Steam-Engine Venture," *Technology and Culture* 6, no. 2 (1965): 165–87.

> Eventually, competing networks must convert to these standards, find ad hoc ways to connect nonstandard equipment with them, or else die out. Standards reduce the risk to manufacturers and the cost to consumers, thus increasing the dominant system's overall momentum.[47]

Thus standards or translatability are a key component of the network's ability to achieve a momentum of its own. The idea that engineers and technologists are "system-builders" emphasises the intricate economic and social web that holds the technological network in place. Hughes' idea of the "reverse salient" emphasized its patchwork, iterant quality as opposed to a seamless, efficient web of technological flows.[48] Thus "technological momentum" was constantly negotiated and actively upheld by those responsible for its maintenance.

The prevailing rhetoric among the engineers interviewed for this thesis is of dogged determination to successfully complete the infrastructure projects despite seemingly insurmountable obstacles. I suggest that this tenacity is a function of the "locked-in" feature of the large-scale investment that infrastructure development requires and this is sufficient in itself to ensure a large amount of "technological momentum". The tenacity of the engineers is a product of the fact that once the wheels are set in motion, reversing is a highly undesirable option. Thus one of the main characteristics of infrastructure projects is that by virtue of their heavy capital investment, there are few available "exit" options, in the sense that Albert Hirschman describes.[49]

Another characteristic of infrastructure is its capital intensive and consequent high-risk nature.[50] Two contradictory images inform our understanding of infrastructure development on the African continent. On the one hand, they contain the gleaming promise of modernising transformation and on the other are plagued by delay, cost overruns, and the wastage of scarce resources. To some extent the disillusionment is a natural consequence of infrastructural development all over the world. In a recent book on mega-projects, Brent Flyvbjerg *et al* identify a disjuncture between the immense faith placed in the power of these projects as instruments of socio-economic transformation, and the high levels of failure and

[47] Paul N. Edwards, "Infrastructure and Modernity: Scales of Force, Time, and Social Organization in the History of Sociotechnical Systems," *Modernity and Technology*, 2002, 199.
[48] The "reverse salient" is discussed in more detail in Chapter Three.
[49] Hirschman, *Exit, Voice, and Loyalty*.
[50] Bent Flyvbjerg, Nils Bruzelius, and Werner Rothengatter, *Megaprojects and Risk: An Anatomy of Ambition* (United Kingdom ; New York: Cambridge University Press, 2003).

cost overruns associated with their actual construction. The promise of mega-projects, the authors argue, is to reduce the constraints of time and space with the ultimate aim of achieving a "frictionless capitalism". Flyvbjerg elsewhere adopts the definition of "mega-projects" used by the United States Federal Highway Administration, as a project of public interest that costs more than $1-billion.[51] The initial project appraisals of mega-projects are over-optimistic in part due to the difficulty of predicting success and in part to present an appealing picture to prospective investors.[52] Thus the frequent cost overruns stem from initial cost under-estimates. But once investors are on board, they are "locked-in"[53] because the costs of turning back and scrapping the project in its entirety would be higher than the cost of cutting losses and proceeding against the odds.

Systems-builders assumed a particular political role in the context of the Cold War. Hughes notes that the US government, during the administration of President Lyndon Johnson, encouraged the spread of systems theory outside its traditional bounds in the military, as a mechanism of governance to resolve problems of social welfare and urban infrastructural design. This gave rise to a hierarchical method of urban management which saw the rise of city engineers like Robert Moses, who was later criticised for his authoritarian approach to infrastructure development.[54] Puzzled by the political impediments they encountered, engineers like Moses attempted to bypass them completely in pursuit of technical efficiency.

This idea of science and technology as being the premise of the sophisticated "expert", who ignores the wealth of knowledge formed by the layman, raises the question of popular and democratic participation in scientific practice. Langdon Winner suggests that items of technology contain within them particular modes of political operations.[55] In discourses of environmental conservation for instance, there emerged the idea that centralised, fossil fuel generated energy systems gave rise to autocratic politics. By contrast, renewable sources of energy were considered to be potentially more inclusive and democratic, because their small scale nature made them more amenable to decentralised ownership. While not disputing that technological artefacts and the arrangement of the technical systems carried a particular politics of their own, Winner forwarded a weaker case for their determinant role. He also

[51]Bent Flyvbjerg, *What is a megaproject?* Blog post, http://flyvbjerg.plan.aau.dk/whatisamegaproject.php
[52] Flyvbjerg, Bruzelius, and Rothengatter, *Megaprojects and Risk*, 43.
[53] Hirschman, *Exit, Voice, and Loyalty*.
[54] Thomas P. Hughes, *Human-Built World: How to Think about Technology and Culture* (Chicago; London: University of Chicago Press, 2005).
[55] Langdon Winner, "Do Artefacts Have Politics?," in *The Social Shaping of Technology* (London: Open University Press, 1985), 120–36.

evokes the classic case of Robert Moses, the engineer responsible for much of the design of the public infrastructure in New York City, as illustrative of the fact that technological systems are imbued with the political ideologies of their designers, which in the end outlast them. Winner writes of Moses that, "Many of his monumental structures of concrete and steel embody a particular social inequality, a way of engineering social relationships among people that after a time becomes just another part of the landscape."[56]

In a later article he criticised a group of scholars he collectively dubbed "social constructivists", concerned with "opening the black box" of technological artefacts to examine the social basis of its construction. [57] In particular Winner criticised their tendency to render the social and technological indistinguishable, arguing that this overlooked the political effects of the technological systems. Paul Edwards suggests that the controversy is a product of the different vantage points of the analysts. Adopting a micro-level scale of analysis, he argues is bound to generate faith in the causal effect of incremental, contingent actions from "users" but also one can assume, those responsible for maintaining the network. On the other hand, macro scales of analysis emphasise the dominance of the technological network over human endeavours while exposing for instance their vulnerability to the destructive forces of nature.[58]

The rise of systems theory coincided with the rise of the faith in authoritarian modernisation that governments across the world adopted as the engine of development. But it grew discredited as the atrocities of the Vietnam War became apparent because of its association with the military industrial complex. Hughes writes that:

> This distrust of government and technology focused not only on military technology but on large-scale technology in general. Hierarchy, bureaucracy, and governance by experts fell into disfavour.[59]

Hughes argues that the reformed "postmodern" approach to systems development was more diffuse and characterised by its "layered" and "horizontal" leadership.[60] Across the globe, the top-down nature of the rule of experts fell out of favour at the same time as authoritarian

[56] Langdon Winner, "Do Artefacts Have Politics?" *Modern Technology: Problem or Opportunity?* 109, no. 1 (1980): 124.
[57] Langdon Winner, "Upon Opening the Black Box and Finding It Empty: Social Constructivism and the Philosophy of Technology," *Science, Technology, & Human Values, Vol. 18, No. 3 (Summer, 1993), 362-378.*
[58] Edwards, "Infrastructure and Modernity."
[59] Thomas P. Hughes, *Rescuing Prometheus: Four Monumental Projects That Changed Our World* (New York: Vintage, 2011).
[60] ibid.

modes of governance in general, laying the ground for the shift towards deregulation and democratisation during the late 1980s and 1990s.

Techno-politics

As the techno-politics literature has demonstrated, engineers and technologists by nature of their work act in a particularly political manner. Importantly this literature has encouraged an analytical focus on the power of material objects. Antina von Schnitzler suggests that technological artefacts are a "political terrain" for the enactment of local politics. She recounts the introduction of pre-paid electricity meters to poor black South African households that were first designed for working class homes in Britain. [61] As a "travelling technology", the pre-paid electricity meter transverses "ethical regimes", and assumes different political connotations within the particular context in which it operates. The focus on the material basis of politics encourages a consideration of local level political configurations. Mucha Musemwa, for instance, convincingly demonstrates the importance of control over water infrastructure to the governing power of colonial and post-colonial municipal governments in the Zimbabwean city of Bulawayo.[62] Andrew Barry argues that rather than a top-down process of rule "the 'macro' political order of the state, in the neo-liberal era in particular, is built up from a complex network of localised technical practices and devices."[63] The technological and material give rise to political controversy and debate.[64] These peculiar "assemblages" in themselves constitute the political.

But there are important limits to the generalizable nature of the link between materials and the political configurations they encourage. For instance, Timothy Mitchell has recently forwarded a case for "carbon democracies", an idea that links the type of mineral mined to the type of polity that emerges over time.[65] Mitchell's central argument is that coal dependent economies are more likely to lead to democratic government while oil-rich countries more commonly encourage authoritarian systems of governance. His argument for materiality however rests on the particular organisation of labour required to extract coal and required to

[61] Antina Von Schnitzler, "Travelling Technologies: Infrastructure, Ethical Regimes, and the Materiality of Politics in South Africa," *Cultural Anthropology* 28, no. 4 (November 1, 2013): 670–93.
[62] Muchaparara Musemwa, "Early Struggles over Water: From Private to Public Water Utility in the City of Bulawayo, Zimbabwe, 1894–1924*," *Journal of Southern African Studies* 34, no. 4 (December 1, 2008): 881–98.
[63] Andrew Barry, *Political Machines: Governing a Technological Society* (A&C Black, 2001), 12.
[64] Andrew Barry, *Material Politics: Disputes Along the Pipeline* (John Wiley & Sons, 2013).
[65] Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (Verso, 2011).

extract oil. The underground nature of coal mining grants workers more autonomy in their daily operations and creates strong dissident networks with a greater power to disrupt the production process. By nature of its extraction process however, oil fails to afford workers the same subversive power. The linkage of the material to the political is thus mediated by the role of workers whose functions in turn are dependent on the nature of the extraction process. However, Mitchell fails to account for the effect of coal extraction methods other than underground coal mining. For instance, open-cast coal mining promotes a fundamentally different form of labour organisation to of underground mines. Thus the equation of material to political system is difficult because of numerous intervening factors which could just as easily shift the political trajectory in a separate direction to the one supposed. In this thesis, I demonstrate that trade union activity has shaped the political role of labour. This coincided with the admission of black trade unions into collective wage bargaining processes during the early 1990s at the Matimba power station. The power station's managers and engineers were not in constant opposition to the demands of labour and their relationship was characterised by compromise as well as conflict. In France, where Hecht has detailed debates surrounding the development of nuclear power stations during the 1960s, scientists and engineers gained their political clout in large part from their public image as harbingers of reason and rationality. Their ability to engage in reasonable and measured tones was considered a key attribute of the democratic citizen so that engineers were important agents of nation-building. [66] Their ability to mesh the political with the technical arose from their role as "systems-builders," which allowed engineers to legitimately make political interventions in their own right.[67] This mingling of social and technical roles is not necessarily a peculiar feature of the latter twentieth century. Rather it is the legitimation of the all-encompassing role of the scientist or engineer that was a particularly novel feature of the Cold War period.[68] This thesis emphasises the organisational distinction between the state and the parastatals. This distinction complicated the political role that the parastatals played because their particular organisational prerogatives at times contradicted those of the state.

Security imperative of the 1960s

In South Africa the apartheid government geared infrastructure development to secure the country against threats from within and without its borders. Against the backdrop of the Cold

[66] Gabrielle Hecht and Michel Callon, *The Radiance of France: Nuclear Power and National Identity after World War II* (Cambridge, Massachusetts: MIT Press, 2009), 301.
[67] Ibid.., 53.
[68] Timothy Mitchell, *Rule of Experts: Egypt, Techno-Politics, Modernity* (Berkeley: University of California Press, 2002), 15.

War, the government aligned itself with the Western powers and boasted of the country's particular technological ability to keep communist elements in Southern Africa at bay. Predictably, the South African government spurned involvement in pan-African forums. Hecht and Edwards have highlighted the fallacious bases of South Africa's claim to scientific excellence on the global stage, particularly in its ambitions of nuclear exceptionalism.[69] Apartheid's rulers appreciated the power of technology as a mechanism of Afrikaner advancement along the path towards full sovereignty,[70] and following the Sharpeville massacre of 1960, prioritised the protection of white rule at the southernmost tip of Africa. Prime Minister Hendrik Verwoerd, dubbed the "architect of apartheid", rose to power in 1958 and wholly embraced the possibilities of technology for effective rule over the black majority.[71] Verwoerd's rule coincided with the general acquiescence of the organisations of scientific research such as the Centre for Scientific and Industrial Research (CSIR), which was set up under the government of Prime Minister Jan Smuts in 1945. The first apartheid Prime Minister, DF Malan, assured the CSIR once he assumed office that the government would respect its independence provided it adopted a "South African colouring". This implied that the CSIR would have to place the country's interests before those of any other. With institutions of scientific research toeing the Afrikaner nationalism line, Dubow writes that:

> By the end of the 1970s science and technology were firmly invoked in support of an ideology of modernising techno-nationalism which ensured that white—and particularly Afrikaner—intellectual prowess was celebrated as a key weapon in the fight against communism and African nationalism.[72]

To meet the security imperative of nation-building and the economic imperative of self-sufficiency, the apartheid government focussed on publicly-funded, infrastructure development, the depth and vigour of which has been only cursorily discussed in the existing literature.[73] During the 1960s the government invested heavily in public works and earmarked R4-billion, an enormous sum for its time, to expand the operations of Iscor, Eskom, and Sasol. It also directed these funds towards the much vaunted Orange River

[69] Paul N. Edwards and Gabrielle Hecht, "History and the Technopolitics of Identity : The Case of Apartheid South Africa," *Journal of Southern African Studies* 36, no. 3 (January 1, 2010): 619–39.
[70] Ibid..
[71] Saul Dubow, *A Commonwealth of Knowledge : Science, Sensibility, and White South Africa, 1820-2000* (Oxford ; New York: Oxford University Press, 2006).
[72] Ibid.., 258.
[73] ibid, 259.

Project, which was modelled on the United States' Tennessee Valley Authority.[74] Public works projects traversed the territorial breadth of the country, and Iscor's engineers identified strategic "growth points" to situate their plants. The development of the town of Ellisras and the Grootgeluk coal mine, which I discuss in the first and second chapters, is rooted in this period of significant public works investment.

In prioritising security in the context of the Cold War, the apartheid regime found common cause with the then embattled colonial forces of neighbouring Southern African countries. In Mozambique, the Portuguese colonial government's fears of rural insurrection informed the development of the Cahora Bassa hydropower project in the early 1970s. The Portuguese colonial government agreed that part of the electricity generated by the dam would be transmitted to South Africa in return for South Africa's aid in controlling the anti-colonial forces of Frelimo. As Allen and Barbara Isaacman write, the dam's designers adopted a particularly authoritarian stance. The dam changed the river's historical ebb and flow patterns and the traditional cultivation methods of the peasants living alongside the river collapsed. In addition, peasants living alongside the river were moved without compensation and re-settled in the "strategic villages," which the colonial government had encouraged as a counter-insurgency measure.[75] Insensitivity to local residents should thus be read in the context of an entrenched colonial suspicion of the African populace. South Africa's power in the region was to a large extent exercised through its infrastructural prowess. In this regard, South African parastatals were an important political entity in their own right as key players in the negotiations between South Africa and neighbouring countries. For instance, Eskom's role in negotiations between Frelimo and Renamo in the 1990s was lauded in parliamentary debates at the time.[76]

Science and Technology in South African governance

In the early part of the twentieth century, infrastructure development played an important part of the white government's ability to enact its rule over the African majority. Control over infrastructure was vested in the powerful- the government, state corporations, and businesses- and was largely divorced from any imperative to uplift the majority of the black and impoverished populace. This white monopoly over the control of science and technology was

[74] P. F. Palmer, "Gold and South African Economic Development," *Economic Inquiry* 2, no. 2 (March 1, 1964): 142–55.
[75] Allen Isaacman, "Displaced People, Displaced Energy, and Displaced Memories: The Case of Cahora Bassa, 1970-2004," *The International Journal of African Historical Studies* 38, no. 2 (January 1, 2005): 215.
[76] Hansard, May 10, 1992, col 8685.

reflected in the segregationist system of education and skills development. Schools and universities excluded black students from scientific education. Renfrew Christie's argues, in his study of the historical development of Eskom, that electricity allowed industrial corporations to mechanise its operations and reduce their reliance on labour-intensive methods and thus on the demands of black labour.[77] Infrastructural development was particularly influential in the agricultural sector. The extension of the railway network into the country's interior during the early twentieth century revolutionised the speed in which farmers could deliver their crops to the market and enabled the "reconstruction of Highveld agriculture".[78] As the century wore on successful commercial farmers invested in agricultural machinery, such as ploughs and threshing machines, to reduce their dependence on African labour. But mechanisation carried its own risks, conditioned by the significant capital investment it required. This led to a crisis in white agriculture during the 1980s when an unexpected rise in interest rates adversely affected farmers' ability to repay the loans that had financed their purchases of agricultural equipment.

Technological instruments often proved unwieldy to those who sought their assistance to implement control. Deborah Posel places the apartheid government's "mania for measurement" to transform and control the population at large, within the broader global context of faith in the power of state driven initiatives. [79] But the apartheid state's control was far from absolute, and the technological systems it employed were at times prone to breakdown. Failures, when they occurred could be catastrophic. This is illustrated in the tale of Prime Minister Hendrik Verwoerd's panopticon administrative system, the *bewysburo,* during the 1960s.[80] The failure of the system lay partly in the manifold techniques ordinary people used to bypass its control. As a result the system never gained legitimacy in the minds of its users, and this is an important reason for the discrediting of high modernist interventions more generally. Stephen Sparks argues that the rhetoric of the "apartheid modern" consistently propagated the idea of the country's technological successes, rarely admitting to its failures. He also argues that the supposedly hegemonic and efficient "techno-modernity" was bolstered by a political reality in which Africans provided the cheap labour.[81]

[77] Renfrew Christie, *Electricity, Industry, and Class in South Africa* (London: Macmillan in association with St. Antony's College, Oxford, 1984), 3.
[78] Timothy Keegan, *Rural Transformations in Industrializing South Africa: The Southern Highveld to 1914* (Johannesburg: Ravan Press, 1986).
[79] Deborah Posel, "A Mania for Measurement: Statistics and Statecraft in the Transition to Apartheid," in *Science and Society in Southern Africa*, ed. Saul Dubow (Manchester: Manchester University Press, 2000), 116.
[80] Breckenridge, *Biometric State*.
[81] Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town," 9.

Cheap black labour underwrote the apartheid government's peculiar technological success, where it was successful, throughout the twentieth century.

Parastatals' early history

South African corporations tended towards large-scale operations and became particularly concentrated during the 1950s.[82] For Fine and Rustomjee the MEC overpowered independent, small-scale producers, illustrating the oligopolistic nature of South African industry. As nationalised entities the parastatals enjoyed legal protection of their monopoly status. But they struggled at first to achieve market dominance over private steel manufacturers and electricity producers in the early part of the twentieth century. Under the guidance of Hendrik van der Bijl, who Clark has termed "South Africa's economic czar"[83], parastatals only realised their full might during the Second World War. The wartime conditions of constrained imports and straitened supply allowed parastatals to realise the benefits of scale in their operations and achieve a market monopoly. While they operated as a parallel, state owned network, Nancy Clark argues that parastatals resembled corporations in the private sector because both had to obey the country's racially based segregationist laws. Working within the Nationalist Party's vision of racial segregation parastatals adopted a particular operational model, which Clark suggests, was the only way that industry could operate. Common features included their desire for monopoly control of markets and the supply of raw materials; the preference for remote rural areas to avoid militant black union activity; and the fact that their operations were highly mechanised to ensure that the work force was split between a minority of (white) technicians and a majority of unskilled (black) workers.[84]

Parastatals and the state

Bill Freund suggests that the apartheid state was a successful developmental state, achieving the "embedded autonomy"[85] necessary for industrialisation.[86] First coined by scholar Peter Evans, the term describes the optimal combination of state guidance and industrial autonomy

[82] D. Innes, *Anglo: Anglo American and the Rise of Modern South Africa* (Johannesburg: Ravan Press, 1984); Feinstein, *An Economic History of South Africa : Conquest, Discrimination, and Development*, 91.
[83] Clark, *Manufacturing Apartheid: State Corporations in South Africa*, 117.
[84] Clark, *Manufacturing Apartheid: State Corporations in South Africa*; Nancy L. Clark, "The Limits of Industrialisation under Apartheid," in *Apartheid's Genesis, 1935-1962*, ed. Philip Bonner, Peter Delius, and Deborah Posel (Johannesburg: Witwatersrand University Press, 1993), 65–95.
[85] Peter B. Evans, *Embedded Autonomy: States and Industrial Transformation*, Princeton Paperbacks (Princeton, N.J: Princeton University Press, 1995).
[86] Bill Freund, "A Ghost from the Past: The South African Developmental State of the 1940s," *Transformation: Critical Perspectives on Southern Africa* 81, no. 1 (2013): 86–114.

necessary to achieve economic development.[87] Freund argues that South Africa contained a circle of technocratic elites who worked effectively to achieve high levels of technological success, such as in the sophisticated spheres of national electrification, steel manufacturing, and coal-to-fuel processing. The importance of "embedded autonomy" is further illustrated by Harry Verhoeven in his study of the Merowe dam hydropower project in Sudan, which fell short of its grand ambitions to supply electricity to the country's borderlands. Verhoeven suggests that part of the reason for the failure was that the institutions responsible for the dam's construction lacked the "benign embedded autonomy" characteristic of institutions in developmental states.[88]

Nancy Clark's in-depth study of parastatals reveals that they displayed a distinct autonomy from government from their inception. At times they were openly defiant. For instance, van der Bijl disregarded government's command to increase the levels of white employment by employing cheaper black migrant workers in place of more expensive white workers.[89] He also continued to encourage foreign capital investment despite government's rhetoric of ridding South African industry from the shackles of imperial capitalism. But the parastatals also gradually drifted into a relationship of compromise with government and with the private sector; an alliance in which each party felt their interests were suitably served. Saul Dubow notes that Hendrik van Eck, who succeeded van der Bijl at the helm of parastatals in 1948 was rumoured to have a direct telephone line from his office at the Industrial Development Corporation (IDC) to the office of Verwoerd.[90]

Fine and Rustomjee suggest that the 1970s saw the triumph of the Nationalist Party's (NP) strategy to gradually inject an Afrikaner character into the historically English complexion of the South African private, corporate sector. Combined with the inter-penetration of the parastatals with private capital, this boosted "post-war" industrial growth in the country.[91] It also allowed for the collaborative development of such ambitious and capital intensive infrastructure projects as the Sishen-Saldanha railway line, which aimed to bolster the country's port and rail capacity for mineral exports. Nonetheless the extent of collaboration should not be overstated. It is important to recognise the institutional distance between the parastatals, the private sector and the government. There was an identifiable boundary

[87] Evans, *Embedded Autonomy*.
[88] Verhoeven, *Water, Civilisation and Power in Sudan*, 254.
[89] Clark, *Manufacturing Apartheid: State Corporations in South Africa*, 70.
[90] Dubow, *A Commonwealth of Knowledge : Science, Sensibility, and White South Africa, 1820-2000*, 251.
[91] Fine and Rustomjee, *The Political Economy of South Africa*, 185.

between them, which at times took the form of meshed prerogatives and at other times of open opposition.

It is also important to recognise that "embedded autonomy" was not the permanent state of parastatals under the apartheid regime. Clarke's study is largely concerned with the period up to the 1960s with only cursory mention of the period from the 1970s until the end of apartheid. The condition of relative autonomy was not unique to South Africa during this period. In many parts of the world the particular Cold War context of modernisation and nationalisation meant that technologists all over the world were elevated as agents of nation building and given free rein in the sense that government provided the legislative and political muscle to facilitate their activities. In the 1970s a greatly changed global funding climate, caused mainly by the oil crisis of 1973, affected parastatal activity. On paper parastatals were meant to be self- financing, which meant that they had to raise money on the foreign loan market. But they relied, all too frequently perhaps, on government bail-outs in times of heavy indebtedness. Even though the parastatals enjoyed government patronage, there were limits to the amount the public purse could tolerate. The limits of public support were exposed in the late 1980s, when government considered the privatisation of parastatals in a bid to appease public dissatisfaction.

While security imperatives drove much of the infrastructure development of the 1960s and 1970s, by the 1980s, the South African government under the leadership of President PW Botha shifted gear in an attempt to endow apartheid with new respectability. This meant spreading the benefits of infrastructural modernisation beyond the narrow confines of the white populace. Nationalist leaders sought a radical transformation of the apartheid concept, altering the "language of legitimation" in a bid to mask the controversial politics of segregation that animated the movement from its inception.[92] This model of development followed a classical "techno political" path, promising a better quality of life through an infrastructural development that was rhetorically shorn of its political motivation to quell black discontent.[93]

[92] Dubow, *Apartheid, 1948-1994*.
[93] von Schnitzler, *Democracy's Infrastructure*.

Infrastructure and neo-liberalism

On one level infrastructure development by its nature contradicts the dictates of neo-liberal wisdom.[94] Competition, a fundamental anchor of the neoliberal system,[95] is not necessarily desirable because of the large-scale and capital intensive nature of infrastructure projects. Competition is likely to result in duplicated capacity and wasted resources. During the 1980s the model of nationalised infrastructure development driven by state corporations fell out of favour in many countries around the world. Growing fiscal strains drew an irate public gaze to the operations and management of those state corporations responsible for infrastructure provision. In the United Kingdom, critics of state corporations argued that the post war system of nationalised infrastructure development was supply heavy. This resulted in the proliferation of large infrastructure projects that couldn't pay for themselves because of a lack of consumer demand. [96]

The tendency of infrastructure projects towards monopoly conditions and their aversion to competition has prohibited the widespread privatisation of state owned entities. In his study of an urban heating system in a small town in post-Soviet Russia, Paul Collier observes that the World Bank, generally considered a key institutional propagator of neo-liberal theory, agreed that the state had to continue to provide heating. He writes that:

> Critical scholars have been transfixed by the image of rapacious multinationals sweeping in to reap profits from infrastructure privatisation in poor countries while essential services go unmet. However well or poorly this image conveys what actually happens after privatisation, the simple fact is that such privatisations have been surprisingly rare.[97]

While the mechanisms through which infrastructure was delivered and funded changed, utilising elements from the "neoliberal toolkit", such as unbundling and indebtedness, the state retained the ultimate responsibility for heating the city's households.

This peculiar feature of infrastructure development as tending towards monopoly control is illustrated by the remarkable proliferation of construction cartels across the globe. These

[94] David Harvey, *A Brief History of Neoliberalism* (Oxford University Press, 2007), 67.
[95] Michel Foucault, *The Birth of Biopolitics: Lectures at the Collège de France, 1978--1979*, Reprint edition (Picador, 2010).
[96] Marvin and Graham, Splintering networks,' Olivier Coutard, *The Governance of Large Technical Systems* (London; New York: Routledge, 1999), 151.
[97] Stephen J. Collier, *Post-Soviet Social: Neoliberalism, Social Modernity, Biopolitics* (Princeton University Press, 2011), 243.

cartels have proven easy bedfellows with unsavoury groups. In 1987 a commission of enquiry in New York exposed the deep penetration of the Italian mafia, the Cosa Nostra, into the construction industry. Their relationship of patronage dated as far back as 1922.[98] The mafia gained its leverage from their infiltration of labour unions, which allowed it to control the construction process. In India, the UK and Holland competition commissions have taken construction companies to task for collusion. In South Africa the most surprising aspect of the Competition Commission's 2013 investigation into the construction industry was that it had taken so long to occur. This particular investigation centred on the collusive practices of South African construction companies during the 2010 World Cup stadium construction, but by all indications collusion was a systemic and long-running practice in industry. In 2013, the editor of the *Business Day* at the time, Peter Bruce, defended collusion as a necessary hedge against risk. Because of the capital intensive nature of infrastructure projects, he argued, the cost of risk and unpredictability was intolerably high. Thus collusion encouraged a degree of stability. Bruce wrote that:

> The fact is that much of the world's industrial economy has been built by cartels, some secret and many tolerated. Sometimes it is impossible not to collude or, put another way, sometimes collusion may be in the national interest.[99]

There is thus a strong sense that infrastructure development requires monopolistic conditions for its survival. In the neo-liberal era of competition where monopolies are undesirable, corporations co-operate in a manner that reinforces stability. The infrastructural network tends to unite the otherwise disparate parts into a coherent whole.

It is important to keep in mind that in many countries, including South Africa, privatisation of state corporations did occur. Corporations were "unbundled" or split into their different operating units and those deemed suitable for a competitive market were sold to private investors. In many cases, privatisation has been partial. Recent scholarship has highlighted the persistence of centrally controlled infrastructure provision that nonetheless adopts some of the "unbundling" mechanisms associated with neo-liberal ethics. James Ferguson for example, describes the use of the "neoliberal toolkit" to deliver social welfare ends in his study of social welfare in South Africa.[100] The key challenge to infrastructure development in

[98] Selwyn Raab, "Many New York Builders Accept Mafia Willingly, State Unit Says," *The New York Times*, September 9, 1987.
[99] "Thick End of the Wedge: What Were Construction Firms Thinking?," *Business Day*, July 15 2013.
[100] James Ferguson, "The Uses of Neoliberalism," *Antipode* 41 (January 1, 2010): 166–84.

the age of neo-liberalism has thus been its ability to keep intact the various forces necessary for its success despite the separation of the network into its constituent parts. Technological advancement has assisted in improving coherence, at least in the world of information technology. Paul Edwards argues that the information age has enabled the greater coordination of increasingly decentralised and disparate items. [101]

In 1996 the ANC adopted its Growth, Employment and Redistribution (Gear) policy, which assumed a distinctive neo-liberal complexion. In the years that followed, influential government officials discouraged state intervention in the economy as a matter of principle. But this changed to some extent during the 2000s. Gillian Hart has described a shift away from the tenets of Gear in the annual budget of 2001, towards "a more interventionist stance in infrastructural development, industrial policy and labour market concerns.[102]Thus by the time of the construction of the Medupi power station, the state had re-asserted itself. This is demonstrated, for instance, in the government's encouragement of the Expanded Public Works Programme (EPWP), which encouraged infrastructure development in a bid to decrease unemployment.

I argue that the technocratic rule of experts has not fundamentally declined in prominence during the neo-liberal era. For David Harvey, neo-liberal systems rely heavily on technocrats and are characterised by a mistrust of democratic participation.[103] Andrew Barry's work on technological zones suggests that the rule of experts has not changed in intensity, although perhaps in form. [104] Technological zones have bound the "experts" across the conventional borders of the nation state and created a common set of rules and regulations. For Barry, the state exerts a partial hold, fulfilling at best a regulatory function, because capitalism pre-supposes an increased geographical and social mobility. Thus "neo-liberal" government is fundamentally shaped at the local level through the interaction of people and things. [105]

Chapter overview

Chapter One describes the forces driving Iscor's entrance to the Waterberg in the context of an apartheid government that sought to legitimate its existence through techno-political means. As a nominally autonomous institution Iscor was motivated by the need to protect the

[101] Edwards, "Understanding Infrastructure: Dynamics, Tensions, and Design."
[102] Gillian Hart, 'Post-Apartheid Developments in Historical and Comparative Perspective.'
[103] Harvey, *A Brief History of Neoliberalism*, 66.
[104] Barry, *Political Machines*; Andrew Barry, "Technological Zones," *European Journal of Social Theory* 9, no. 2 (May 1, 2006): 239–53.
[105] Barry, *Political Machines*, 12.

country's coal reserves from the wiles of the global market, having absorbed the government's prerogative of ensuring national self-sufficiency. The material appeal of the Waterberg coal reserves was in turn a product of a particular configuration of political and economic factors.

Chapter Two discusses the territorial transmission of state power from the capital to the border region of Ellisras. Iscor's autonomy from government meant that one of the purposes of infrastructure development- transmitting state power over a given territory- was mediated by the parastatals and their engineers. Thus the extension of the state's tentacles was not as straight forward as might have been supposed. If Iscor's engineers are considered the guardians of the infrastructure network, they gained legitimacy through the material benefits their activities promised. This won over the otherwise recalcitrant elites in the Ellisras district.

Chapter Three describes Eskom's development of the Matimba power station in Ellisras. Eskom was driven to the Waterberg by concern over air pollution, as the Eastern Transvaal became saturated with air pollution from its pre-existing power stations in the region. Driven by the political imperatives of self-sufficiency and national security, Eskom's engineers had a high risk threshold. This allowed them to overcome the otherwise stringent barriers to entry of infrastructure development in the Waterberg. There existed a degree of coherence between the foreign specialised firms and local subsidiaries which had faded at the time of Medupi's construction. This period has been dubbed "the golden age of power generation" and the local manufacturing industry for power station parts was at its height.

Chapter Four describes the Matimba power station's absorption of the imperatives of the democratic and neo-liberal transition of the 1990s. The conventional periodisation of neo-liberalism, generally thought to have arrived during the late 1980s, does not coincide with the reality of privatisation on the ground. At a national level, pressure groups resisted the "unbundling" of Eskom, and the consequent fragmentation of the network because of the effect this might have on Eskom's ability to supply electricity at the low prices necessary to ensure its affordability to poor households. Privatisation did however effect a different conception of power station development, one that favoured commercial reform in the direction of cost saving. At the Matimba power station the imperative of transformation was tied to that of professional autonomy. This autonomy is an essential component of the engineering profession.

Chapter Five discusses the transformation of the labour situation in Lephalale, which like other parts of the country saw a gradual transition from a migrant labour system to one where "stabilisation" was the chief imperative. Stabilisation during the 1980s in Lephalale is illustrated most clearly in the creation of the black township Marapong. It argues that the arrival of independent black trade unions signalled a fundamental transformation in the balance of power between workers and managers at least at the Matimba power station. From the early 1990s independent black trade unions assisted in the negotiation of the terms of the democratic transition at the power station. The new power station manager at Matimba introduced bargaining forums in 1992 that enabled direct consultation with trade union representatives.

Chapter Six describes the construction of Medupi, which began in 2007, after years of deliberation over the fate of Eskom. Because of the near twenty year time lag between the construction of Medupi and the construction of Eskom's last power station, the construction network had to be resuscitated from a long lethargy to face unprecedented challenges. Medupi's overseers have faced the challenge of keeping together the disparate forces necessary to render the infrastructure development possible. For instance de-industrialisation in the South African economy since the 1980s has caused a distinctive shortage of artisanal skills. Those workers skilled in intricate artisanal tasks rotated continually between the country's major infrastructure projects. But the presence of skilled workers from outside of Lephalale has pushed against the impetus for localisation and the demands of local Ellisras residents for development. The transition from the migrant labour system to a more settled and stable workforce particularly in the township of Marapong meant that local residents had a greater claim on the opportunities for upliftment. The "burden of development" has increased the expectations loaded onto the successful working of the infrastructure project.

Methodology

This thesis uses a combination of oral and archival sources to reconstruct the historical events in question. I have consulted the National Archives of South Africa, which is a depository of records from various tiers of government, from the local to the national. These archives contain a rich collection of Iscor's records and I have drawn on the minutes of its board meetings from the 1970s and various correspondences between the corporation, government and various economic organisations in the country. However, Eskom has not deposited the bulk of its historical records in the National Archives. I thus had to seek special permission from Eskom to examine its archives, which are housed at its headquarters in Megawatt Park.

I also received permission to access the record collection of the Matimba power station in Lephalale. This permission was granted on condition that Eskom review the chapters in which the archival material was cited before they were publicly disseminated. These chapters, which are Chapters Three, Four and Five, have met with Eskom's approval and they have not requested that I alter them in any way. I also made consulted roughly 600 newspaper articles from various national publications.

Archival records are by their nature scattered, consisting of disparate documents. My challenge has thus been to piece together a narrative where the link between the events detailed in various documents is not entirely clear. For assistance with this task I have relied on the recounting of events from engineers and residents of Lephalale who had first-hand knowledge of the events in question. These have included engineers from Iscor who were responsible for setting up the Grootgeluk coal mine, residents of Lephalale who recalled the transformation in the town during the second half of the twentieth century, and engineers employed by the Matimba power station. Interviews were generally conducted with a view to gaining the life history of the interviewees. In some cases, due to time constraints, I restricted the discussion to events that directly pertained to the activities of Iscor and Eskom in the Waterberg. The majority of these interviews took place during periodic field trips to Lephalale in 2014 and 2015. In some cases I returned for follow-up interviews to request clarification or further explanation. I discovered that in the main oral sources complemented rather than contradicted the archival evidence.

The discussion of the construction of the Medupi power station in Chapter Six does not draw heavily on interview material. Rather it is primarily based on court cases and about 300 newspaper articles. I avoided interviews for this discussion because the complex nature of Medupi's construction means that there are as many view points as there are people. In addition its fraught public image has meant that the key agents were generally cautious about discussing events at the power station. The advantage of Medupi's controversial nature is that the media coverage of its progress has been extensive and the archive vast. The media coverage in general suffers from the limitation that the journalists generally work for Johannesburg-based publications and travel sporadically to Lephalale and the Medupi power station. I have drawn on these articles to reflect the progression of events over the years, including interviews with managers at Eskom who have been responsible for Medupi. The latter have been particularly helpful because they reflect facts that Eskom's managers are comfortable to place in the public record and so carry some veracity. Newspaper reports have

thus provided a sense of the various corporation's intentions as they changed over time and a useful chronology of actual events.

A note on terminology

The town of Lephalale, where my research is based, was originally called Ellisras. Its name changed in 2002. I use the name Ellisras in my discussion of historical events before the name of the town was changed and Lephalale for events thereafter.

Chapter 1: Iscor and the Grootgeluk Coal Mine

Introduction

This chapter discusses Iscor's search for coking coal, a desperate quest which saw its engineers travel across South Africa's northern *bushveld*, beckoned by the underground riches of the Waterberg coal fields. Iscor's activities in the Ellisras district during the 1970s encouraged Eskom to build the Matimba power station there during the 1980s. The developments of these large technical systems in the late apartheid era set the stage for the construction of the Medupi power station decades later. This chapter demonstrates that the development of large technical systems was conditioned not directly or wholly by the demands of Minerals-Energy Complex[106] but by the apartheid government's desire to realise its vision of national self-sufficiency. As a nominally autonomous institution, Iscor absorbed this prerogative into its own inner workings and oriented its activities accordingly. This chapter also highlights Iscor's difficulty with forecasting national supply and demand of raw materials in a context of public sector financed infrastructure projects rather than consumer demand. As the privatisation debate of the late 1980s would demonstrate, Iscor and Eskom's tendency to over-estimate the demand for raw materials both globally and domestically had catastrophic impacts on their financial stability.

Iscor's quest for coking coal became an urgent one during the late 1960s and 1970s, the golden age of state-led infrastructure development. At the same time the government emphasised expanding the scope of the country's mineral exports outside of the traditional ballast of gold to include coal and iron ore. Diversifying mineral exports was a lucrative source of export revenue for the government but it also threatened the security of the coal supply for domestic consumers such as Iscor. Iscor managed these conflicting government imperatives by starting the Grootgeluk coal mine. In so doing, Iscor's engineers displayed a remarkable degree of tenacity. This tenacity was conditioned by two factors. Firstly, unexpected obstacles proved ultimately surmountable because Iscor was "locked in" to the project through its large capital investment. This ensured that retreat was more expensive than persistence. Secondly, Iscor had imbibed the ideal of national self-sufficiency as an organisational ethic and this motivated its engineers to forge ahead.

The Waterberg, the site of Iscor's sought after coal reserves, was a relatively sparsely populated region for much of the twentieth century. Its hot and arid environmental conditions

[106] Fine and Rustomjee, *The Political Economy of South Africa*.

prevented easy habitation. In her discussion of the region's mythological connotations, Isabel Hofmeyr describes its distinctive topographical features that separated the district from the rest of the Highveld in the popular imagination of Afrikaner settlers. As Hofmeyr writes: "…White settlers were attracted by its 'fictions' of being 'the ideal theatre of manly adventure, of great endeavours and the possibility of princely wealth'." A mountain range ran along its south west border rendering the Waterberg an isolated district that became known as the "zone 'behind the mountain'".[107] Hofmeyr traces this perception of isolation and separation to the 1850s. The Waterberg thus became home to renegade pioneers, to those white settlers striving to escape the clutches of the rudimentary state power exercised by the Zuid-Afrikaanse Republiek (ZAR) in the Transvaal. In some cases, the Waterberg was a place of refuge for those escaping the servitude of tenant labour in more densely populated agricultural regions. The reason that Iscor's engineers ventured to this far corner of the South African countryside, which had acquired a desolation of mythic proportions, is the subject of this chapter.

As discussed in the Introduction, the relationship between the South African government and the parastatals closely approximated an ideal state of "embedded autonomy" under apartheid.[108] In this case Iscor's founding engineer Hendrik van der Bijl and his prodigal successor Hendrik van Eck drove the direction of the parastatals' development while staying in close contact with government officials. Van Eck, in particular, gained the trust of government by supporting its policy of "industrial decentralisation".[109] Industrial decentralisation was intended to encourage industrial development outside of the main urban centres and across the geographical breadth of the South African countryside. The autonomy he enjoyed was thus conditioned by the government's faith in his commitment to satisfy the needs of the national interest.

The mid-60s to 1976 were the heydays of public sector investment in South Africa. Fixed investment by the government and public enterprises increased from 45% of total investment in 1963 to 53% in 1976 before plummeting to 27% by 1991.[110] Charles Feinstein attributes these changes in public sector investment to the spending behaviour of the state corporations, particularly Sasol, Iscor and Eskom. . Government-encouraged parastatal spending during the

[107] ibid, p11.
[108] Freund, "A Ghost from the Past."
[109] Saul Dubow, *A Commonwealth of Knowledge : Science, Sensibility, and White South Africa, 1820-2000* (Oxford ; New York: Oxford University Press, 2006), 251.
[110] Feinstein, p221

1960s, was targeted at the sectors most likely to suffer from international sanctions. The parastatals, especially Iscor and Eskom, spearheaded the country's industrialisation and modernisation campaign in the face of international hostility that intensified after the Sharpeville massacre of 1960. Following South Africa's withdrawal from the Commonwealth in 1961, the records of parliamentary debates reveal a palpable anxiety among members of parliament over the country's appeal to foreign investors.[111] Nonetheless the government's strategy of nation-building through state driven industrialisation soon bore fruit. A year later certain members of parliament praised the government for investing in Eskom, Iscor and Foskor, and the role those entities played in stimulating economic activity within the private sector.[112] Government continued to proclaim the virtues of state-directed planning and in 1966 the Prime Minister Hendrik Verwoerd announced the establishment of the Department of Planning and Coordination. In this conception of governance and development, economics and scientific progress were considered crucial measures of the country's prosperity.[113] Co-ordinated planning was to inform the country's regional development. The Prime Minister stated in 1966 that:

> In the sphere of physical planning no fewer than 15 different regions and larger areas are being surveyed at the moment so that the diverse types of development taking place within any specific area can be properly co-ordinated. Never before in South Africa, and in few countries in the world, has so systematic and creative an attitude been adopted as is being adopted in the Republic at present.[114]

Under the guidance of van Eck, the parastatals enjoyed a substantial degree of autonomy from government in expanding their infrastructural scope across the country. The threat of international sanctions against South Africa, which loomed large during the 1970s, forced the government to come to terms with its creeping isolation. The idea of economic self-sufficiency became the mantra within government circles and its technocratic personnel assumed the mission to make South Africa industrially competitive with great urgency. The oil crisis of 1973 further underlined the need to reduce the country's dependence on imported oil, encouraging the state-sponsored coal-to-oil initiative of Sasol. But these imperatives of increased mineral exports and economic self-sufficiency were at odds with each other.

[111] Hansard, March 23, 1961, col 3591
[112] Hansard, May 18, 1962, col 5939
[113] Hansard, January 15, 1966, col 74-75
[114] ibid., col 75

Diversifying Exports

In the 1970s the prospects for the gold mines, the basis of the country's economic prosperity for centuries began to falter after almost a hundred years of consistently positive performance.[115] The costs of production rose as miners were forced to mine at deeper levels. But the price of gold remained high during the 1970s. Feinstein writes that:

> …While the price of gold was rising during the 1970s it seemed to many that the Republic was entering a new era of growth and prosperity. But when the price plunged downwards after 1980 the illusion was shattered. The engine which had once driven the whole economy forward so vigorously had clearly stalled.[116]

Tasked with interrogating the future of the country's economic prosperity, the Reynders Commission of 1972 concluded that import substitution industrialisation had run its course. [117] The Commission argued that there was a limited scope for further development of light industry and significant structural constraints to the manufacture of complex goods. Feinstein argues that the government rejected the one possible option that would promote manufacturing: termed "inward industrialisation", this required the development of a black consumer market. Since encouraging an equitable income distribution across racial barriers defied the precepts of apartheid, it settled on the only alternative: increasing the scope of the export market by emphasising minerals outside of the scope of gold, particularly coal and iron ore.

In their definitive work on the nature of South African industrial development, Ben Fine and Zavareh Rustomjee attribute the frenzy to increase mineral exports to the strategic manoeuvring of key players within the Minerals-Energy Complex, and particularly those that constituted the Transvaal Coal Owners' Association. They suggest that the efficiency of the massive infrastructure development intended to ease the passage of minerals for exports- railway line, ports and harbours- was testament to the greater coordination between the government and the private sector. This in turn was a result of the erosion of the boundary between English and Afrikaner capital that had previously manifested in a tight division between the Afrikaans dominated public sector and the English dominated private sphere. By the 1970s, following concerted efforts at capital accumulation, Afrikaner businessmen had

[115] Feinstein, *An Economic History of South Africa : Conquest, Discrimination, and Development*.
[116] ibid, 202.
[117] ibid, 192.

diluted the hold of English business in the country's capital concentration, ensuring that the NP-led government enjoyed a better working relationship with those in control of capital.[118]

But this picture of a seamless coordination between government policy and those in industry with the capital and technical know-how to implement this policy fails to account for the contradictions that arose within each party's organisational aims. This chapter demonstrates that the co-operation between Iscor and government was an uneasy one. The relationship was conditioned in large part by financing, particularly in convincing government to contribute state funds when Iscor was unable to source the required funds from its own reserves. When Iscor was ready to proceed with the Grootgeluk coal mine in the mid-1970s, its internal funding sources had dried up. But the financing constraint at the time was not strong enough for Iscor's engineers to fully restrict their projects and activities in the pipeline.

I argue that the ultimate development of the Grootgeluk coal mine was made possible by the peculiar historical context of the 1970s. Iscor was caught between the twin governmental imperatives of achieving economic self- sufficiency and diversifying the country's mineral exports. To fulfil its mandate of acting in the national interest by promoting the country's steel manufacturing capacity, it required a steady supply of one of its core raw inputs: coking coal. But the government's drive to diversify mineral exports encouraged privately owned collieries to gear their production for global export, so threatening the security of supply for domestic consumers such as Iscor. This peculiar combination of factors created the conditions for the exploitation of the Waterberg coal reserves. This was a high-risk and thus costly decision because of the dearth of supportive infrastructure in much of the Waterberg, which contained no other coal mine.

The Development of the Grootgeluk Coal Mine

The Grootgeluk coal mine was a product of an ambitious expansion plan that Iscor's managers drew up in 1968. As part of the expansion plan, and in a bid to ease the transport of iron ore from its Sishen mine in the Northern Cape to the port of Saldanha Bay for export, Iscor built the Sishen-Saldanha Bay railway line. But the collapse of global demand for iron ore at an unpropitious time meant that the Sishen-Saldanha Bay railway line did not deliver the expected profits, forcing its managers to stall the remainder of the projects in the pipeline. It also forced Iscor's managers to pay closer attention to its ability to survive in a global market governed by the fickle movement of supply and demand. In addition, as separate

[118] Fine and Rustomjee, *The Political Economy of South Africa*.

financial entities from the government, parastatals relied on foreign loans to fund their operations. But the international financial market suffered from a severe downturn in the 1970s in large part due to the oil crisis of 1973. Thus Iscor was forced to consider more closely the use of planning models to better survive the market as a result of its straitened finances. The World Bank reared its head here, as it did in other developing countries during this period, encouraging Iscor to utilise computer driven models of market planning developed by World Bank engineers.[119] This evangelical spread of science and technology was intended to encourage forms of thinking compatible with democratic participation and to contribute to the creation of a rational citizenry.[120]

This chapter is also an attempt to understand the nature of industrial and engineering activity under the apartheid regime. Iscor attempted to develop a viable and profitable steel industry and diversify away from an otherwise easy reliance on mineral exports. But during the 1970s the government emphasised the continued importance of income from raw material exports and forced the country to diversify its mineral exports. This interfered with Iscor's plans to increase its steel production, but did not scupper it completely. Iscor's engineers demonstrated a remarkable goal-oriented tenacity encouraged, at least in part, by the same anxiety that drove the Afrikaner nationalist movement elsewhere in the country. The relationship between the government and Iscor in this case can be characterised as one of negotiation and compromise rather than parastatal subordination to government decisions.

One of the preoccupations of the existing historical studies of parastatals is the importance of ethnicity, and these often position the English-dominated private sector against the Afrikaans-dominated public sector. Iscor had historically sourced its coking coal from collieries at the Witbank and Natal coalfields. But in the 1960s Anglo-American began to buy up more of these, particularly in Natal. The encroachment of the Oppenheimer group had already raised concern when it formed the Highveld Steel and Vanadium Company in direct competition with Iscor. It is tempting to point to the ethnic factor, in terms of the Afrikaner right's antipathy to English businessmen although the evidence is not quite conclusive. Tim Cross has demonstrated the persistence of the ethnic divide. In the late sixties P.W Hoek, a member of the *Broederbond* and Iscor's commercial manager, launched an investigation into

[119] M.T. Allen and G. Hecht, *Technologies of Power: Essays in Honor of Thomas Parke Hughes and Agatha Chipley Hughes* (The MIT Press, 2001).
[120] ibid.

monopoly in the steel market with the consent of Prime Minister Hendrik Verwoerd.[121] The resultant Hoek report contained a scathing indictment of the Oppenheimer group and called for the dissolution of its Anglo-American empire. The *Broederbond* feared that the Oppenheimer group threatened its policy of separate development through "economic integration" and by thwarting the entrance of Afrikaners into the commercial world in sufficient numbers.[122] Since the report was only ready after Verwoed's death, it was received by his successor BJ Vorster in 1968. Vorster refused to dismantle the Oppenheimer Empire, making enemies within the *Broederbond* in the process and aligning himself more clearly with the more liberal, *verligte* camp that was then on the rise. Cross suggests that Iscor's refusal to partner with Anglo to form Highveld Steel reflects the continued dominance of ethnic concerns during this period, although bar the coincidental presence of Hoek in both organisations, he presents no definitive documentary evidence. It is difficult to draw any general conclusion about the influence of ethnicity here, considering that Iscor had a few years earlier partnered with Anglo-American in acquiring General Mining.

Engineers, Tenacity and Nation-Building

The tenacity of Iscor's engineers played an important part in the ultimate development of the Grootgeluk coal mine. Accounts of tenacity by engineers are too ubiquitous to be attributed solely to the personality characteristics of the individuals in question. Tenacity appears to have been conditioned by a particular institutional culture within Iscor at the time that one of its engineers Joe Meyer attributed to the nature of Afrikaner nationalism during this period. Meyer was one of the founding engineers of the Grootgeluk coal mine and served as its manager for decades. He described the difficulties faced by Iscor's engineers as follows:

> We had to make a difference at a time when a lot investment was done in the steel industry with always a shortage of funds. Engineering creativity was the order of the day. We could stretch a Rand a long way…We had challenges- we had huge challenges at Thabazimbi, and that made us persevere, *vasbyt*, in a way that you can't believe so that the country could grow. Most of the development in the country was done on the iron ore from Thabazimbi mine through to steel at the Pretoria Steel Works. I mean in those days the people came from the farms after the Rinderpest, it was just after the

[121] Tim Cross, "Afrikaner Nationalism, Anglo American and Iscor: The Formation of the Highveld Steel & Vanadium Corporation, 1960–70," *Business History* 36, no. 3 (1994): 81–99, doi:10.1080/00076799400000076.
[122] Serfontein J. H. B, *Brotherhood of Power: An Expose of the Secret Afrikaner Brotherhood*. (Rex Collings ltd, 1979), 177.

second world war, people just wanted to improve their conditions again, to stabilize after a very challenging time where a lot of people lost everything they owned."[123]

The poverty of Afrikaners in the countryside in the first decades of the twentieth century, channelled into the relatively cohesive Afrikaner nationalism of the NP endowed those state organs responsible for economic development with a peculiar ethic of desperation. Fairly regular international relations shocks over the ensuing decades compounded this institutionally-embedded anxiety, fuelling the perpetual fear of the survival of the white race in the southernmost tip of the African continent.

The implications of the changed international climate dominated parliamentary debates during this period. Fears of South Africa's creeping isolation were apparent in talk of an alliance that was brewing between Arab oil producing states and certain African countries within the Organisation of African Unity (OAU). Opposition Members of Parliament blamed apartheid's racist policies for what they considered to be an unnecessary international animosity. The Minister of Economic Affairs reassured them that South Africa's technological prowess would enable it to retain a position of strength despite the unpopularity of the apartheid regime.

> With South Africa's vast uranium resources and advanced techniques, we are in a position to play a very important role in the development and establishment of new energy resources for the world, and let me assure you that the outside world is aware of this…But the making of contributions in the technical and scientific spheres is not limited to the exploitation of uranium in South Africa. Our advanced development has enabled us to co-operate with and grant assistance to numerous states in the technical and scientific spheres, states not only in Africa but also in Latin America and the Middle East.[124]

Technical and economic self-sufficiency was intended to buffer South Africa against international hostility while ensuring the longevity of the apartheid regime.

Iscor and the Engineers

Iscor encouraged the development of white engineers and offered its employees numerous opportunities for their professional development. The corporation also offered university

[123] Interview with Joe Meyer, March 17, 2015, Onverwacht.
[124] Hansard, 6 Feb 1974, col 219

scholarships to aspirant engineers, thus to some degree overcoming class-based barriers to entry. An engineer employed by Iscor, Joe Meyer, recalled having to walk long distances each day barefoot between his primary farm school and the farm hostel in which he resided as a child. A shortage of classrooms at the school meant that the teaching for two of his classes was conducted in the open air, under the shelter of trees. After successfully completing his secondary schooling, he enrolled at the University of Pretoria to study civil engineering after working hours. The University of Pretoria had such a program at that time. But without the financial means to see his degree to completion, he approached Iscor for a bursary to fund his last two years. Iscor however, was only concerned with developing mining, electrical, mechanical, metallurgical, electronic, chemical and industrial engineers, who were the backbone of the mining and steel industry, and awarded bursaries accordingly. Despite queuing in an intimidating waiting room before the interview and watching applicants depart empty handed, Meyer insisted, that he preferred to study civil engineering during his bursary interview. Eventually, Iscor agreed to fund his third and fourth year of study in civil engineering. He later acquired a Mine Manager's Certificate of Competency at the Department of Minerals and Energy. Meyer subsequently became the Mine Manager at the Thabazimbi Iron Ore Mine, roughly 140 kilometres south of Ellisras, and at the Tshikondeni Coal Mine before he was appointed to the position of General Manager at the Grootgeluk coal mine.

Michael Deats's parents were unable to afford university tuition fees when he completed high school. His mother was employed as a short hand typist and his step father a motor mechanic. Calling on the largesse of a wealthy uncle from Potgietersrus, his parents secured a loan for his first year of study at the University of the Witwatersrand. During his second year, the bursary he received from the diamond mining corporation, de Beers, determined his choice of mining engineering as the branch of engineering he would specialise in. As a newly-graduated mining engineer he worked for de Beers for two years. He was subsequently transferred from de Beers' Kimberley mine to its Premier mine close to the town of Cullinan. Distraught at the working conditions there - "they treated me very poorly, roughly, cruelly," he said[125] - he left de Beers to work at Iscor's iron ore mine in Thabazimbi.

While Iscor generally promoted Afrikaans-speaking staff in the interests of Afrikaner upliftment, Deats's story demonstrates that being English-speaking was not an

[125] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.

insurmountable obstacle to succeeding in the engineering ranks. When he first began work at the Thabazimbi iron ore mine, he was surprised at the thoroughly Afrikaans culture of the place and was forced to become adept at the language during the course of the seven years that he spent at the mine. Following his time at Thabazimbi, he worked at the Iscor-owned Durban Navigation Colliery where he implemented a mining technique known as longwall coal mining, during the early 1970s. An innovative technique in South Africa at the time, longwall coal mining encouraged the greater mechanisation of coal mines. This made his name within the organisation and by his own admission Deats became the "doyen of coal mining" in the country. He was later promoted to the position of Iscor's head of mining, earning him a seat on its Management Board. Thus in some cases performance proved stronger than ethnicity in determining the movement of personnel through the ranks.

Nation-Building during the 1960s

The exploitation of the Waterberg coal field was part of Iscor's government-approved expansion programme that began in 1969. As part of the plan, the industrial hub of the Van der Bijl Park Works was expanded and the Newcastle steelworks constructed. The expansion programme appeared to rest on a solid domestic demand for steel. Organised commerce complained of a shortage of steel in the 1970s. A letter from the Transvaal Chamber of Commerce in 1973 described the situation as dire, and the shortage of steel a structural problem that had last been brought up just three years earlier in 1970. The steel shortage was combined with a general labour shortage at the time, which rendered downscaling production difficult because workers could not easily be dismissed. As a result, production costs continued to mount while production plants idled.[126]

As part of its grand expansion plan, Iscor intended to increase its steel manufacturing capacity not just to satisfy the demand of South African industrialists but also to increase its steel exports. A research report prepared by the Iscor Market Research Team in 1968 is instructive in its insight into the parastatal's perception of the international steel market.[127] The report discussed the impact of the Kennedy Round negotiations held between 1964 and 1967; a multilateral negotiating forum intended to foster international consensus on import protection and "free trade". But the United States had disregarded its prior promises to limit its protectionist measures and import tariffs, giving rise to a chorus of protest from its trade

[126] Letter from IG Murray, Director of Transvaal Chamber of Commerce, to SL Muller, Minister of Economic Affairs, Aug 14, 1973; National Archives of South Africa (hereafter referred to as NASA), MES 242 H4/12/2.
[127] "The World Steel Industry: Part II" (Iscor Market Research, June 1968); NASA, MPP 43 A3/10/9.

partners in Western Europe and Japan. The American iron and steel industry was at the time in decline, explaining the country's reluctance to reduce its own protectionist measures.[128] The global steel market was experiencing the beginning of an over-supply crisis that would reach its apogee in 1980. The condition of over-supply had become apparent in 1964, leading to calls for greater international co-operation. South Africa was firmly positioned in the anti-communist bloc by its membership of the International Iron and Steel Institute, which was chaired by Dr Hans-Gunther Sohl, a prominent steel manufacturer under the Nazi regime.[129] South Africa was a small fish in this pond and received little mention in accounts of the global steel industry.[130] Nonetheless Iscor was determined to export its steel. According to the agreements reached during the Kennedy round negotiations, preferential treatment was afforded "developing countries", which included South Africa. A report prepared by Iscor's research division highlighted the need for industry to take advantage of these concessions by improving its export performance.[131] The rapid expansion of steel exports was also thought to fit with the recommendations of the Reynders' Commission of the early 1970s.[132]

By satisfying the growing domestic demand for steel, Iscor also hoped to prevent the country's dependence on steel imports. This would defend it against "dumping" by other steel manufacturing countries. Dumping was a particularly controversial trick. It has at times been dubbed "economic colonisation", because those countries with surplus capacity exported steel at lower prices than the receiving country's domestic steel market, so destroying its steel manufacturing capacity. Nancy Clark has demonstrated that one of Hendrik van Eck's early victories during the foundational years of Iscor was to defend against the dumping of steel by European manufacturers. This momentum was established during the Second World War when the economies of Western Europe were inward-focused and South Africa had to rely on its own production capacity for manufactured goods. The parastatals, Iscor, in particular, rose to their full glory particularly because they over-powered the private sector and assumed their place as the driver of the South African steel industry.

One of the most concrete ways in which parastatals enacted the government's political aims was through the policy of industrial decentralisation. Industrial decentralisation was touted by

[128] Yves Mény, Vincent Wright, and Martin Rhodes, *The Politics of Steel: Western Europe and the Steel Industry in the Crisis Years (1974-1984)* (Walter de Gruyter, 1986), 128.
[129] "The World Steel Industry: Part II."
[130] Mény, Wright, and Rhodes, *The Politics of Steel*.
[131] "The World Steel Industry: Part II."
[132] Feinstein, *An Economic History of South Africa : Conquest, Discrimination, and Development*.

the government as a means of keeping whites on the land and preventing the depopulation of the countryside. When the Minister of Economic Affairs announced in parliament in 1969 that the town of Newcastle in Natal would house Iscor's new Steel Works operation, he stated that, in choosing the site, attention was paid to the "wider social and developmental requirements within the framework of the government's policy."[133] The "government policy" he referred to was that of encouraging industrial development in rural areas. In Newcastle the presence of an established white community was an important motivating factor. Other factors were more self-evident, such as the availability of transport infrastructure, water, power and labour and the long term future of steel exports. But the most telling part of this arrangement was that political factors were one among many other economic and technological factors that Iscor had to consider in its operations.

Saldanha Bay

As part of government's broader emphasis on diversifying mining exports, coal and iron ore became crucial raw materials for the export market. Iscor took charge of the development of the railway line from its Sishen iron ore mine in the Northern Cape to Saldanha Bay, the deepest natural port in the country. But by 1979, as Hansard records demonstrate, opposition party members in parliament were arguing that the investment in the Sishen-Saldanha railway line had been wasted and the Minister of Economic Affairs agreed.[134] In defence, he explained that the railway line had seemed feasible in 1960s when analysts predicted high global demand for South Africa's mineral exports. But these predictions were drastically undermined by the unexpected oil crisis of 1973, which curbed global demand for iron ore. The difficulties of predicting global demand for iron ore was echoed a decade later in a report by Iscor engineer Ben Alberts, one of the founding engineers of the Grootgeluk coal mine. Alberts argued that the South African iron ore export market was an instance of bad planning:

> The entire forecast process is risky, especially if an attempt is made to forecast a world demand that is subject to political and economic developments in different parts of the world … The history of the iron-ore market bears witness to the influence of over-optimism, uncoordinated planning, the economic situation in the world, and

[133] Hansard, 16 May 1969, col 6133
[134] Hansard, June 19, 1979, col 9256-7.

consideration of only some of the factors that will influence the demand for iron and steel.[135]

A brief discussion of Saldanha Bay is intended here to highlight the over-optimism embodied in the government and Iscor's bid to expand its mineral exports.

In 1970 excitement over the forecast for Japanese steel demand caused South African iron ore mines to expand their production for export. A large amount of political goodwill was built around the development of the Saldanha Bay area as an economic growth point. Letters from the Cape Midlands Development Association are instructive in this regard. In a memorandum the Association wrote that "one of the main reasons for the persistence of the Saldanha Bay scheme is that a new growth point must be established in the Saldanha Bay area to give work to the growing number of Coloured citizens in the future."[136] The Bantu Commissioner for the Eastern Province had decided that all 'bantu" had to be removed from the Port Elizabeth and Uitenhage areas so as to make the region free for the exclusive habitation of coloureds. But the Association argued that labour was in short supply in the district for the motor industry in the region although the situation was alleviated by the migration of coloureds from rural areas and from the Western Cape. Protesting against the "synthetic" and forced nature of the arrangement, it stated that "this Association has sound knowledge of the Coloured people, and they cannot see them being attracted to the heavy work of steel making."[137] Thus Saldanha Bay development scheme was part of the government's broader scheme of social engineering at a regional level.

South Africa was not the only iron ore producing country that geared its infrastructure to meet the Japanese iron-ore demand. News of its endeavours caused some consternation among Australian iron ore mines who were also hoping to profit.[138] As early as 1971, the major Japanese steel manufacturers down-scaled their initial forecasts of iron ore demand. One of the factors cited in correspondence was the American devaluation of the dollar that had brought about a situation of "inactive production" at Japanese factories. This reduced their demand for South African raw materials. The Japanese soon made tentative moves to call off the deal with South African iron ore exporters. Japanese engineers, who had assessed

[135] Ben Alberts, "Presidential Address: Planning the Utilisation of South Africa's Coal Reserves," *Journal of South African Institute of Mining and Metallurgy* 87, no. 11 (November 1987): 388.
[136] Cape Midlands Development Association, *Memorandum: Growth Points and the Siting of the Fourth Iscor*, March 15 1972; NASA, MES 239 H4/12/2.
[137] ibid.
[138] JB Mills, South African ambassador in Pretoria to the Secretary for Foreign Affairs, January 11, 1972; NASA, MES 239 H4/12/2

the development of Saldanha Bay, thought it would cost R300-million more than was initially promised: a cost that was likely to be heaped onto the price of iron ore. The Japanese engineers also thought that Saldanha Bay would be completed later than its developers had initially promised.[139] At the same time, the Japanese government issued blunt condemnations of the apartheid regime, creating the perception that the country was unwilling to do business with South Africa.[140] Nonetheless the development of Saldanha Bay proceeded anyway: too much had been invested in the project for it to be abandoned. In 1972, a newspaper article with the headline "Saldanha ready - at almost any price" described the iron ore component of the project as controversial. Hans Coetzee, the director and general manager of Iscor, had added a "semis" plant or a steel manufacturing plant to the Saldanha Bay development so that processed steel could be exported.[141]

The money that Iscor spent on the Sishen-Saldanha railway line had a knock on effect on its other projects in the pipeline, including the Grootegeluk coal mine. In its annual report of 1978, Iscor wrote of its dire debt situation, coupled with the fact that its revenue from iron ore exports was less than it first expected:

> Between 1971 and the completion of the expansion programme in 1976 the situation changed drastically. Loan funds from overseas became practically unobtainable, the tenure of foreign loans shortened dramatically from 20 years to one or at the most two years and interest rates rose sharply.[142]

As a result, financing the Grootgeluk coal mine increasingly appeared to be an uncertain proposition. But as the next section demonstrates, rather than cancelling the project, Iscor's management committed to funding the mine at all costs.

Demand and Supply Forecasts

Iscor was at the time attempting to implement models that would enable it to better deal with the volatility of supply and demand forecasts. During the same period that it opened the Grootgeluk coal mine, Iscor was also working to improve its forecasts of supply and demand. Improved forecasts were crucial for the Corporation to better survive market conditions. In explaining the development of the Grootgeluk coal mine, Ben Alberts wrote: "To assist Iscor

[139] Extract from Eastern Province Herald, 'Japanese seek ore berth policy switch,' March 10, 1972; NASA, MES 239 H4/12/2
[140] Extract from the Eastern Province Herald, 'Japanese Slate Apartheid,' Feb 2 1972; NASA, MES 239 H4/12/2,
[141] Iscor Survey, *Business Times*, November 26, 1972; NASA, MES 239 H4/12/2
[142] Iscor Annual Report, 1978; NASA, MPP 50 A3/10/9.

in the proper preparation of these plans, a sophisticated computer programme was developed by the Department of Planning and New Development that indicates the demand for raw materials for any given set of conditions and production rates."[143] At the same time, the World Bank offered Iscor its assistance with helping to develop its planning systems. In a memorandum dated June 1976, one of the Bank's employees detailed Iscor's undesirable financial position in which 70% of its long term capital was debt-funded. Persistent political pressure to keep the steel price low meant it could not meet the rising production costs by itself. And since Iscor was in the midst of its ambitious expansion programme the possibility of escape was limited.[144] The World Bank proposed that Iscor adopt a system based on a linear programming mathematical model that optimised the combination of certain variables to predict the best course of action. Despite some reservations about the political repercussions that might occur in co-operating with apartheid South Africa, the World Bank argued that Iscor would provide a convenient test case and an important source of data for testing the model's applicability in developing countries.[145]

The model would determine the least cost combination of different activities in the sector, including for instance transportation and production. Where components were in competition, for instance the decision to import goods or produce them domestically, the system was designed to select the cheapest option. The World Bank representative in this case, Peter Glenshaw, envisioned a collation of otherwise available data, which he argued was often neglected by planners. While the model appeared heavily dependent on potentially unreliable data sources, Glenshaw reassured Iscor that:

> It has been our experience that the most of the required data is available – but often scattered among a number of related agencies. For example, rail transport data will reside with the railway authorities, truck transport data with private truckers, while production cost and operational data will be with the management of the individual plants.[146]

[143] Ben Alberts, "The Planning and Establishment of the Grootgeluk Coal Mine," in the *Journal of the South African Institute of Mining and Metallurgy*, p343.
[144] Memorandum, Investment in the steel sector, the World Bank's model and South Africa's co-operation, Washington DC, June 9, 1976; NASA, MPP 23/A3/10/1
[145] Eden Medina has remarked on similar attempts at market regulation through computerised models in Chile under the presidency of Salvador Allende : Eden Medina, "Designing Freedom, Regulating a Nation: Socialist Cybernetics in Allende's Chile," *Journal of Latin American Studies* 38, no. 3 (2006): 571–606.
[146] Letter from Peter Glenshaw to Ambassador J de Loor, March 24, 1976; NASA, MPP 23 A3/10/1

By January 1977 Glenshaw had realised some of the shortcomings of his earlier approach. He wrote to the South African ambassador in Washington that the future of the steel sector in South Africa was greater than the success of Iscor alone and that maximising Iscor's operational efficiency was only part of the puzzle. Other routes included the potentially more cost effective role of the private sector in the national steel industry. In addition, it was important to consider national prerogatives such as foreign exchange earnings and broader fiscal plans.[147] He volunteered to work with the grain, rather than against it, and with the South African government to install the model at Iscor's headquarters. Thus a purely cost-based calculation of demand and supply was not enough to accurately predict the "national interest" as the World Bank came to realise.

Iscor and the Private Collieries

Iscor's official reason for exploiting the coal reserves of the Waterberg was that the country faced an imminent shortage of coking coal. But the predicted shortage was based on the costs of extraction rather than the actual amount of coking coal beneath the ground. During the 1970s the possibilities of coal extraction soared as coal mines mechanised their operations. Motivated primarily by steadily rising labour costs, mechanisation meant that machines replaced low-skilled labour where this was possible.[148] This was a sharp break from the general pattern established over the course of the twentieth century, under which South African coal enjoyed a competitive advantage on the global market due to the availability of cheap labour.[149] The mechanisation of coal mines also allowed engineers to extract coal they had previously considered unreachable, thus increasing the country's estimated coal reserves. The introduction of open cast mining methods for instance, a highly mechanised form of mining, improved the extractable coal reserve estimates from 26 billion to 61 billion tonnes.[150] Iscor eventually opted to use open cast mining method at the Grootgeluk coal mine, which was less labour intensive but required more capital investment in machinery. As part of the mining method coal was scooped from the walls of the pit and hauled on the backs of gigantic trucks that crawled along the floor of the pit.

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[147] Letter from Glenshaw to Ambassador J de Loor, January 20, 1977; NASA, MPP 24 A3/10/2

[148] Andrew Marquard, "The Origins and Development of South African Energy Policy" (PhD Thesis, University of Cape Town, 2006), 77, http://webdav.uct.ac.za/depts/erc/Research/publications/06Marquard%20PhD%20Thesis.pdf.

[149] Stephen Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town." (PhD Thesis, University of Michigan, 2012); Gabrielle Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (The MIT Press, 2012); Stephen Gelb, *South Africa's Economic Crisis* (New Africa Books, 1991).

[150] DW Horsfall, "A general review of coal preparation in South Africa" in *Journal of the South African Institute of Mining and Metallurgy*, August 1980, 259.

Labour

Archival evidence suggests that labour disputes affected the reliability of the coking coal supply from private collieries. According to Timothy Mitchell, underground coal mines in nineteenth century Britain were particularly prone to labour unrest because the nature of mining operations created the material conditions of autonomy conducive to subversion.[151] Labour unrest in March 1973 at the Iscor-owned Durban Navigation Coal mine (DNC) in Natal further threatened the supply of coal. In correspondence between government and Iscor, officials blamed the disruptions on ongoing ethnic conflict. Xhosas and Pondo workers who were likely to have been migrant labourers from the Eastern Cape were alleged to be in conflict with Basotho workers. To resume mining operations the mine's management fired "49 Xhosas" and "one Basoto".[152]In March 1975, a letter from Iscor citing ongoing rioting at the Hlobane and Northfield coal mines in Natal called for the Minister to urgently intervene because the mines supplied 46% of Iscor's coal requirements.[153] The Minister of Mines, Piet Koornhof, acted quickly and decisively. To "normalise" operations he encouraged the development of open cast mining methods in Hlobane so that miners would not have to venture underground.

Michael Deats was at the vanguard of the movement for coal mine mechanisation and oversaw the eventual mechanisation of DNC. He had been awarded a bursary from the mining equipment manufacturer Atlas Copco to spend two months in Sweden where, he said, "I learned more about sub level caving than I'd ever learnt about iron ore mining in my life." Sub level caving was a method of large-scale mechanised mining in which the mineral-rich ore was blasted by explosives. But his innovations were not immediately embraced:

> And then I tried to introduce some of what I'd learned in Thabazimbi but I wasn't senior enough. I wasn't at top-level management, I was middle-management and they weren't going to listen. So when I was offered this opportunity to go to DNC which is close to Dannhauser, South of Newcastle, I introduced this method [longwall mining] and three years later I was a manager of the line. And in 1984 I was promoted to Iscor head office with the express purpose of opening up the Waterberg colliery.[154]

[151] Timothy Mitchell, *Carbon Democracy: Political Power in the Age of Oil* (London; New York: Verso Books, 2011).
[152]From JC Heunis, die Sekretaris van Nywerheidswese to PJG Koornhof, Minister van Mynwese, 'Onluste by Hlobane Northfield Steenkoolmyn,' March 20, 1973; NASA, MES 233 H4/12/3.
[153] ibid.
[154] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.

Longwall mining had evolved into its mechanised form among the collieries of England and was by that stage a commonly used method in Europe. It involved the underground extraction of coal in long wall-like sections of the coal face.

The Grootgeluk coal mine was initially developed as an open-cast coal mine for supplying coking coal to the Iscor Steel Works. Iscor also built the Tshikondeni coal mine in 1978, which was situated in the former Venda homeland east of the town of Mussina, as an underground coal mine from the outset to supply better quality coking coal. Thus the greater labour costs of the 1970s did not signify the end of underground coal mining. The peculiar nature of the coal deposits also determined whether the mine would be underground or open cast. According to Joe Meyer, Grootgeluk became an open cast coal mine because of the nature of the Waterberg coal deposit. The thin overburden above the coal meant that it was cheaper to use open cast than underground mining methods. In Mpumalanga by contrast the coal is much deeper, but the thick sandstone roof makes it easier to mine safely with less roof bolts. Meyer described the Waterberg coal deposit as follows:

> Inside those two faults you do open cast mining because the overburden is only between 12-25 meters thick. So if you want to mine underground you need a solid roof. In Mpumalanga, they've got a thick sandstone layer which is above the coal. So you can go in, you can put roof bolts in and you bridge over the pillars.[155]

Iscor's official reason for developing the Waterberg coal fields, in its correspondence with the various Ministries, and in its media announcements, was that it was driven to the Waterberg coalfields by a national shortage of coking coal. As part of an earlier attempt to allay the supply crisis, Iscor purchased a 49% stake of the Moatize coal mine in the Tete province of Mozambique. But by 1974 its prospects there appeared increasingly uncertain as the voice of the anti-colonial movement resounded with ever more clarity.[156] Iscor traditionally relied on collieries clustered in the Natal and the region surrounding Witbank in the Eastern Transvaal to supply its steel plants. Collieries in Natal had long been exporters of coal and in the early twentieth century supplied the infant colonial economies of East Africa and South East Asia.[157] But these mines were fast approaching exhaustion with some

[155] Interview with Joe Meyer, March 17, 2015, Onverwacht.
[156] From TF Muller Chairman of Iscor to SL Muller Minister of Transport, May 16 1974; NASA, MPP 47 A3/10/9
[157] Ruth Edgecombe and Bill Guest, "The Natal Coal Industry in the South African Economy, 1910-1985," *South African Journal of Economic History* 2, no. 2 (1987): 52.

collieries having already closed down.[158] Nonetheless, the description of a "shortage of coking coal" fails to explain why Iscor needed to own and manage its own coal mine when its chief concern was with producing steel. The answer lay in the tensions between Iscor and privately-owned collieries, and the newly introduced threat of the global export market.

In May 1974 a memorandum to the Secretary of Trade from the managing director of Iscor detailed the Corporation's stance on the country's coking coal situation.[159] He timidly reminded the government that Iscor had its own coking coal requirements despite the coal export boom. He predicted that Iscor would confront a coal crisis by the year 2000. He wrote that Iscor's management had "learned" that the government intended the railway network leading to Richards Bay to serve the coal producers in the Transvaal, particularly in their efforts to export coal to Japan. The memorandum urged the government to ring fence certain minerals for domestic consumption and so guard against the private sector's export enthusiasm. It was international best practice to protect domestic consumption from being eroded by the private sector's enthusiasm for coal exports. In another memorandum, Iscor's managers argued that a steel producer which did not directly control its raw material supplies was in a vulnerable position:

> The purpose is to manufacture steel at the lowest cost but if a smelter buys raw material from the private sector, he finds daily that he must pay excessive prices because there is worldwide a demand for the raw materials…This has once again been shown during the last eighteen months, in the massive increase of the coking coal price in Europe, from R30 per tonne to R70 per tonne, applying consequent pressure on the steel price. Iscor has made a mistake over the last three decades in not buying the appropriate coking coal mines because coking coal is now its greatest bottleneck. As a result of a shortage in coking coal, Iscor suffered a production loss of hundreds of thousands tonnes of steel per year, which resulted in a monetary loss for the country's foreign currency.[160]

Private collieries were therefore no longer entirely reliable sources of coking coal. This was in part due to natural exhaustion of the coal mines, but also due to their loss of loyalty to domestic clients.

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[158] "Iscor's Novel Blend in Search for Coking Coal," *Rand Daily Mail*, January 3, 1978.
[159] From JP Coetzee, Besturende Direkteur to G Steyn, Sekretaris van Handel, 'Steenkool Posisie in Suid-Afrika- Yskor se Siening,' May 13, 1974; NASA, MES 234 H4/12.
[160] From Yskor to JC Henuis, Minister van Ekonomiese Sake, 'Yskor en die Private Nywerheid in die Republiek van Suid Afrika- Quo Vadis?,' March 17, 1975; NASA, MES 245 H4/12/3.

Importantly, Iscor's management set on a path to deliberately avoid purchasing coal from the private sector. In 1978, the *Rand Daily Mail* reported that collieries in the Eastern Transvaal district of Witbank were in the process of gearing their coking coal production for the export market. The article noted that "the mines producing this coal are committed to selling it to the Japanese steel mills."[161] At an Iscor board meeting of July 1975, board members resolved that "management reduces its heavy dependence on the private sector for metallurgical coal and makes every effort to increase the proportion of coal … to be supplied from Iscor mines from the current 15% to at least 50% by 1980."[162] A year later, in July 1976, the chairman of Iscor described the corporation as held to ransom by private coal mines that imposed excessive charges on the coal price for any capital they spent on expanding their operations to meet Iscor's coal demand. Iscor had experimented with utilising imported coking coal from the United States but found this coal to be too expensive. The possibility of importing coal through Richards Bay was constrained by the limited rail capacity from Richards Bay to Iscor's steelworks.[163] While the costs of coal imports were lower than those of the heavy infrastructural requirements initially required to start the coal mine, the lower domestic price of coal was to Iscor's advantage in the long term.

The introduction of new blending technology also made it feasible to exploit the coking coal resources of the Waterberg since the coal in this region was of a generally lower coke quality. This blend technology was then being developed in America and Europe and allowed the low quality coal, which meant that it contained a lower content, to be more extensively used. While the coking coal from the collieries of Witbank and Natal were normally blended in equal amounts, the lower quality of the Waterberg coking coal meant that more of it could be used with the Natal coking coal so as to conserve the latter.[164] As a result Iscor urged the government to protect coal with a low content from the export market, convinced that the Mining Rights Act of 1967 provided the requisite legislative muscle.[165]

[161] "Iscor's Novel Blend in Search for Coking Coal," *Rand Daily Mail*, January 3, 1978.
[162] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation Limited, July 23, 1975; NASA, MPP 44 A3/10/9.
[163] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation Limited July 14, 1976; NASA, MPP 44 A3/10/9.
[164] "Iscor's Novel Blend in Search for Coking Coal," *Rand Daily Mail*, January 3, 1978.
[165] From JP Coetzee, Besturende Direkteur to G Steyn, Sekretaris van Handel, 'Steenkool Posisie in Suid-Afrika- Yskor se Siening,' May 13, 1974; NASA, MES 234 H4/12.

The search for Coking Coal

While the exploitation of the Waterberg coal fields was in the pipeline, Iscor had simultaneously prospected for coking coal in other areas of the Transvaal. In May 1977, the chairperson of Iscor announced that "whereas the Corporation had only the Grootgeluk proposition in mind six months ago, there were now five coking coal propositions available."[166] One of these options, which eventually morphed into the Tshikondeni coal mine, lay at the northern edge of the Limpopo province and formed part of the Soutpansberg coalfields. The proposed mine site lay within the bounds of the former Venda homeland, which complicated the matter for the Department of Bantu Development. The Department's officials argued that if the homeland acquired independence the ownership of the mineral rights would potentially be in dispute. To resolve the issue, plans were laid to have the land on which Iscor built its coal mine declared a white area. Thus even if Venda became independent, Iscor would still own the coal mine.[167]

Though the various Ministries approved the idea of a coal mine within the bounds of a Bantustan, they refused to consider one within the wildlife conservation precinct of the Kruger National Park. The Tshikondeni coal mine was situated at the border of the Kruger National Park close to the Pafuri camp which is the northernmost camp of the Park and rich in biological diversity. But the government was intractable in its refusal to allow Iscor to exploit the coal in the Park, according to Deats:

> Tshikondeni was a big source – it's closed now, it's been worked out. Although I don't believe it's worked out. I believe the coal field extends under the Kruger National Park. Now I can remember talking to various cabinet ministers and various Parks Board people, when I worked at Iscor, about extending the mine underneath the border of the KNP. And they were horrified, absolutely horrified. And I said but we're not going to affect the surface, not going to cave the surface or anything like that. We might have a ventilation shaft – that's it. The pristine glory of that part of the park, and that part of the park is beautiful, will only be disturbed by a ventilation shaft, that's it. No, you can go up to the fence but don't cross it. But the coal doesn't know about that fence…[168]

[166] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, May 25 1977; NASA, MPP 49 A3/10/9

[167] Letter from JP Coetzee, Director of Iscor to JC Heunis, Minister of Economic Affairs, 23 March 1977; NASA, MPP 24 A3/10/2.

[168] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.

According to an interviewee who was the head engineer of the Tshikondeni mine when it opened in 1982, the coal there was of higher grade coking coal than the sort found at the Grootgeluk coal mine. But the mine's chief drawback was that the coal deposits were situated at an awkward angle, which meant that entirely exhausting the coal deposits required expensive techniques. As he stated: "It was very difficult to mine because it was at an incline, an angle. You had to mine underground but at an angle of 22 degrees. Now that angle is slippery for machines to work…Most of the coal has been taken out. Obviously there are still some coal portions left which are more difficult to mine, and it's not cost effective to take it out."[169]

While the prospecting work and excavation of mining shafts for the Grootgeluk coal mine had commenced in the early 1970s, in 1976 the project ground to a halt as funding dried up. In the aftermath of the 1973 oil crisis, Iscor confronted a dramatically altered foreign climate for loan funding. This unexpectedly straitened position threatened the financial sustainability of the Grootgeluk coal mine. But by January 1977, the alternative sources of coking coal were proving increasingly unpropitious. South African collieries had not stepped up to the plate and failed to reassure Iscor that they could satisfy its coking coal requirements. The minutes of an Iscor board meeting for that month reflect a consensus among board members that Iscor needed to exploit the Waterberg coal fields:

> Mr Duncker reported that the Corporation was continually stating its coking coal requirements to the private coal mining industry but to date no proposition has materialised which could serve as an alternative to the Grootgeluk project…During discussions on the merit of the Grootgeluk Project Board members were unanimous in their views that such a project was indispensable to the future provision of coking coal for the Corporation's existing metallurgical capacity, but on present indications the Corporation lacked the funding to proceed with the projects on full scale.[170]

Determined to proceed against the financial odds, board members reached a vague resolution to negotiate a financial arrangement with the Minister of Economic Affairs. Halting the project and cancelling the contracts Iscor had already signed would prove too expensive,

[169] Interview with engineer (anonymous), September 2014, Lephalale.
[170] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, Jan 26 1977; NASA, MPP 49 A3/10/9.

considering that Iscor would still be faced with a coking coal shortage.[171] Iscor requested R195-million from the government for Grootgeluk, a figure based on a "minimum expansion plan" that utilised "unorthodox" methods such as short term loans and lease financing. In February 1976 the state responded with the guarantee that it would provide R100-million and asked that Iscor gather the rest on the loan market.[172] In 1978 Iscor's management raised a further R295-million for the following year, stating that this was achieved "once again at the risk of funding Iscor by methods as would not, in all instances, reflect sound financial policies and principles."[173]

Searching for alternative sources of funding is a recurrent theme in the minutes of Iscor's board meetings. The various options considered included requesting assistance from the government, fellow parastatals, private financiers and construction companies. By July 1976 Iscor's capital expenditure had been drastically cut and its managers considered selling some of its assets. This included selling the Sishen-Saldanha railway line to the South African Railways and roping in the manganese public corporation, Samancor, to purchase the Grootgeluk coal mine and exploit the coal, although Samancor eventually declined the offer.[174] Another fundraising option which proved too expensive in the end involved reaching "reasonable terms" with a financial entity called "Southern Life Association" to raise R100-million in financing.[175] But the idea was a novel one and the fund-raising necessitated computer assisted calculations "considering the vast amounts involved and the precedent setting nature of this type of financing." In September 1977, one of the board members suggested that Iscor employ a special consultant with the sophisticated analytical expertise to calculate the proposed costs.[176]

Eventually, in July 1977, Iscor's management arrived at a new scheme: to sell the "non-metallurgical" coal that the Grootgeluk coal mine produced to Eskom, thereby indirectly

[171] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, July 16, 1976; NASA, MPP 44 A3/10/9.
[172] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, February 25, 1976; NASA, MPP 44 A3/10/9.
[173] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, April 26, 1978; NASA, MPP 50 A3/10/9
[174] "Vergadering no. 552", Undated; NASA, MPP 44 A3/10/9.
[175] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, May 25, 1977; NASA, MPP 49 A3/10/9.
[176] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, September 28, 1977; NASA, MPP 50/A3/10/9

sharing the mine's operating costs.[177] In August 1978 board members decided to prepare the tenders for Eskom to purchase its coal from Grootgeluk coal mine, and to arrange for minor modifications to be made to the water pipeline originally intended to lead from the Hans Strijdom Dam to the Grootgeluk coal mine, so that the dam could supply a power station with a generating capacity of 1200MW.[178] By September 1977 Eskom had agreed to proceed with a dry cooled power station nearby Grootgeluk.[179]

In Ellisras, all engineers felt the pressure of parsimony in their development of the Grooteluk coal mine. Joe Meyer described Iscor's activities in Ellisras during the 1970s as severely constrained by the lack of funds. The managers of the Grootgeluk coal mine were constantly reminded by Iscor's head office that money was in short supply. But Meyer was still expected to produce the necessary infrastructure for the mine and in the town. This included the development of the Mogol Club, a recreational hub with various sports facilities, intended to serve all staff and the community around it in the otherwise derelict portion of the *Bushveld*. To develop the mine and the supportive infrastructure closer to the town of Ellisras, Meyer said that his team was forced to find creative and cost-efficient solutions to challenges that arose. As Meyer related:

> The guys from the mine and contractors lent us pieces of equipment over weekends, maybe a piece of equipment during the week to clean out where the fairways was going for the golf course. The MD [Managing Director] of mining at the time came here and he said that the next apprentice athletic meeting, which was usually held at the Steel Centres, will next be held at the Mogol Club and that meant we had to build an athletic track. And he gave me two months to build an athletic track. Two months and we were ready. And the same with the rugby, he was a big rugby fan. He played for Northern Transvaal himself, so he said you better see that there are facilities. But he gave us limited funds and we had to be very creative to solve this challenge, but we did and the rugby was played.[180]

[177] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, July 27, 1977; NASA, MPP 50 A3/10/9.
[178] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, 30 Aug, 1978; NASA, MPP 50 A3/10/9.
[179] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, September 28, 1977; NASA, MPP 50 A3/10/9.
[180] Interview with Joe Meyer, 17 March 2015, Onverwacht.

Minutes of the Iscor's Board meetings reflect that second hand equipment was at times used. In one case Iscor shipped the equipment halfway across the world to reach Ellisras. In 1978, Deats gained the Boards' approval to import second- hand "stackers", which had first been used for the construction of the largest earth-filled dam in the world, the Tarbela Dam in Pakistan.[181]

Eskom and Ellisras

According to Deats, the relatively sparse settlement, consisting of a few struggling farmers in the area, meant that Iscor bought the farm "for a song."[182] Coking coal was known to exist in the Waterberg since 1922.[183] In 1954, the government reserved the prospecting rights of 123 farms in the Waterberg district for the sole use of Sasol and Iscor, and preserving these parastatals' rights against any encroachment from the private sector. These rights were reserved with the understanding that the minerals would be used for chemical and metallurgical purposes within the country and it was only with the coming of the oil crisis in the 1970s that the private sector paid real attention to the supposed injustice of the system. The coking content of the coal meant that only Iscor could really make use of it and so Sasol did not rush to exploit the reserves.[184]

The Waterberg coal reserves are thought to have been initially discovered by the settler farmers in the region who had drilled for water and stumbled across coal deposits relatively close to the surface.[185] Despite the early discovery of the coal fields, Iscor's engineers conducted the first large-scale exploitation of the coal fields in the 1970s. Deats related that:

> So when I got to the Waterberg, in 1974/5, there had been a bit of prospecting done, quite a lot of prospecting work, a couple of shafts had been sunk because at the bottom of the succession of coal there are some discrete seams which on their own are suitable for export. So nobody was really thinking at that stage of a coking coal or a steam coal mine. So we went up there and we did various feasibility studies and said what we need

[181] Minutes of Board Meeting of the South African Iron and Steel Industrial Corporation, August 30, 1978; NASA, MPP 50 A3/10/9
[182] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.
[183] P. E Hall, "A Preliminary Note on the Waterberg Coalfield as a Possible Source of Coking Coal," *Journal of the Chemical, Metallurgical and Mining Society of South Africa*, October 1945, 124–32.
[184] *Verslag van die Staatskonsultante oor die Privatiseering van Yskor Beperk,* August 8, 1989; NASA, MPP 4 1/3/1
[185] Interview with Joe Meyer, March 17, 2015, Onverwacht.

is 2-million tons of coking coal to meet Iscor's requirements for coking coal to make coke, to make iron to make steel.[186]

The development of the coal mine was too capital intensive to be undertaken lightly. Because the region had a crucial lack of infrastructure, an entire town with connecting networks to the country's industrial hubs had to be built. According to Deats, gaining Eskom's co-operation required some cajoling of government officials and representatives from Eskom:

> So we went up there and did a feasibility study and said without a power station we can forget about it. Now the kinds of power stations Eskom was building in those days were called six packs. Six discrete generating units. And the capacity of those power stations was just short of 4000 megawatts. Now to get Eskom to build a power station up in the Waterberg, they were about as interested as my cat is in running after dogs. So we first of all got every cabinet minister in the John Vorster regime to visit the site and we said listen, without a power station we can't build a coking coal mine because what we did is we pushed all the run of mine, that's the raw coal into a washing plant and had two products; steam coal for the power station and coking coal for Iscor.[187]

Eventually the government and Eskom overcame their initial indifference and agreed to construct the power station in the water scarce region of the Waterberg. This will be discussed in more detail in Chapter Three.

Conclusion

This chapter has discussed the peculiar combination of circumstances that enabled the difficult exploitation of the Waterberg coal fields, so setting the stage for the construction of the Medupi power station decades later. The material appeal of the Waterberg coal reserves was in turn created by a particular configuration of political and economic factors. In addition certain technological advancement made possible the exploitation of coal reserves previously considered untouchable, such as those of the Waterberg. The Grootgeluk coal mine began because of Iscor's search for coking coal, which was of a lower quality than that found elsewhere in the country. A desperate drive to achieve national self-sufficiency encouraged Iscor's engineers to overcome the obstacles that threatened to retard the development of the Grootgeluk coal mine. This created a peculiar network of parastatal and technological presence in unlikely locales across the country. In the case of the Waterberg, the parastatal

[186] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng
[187] ibid.

presence was primarily determined by the materiality of the underlying minerals. The appeal of the materials was in turn a product of the peculiar political conditions that rendered their exploitation possible.

Chapter 2: Ellisras and the Entrance of Iscor

The previous chapter detailed the forces driving Iscor's engineers to exploit the derelict coal fields of the Waterberg. As bearers of infrastructural prowess and scientific progress, they also were conduits of state power to the embryonic municipality that was Ellisras in the 1970s. But this peculiar configuration of political power operated outside of the normal administrative state bureaucracy, a phenomenon Gabrielle Hecht has termed "technopolitics."[1] Iscor's engineers encountered resistance to their operations from recalcitrant white elites in Ellisras. The resistance proved insurmountable in some cases, manifesting in the development of an "Iscor town" situated only a few miles distant from the traditional business centre of Ellisras. Where Iscor gained the consent of white elites, this was because the latter recognised the infrastructural benefits Iscor's engineers offered. These included a steady supply of water and electricity for farmers and residents of the town to use and the introduction of "orderly" urban development. Iscor thus supplied the infrastructural muscle to make orderly and co-ordinated urban planning possible in line with the government's regulations for white towns.

Introduction

In his seminal history of the trajectory of European city-state development, Charles Tilly[2] considered the degree of territorial incorporation into the ambit of the state as a function of the interacting variables of "capital" and "coercion". These variables were proxies for city elites and state power respectively. Drawing on Tilly, Jeffrey Herbst considered the extension of state power from the centre to the periphery in the African context.[3] Although he excludes South Africa from his country sample, because it diverges from the experience of other African countries, his analysis is not entirely inapplicable to the South African context. Herbst provides a useful foil to the European experience; demonstrating that for many African countries state intervention was not intrusive, but welcomed, because of the development it promised. But in a departure from Tilly's mode of analysis, Herbst's

[1] Gabrielle Hecht, "Technology, Politics, and National Identity in France," in Allen, M and Hecht, G (Eds). *Technologies of Power: Essays in Honor of Thomas Parke Hughes and Agatha Chipley Hughes* (2001, n.d.).
[2] Charles Tilly, *Coercion, Capital and European States: AD 990 - 1992,* Revised edition (Cambridge, MA: Wiley-Blackwell, 1992).
[3] Herbst, *States and Power in Africa*, 2000.

conclusions are based on the geographical dispersion of population densities rather than a qualitative examination of the interaction between states and local economic elites. Herbst argues that the defence of national borders against foreign invaders incentivised European states to transmit their presence from the capital cities to the peripheral borderlands. But African states lacked this prerogative of border defence because of their uncontested national borders. This explains the persistence of customary authority in rural areas, and the failure of road building to extend from the capital to the periphery. Herbst suggests that internal challenges to central authority have posed a greater challenge to the integrity of the African state than external threats to its borders.[4] Herbst's conceptual linkage of military spending, border defence and the extension of state power is useful in explaining the South African government's interest in Ellisras despite the fact that his account of the weakness of the African state is not applicable here. In South Africa the apartheid government prioritised border defence during the 1980s as the fear of insurgency from neighbouring African countries grew. The government stationed military posts at key nodal points along the border including at Ellisras, which lay near to the South African border with Botswana. Thus the development of large technical systems at Ellisras was enacted in the context of the state's priority to defend the country's borders. While there is little evidence to suggest that defence prerogatives drove Iscor's entrance to the Waterberg, they still moulded the political environment in which its engineers operated.

Catherine Boone has developed a typology for understanding the relationship between local elites and central state power in certain West African countries.[5] She attributes regional variation in the nature of state control to the configurations of power at the local level and to the degree of state interest in incorporating the territory in question into its ambit of power. Boone argues that where local elites enjoy a significant degree of economic autonomy, the state will likely attempt to "usurp" and destroy the power of local elites. But where local elites rely on state largesse for their economic prosperity, the state tends to opt for power sharing at the local level.[6] The latter scenario most closely fits the conditions in Ellisras during the 1970s where economic prosperity for white farmers arrived only with Iscor's

[4] Herbst explicitly excludes South Africa from his country case studies, but the model is nonetheless still worthy of consideration.
[5] Catherine Boone, *Political Topographies of the African State: Territorial authority and Institutional Choice*, Cambridge Studies in Comparative Politics (Cambridge, UK ; New York: Cambridge University Press, 2003), 32.
[6] ibid, 36.

engineers. Iscor's large-scale mining and infrastructural activities drew the concerted gaze of the state to the district's economic and political fortunes.

The story I tell here complicates Boone's model, which is rooted in the commercial agricultural heartlands of West Africa. In Ellisras, the power of state officials at the local level was conjoined with that of Iscor's engineers. As the agents of infrastructure development, Iscor's engineers were nominally autonomous from the officials of state. Despite the low population density of Ellisras, Iscor still had to negotiate and build relationships with local elites in order to gain some degree of consensus for its operations. Primarily concerned with the welfare of its coal mine, the mine's managers had to deal with rumblings of discontent from long standing white residents. By sharing its supply infrastructure with the residents of the town, primarily water and electricity, Iscor at once ensured a degree of buy-in of local elites and the successful functioning of its coal mine. But Iscor's engineers and the Grootgeluk coal mine did not gain universal consensus, at least initially, and some white residents obstinately refused to co-operate.

Iscor's activities also attracted the interest of officials concerned with enforcing racial segregation at both the provincial and national level. This ultimately resulted in the removal of black "squatters" from the farmlands surrounding the town. Forced removals occurred across the Transvaal at the same time and should thus be considered in light of the apartheid government's broader policy of "homeland consolidation". Prime Minister PW Botha's response to the rising tide of African nationalism, which he feared would encourage popular revolts in South Africa, was to dilute nationalist aspirations through the homeland system. He attempted to hasten homeland independence by catalysing regional processes already afoot.[7] He also hoped that a "constellation" of homeland states would collectively act to defend the country's borders against attack from its newly independent neighbours in Southern Africa. The homeland system operated on a pseudo-federal model, which to anti-apartheid activists was an inherently inequitable one. This was because the "independent" homelands had little chance of economic survival and would consequently remain dependent on white South Africa. But to the technocratic minds of the various ministers, the homelands' lack of economic viability was not an insurmountable obstacle. Rather, as part of its "industrial

[7]Robert Davies and Dan O'Meara, "Total Strategy in Southern Africa: An Analysis of South African Regional Policy Since 1978," *Journal of Southern African Studies* 11, no. 2 (April 1, 1985): 183–211; "Blacks Hold the Key to 'Constellation', PM Told," *Rand Daily Mail*, August 30, 1979.

decentralisation" policy, the government offered numerous economic incentives to corporations to situate their plants at the borders of the homelands.[8]

Independent homelands were also intended as the culmination of a governmental policy that encouraged autonomous regional development.[9] A government memorandum discovered in the National Archives of South Africa dated 1965, whose author was not identified, discussed its policy of regional development as it related to Ellisras district. The anonymous official noted that it was state policy to encourage autonomous regional development in line with what he alleged was the normative pattern in "Western democracies". He advocated a more systematic effort to utilise natural resources in a "full and balanced" manner. The author considered regional development to be the best method of ensuring the "optimum development" of the region's natural resources, including labour. Given that the state could not take complete responsibility for local development, an emphasis on regional development would allow the private sector to make a larger contribution.[10]

But while this idea of regional development emphasised autonomy at the local level, in practice local government was constrained by an interminable process of bureaucratic consultation. Each of the interest bearing Ministries weighed in on these debates. In Ellisras, because of Iscor and Sasol's forthcoming activities in the region and its raised economic prospects, the author of the memorandum argued that development had to be properly co-ordinated to ensure its even implementation. The emphasis on coherent regional development led to the establishment of a local governance association for Ellisras composed of the respective representative bodies. The bottom up development espoused in the concept of regional development meant that the town of Ellisras would have to marshal its own resources for urban development. To achieve this end, it had to call on the assistance of the corporate entities interested in exploiting its mineral endowments. In this case, Iscor provided the financial assistance and technical know-how to supply the infrastructure necessary for urban development. These included the availability of water and electricity infrastructure and the proper housing of black labourers in line with municipal segregationist policies. In this way Iscor gained the consensus of the local elites and eased the incorporation of the territory into the orbit of state power. This preliminary urban development proved especially valuable for the state when border defence became an important state prerogative during the 1980s.

[8] Daryl Glaser, "The State, Capital and Industrial Decentralisation Policy in South Africa, 1932-1985." (M.A, University of the Witwatersrand, 1988).
[9] Hansard, June 18, 1976, 9707.
[10] 'Ellisras Ontwikkeling', September 10, 1965; NASA, RNH 105 NH5/55.

Ellisras in the Twentieth Century

Early Town History

For most of the twentieth century, the region that was to become known as Ellisras was untouched by state regulation, mainly due to its tiny white settler population. Arid environmental conditions made successful agriculture difficult and prevented dense residential settlement. It was only with Iscor's arrival and the prospect of large-scale industrial development that state officials paid closer attention to the direction of the town's development. Officials who visited the district during the 1960s found that the town's material conditions offended the principles of apartheid. The scarcity of basic services meant that whites could not attain the standards of living necessary to set them apart from the surrounding African communities. Government insisted that for Ellisras to be formally declared a town, residents had to ensure that necessary service provision was in place. But this required a significant investment in urban infrastructure. Early private initiatives were shoddy and inadequate. It was only with Iscor's financial muscle that the residents of Ellisras could fulfil the infrastructural requirements that were required for the government to afford the town municipal recognition.

According to the official history of the town, Ellisras was named after two white settlers who settled on the farm of Waterkloof during the 1930s. These early settlers, Patric Ellis and Jan Erasmus, merged their last names to form the name "Ellisras". The Waterkloof farm also included a railway stop for a line that passed from Vaalwater in the south to Stockpoort in the north. In line with Bill Freund's description of African cities historically forming around the nodes of transport networks, the incipient town developed around the railway stop.[11] Patric Ellis hailed from the Marico district, roughly 300 kilometres south - west of Ellisras. He was a member of the underclass of Afrikaner settlers who did not own land and worked as a tenant labourer or *bywoner* and fought in the Anglo-Boer war.[12] Seeking a new beginning, he migrated to the inhospitable territory of the Waterberg.[13] The town consisted of a rudimentary commercial centre and barter was a common form of exchange. Ponk Ellis, the grandson of Patric Ellis, described the bartering system of trade in existence when his grandfather settled in the district. White settlers hunted the *bushveld* game for their survival and exchanged dried meat for agricultural crops, such as grain and peanuts, with the nearby

[11] Bill Freund, *The African City: A History* (Cambridge University Press, 2007), 6.
[12] Hannes Engelbrecht, *Ellisras: My Dorp*, Ellisras Nuus Uitgewers (Printers), Undated. This local publication is held by the Lephalale Public Library.
[13]Interview with Ponk Ellis, August 2013, Lephalale.

African chiefdoms. The town's lone storekeeper served as the only contact with cash for the townsfolk. Ellis described farmers exchanging chicken, bones and "anything you could give him" for money or household supplies. It is not clear how the nature of commercial exchange changed over the decades but by the time Michael Deats arrived in Ellisras in the early 1970s, he found an unremarkable smattering of buildings: "There was a bottle store," he said, "And there was a little kind of hotel and when I say little I mean little. And a few houses. And I think there was a magistrate…"[14]

The Waterkloof farm was a natural magnet for residential settlement because of its proximity to the Mogol River. The Mogol River is a tributary of the Limpopo River to the north of Ellisras. Ellis described the settlement as follows: "Everybody [was] just behind the river because they got clean water from the river and they made a plan to get vegetables. That is why they're always behind the river. And the whole world was open and they were hunting for meat."[15]

Before Iscor built the Hans Strijdom dam to supply water to its Grootgeluk coal mine in the 1970s, the Mogol River served as a crucial water supply for farm dwellers. But the river was not an entirely reliable irrigation source, because of its slender and temperamental flow. A long-time resident of Ellisras, Willie Loots described the river's precariousness as follows:

> I was born here and I grew up here, and there have been times where this river was dry two or three years in a row. Where there was no water. Fortunately it has a very deep sand bed, where you could put in sand pipes and then you would suck the water from deep underneath the sand. But that was for household use only and maybe a little bit of cattle but all the irrigation farms basically started when the dam was built.[16]

Until the arrival of Iscor there was little sustainable crop farming in the region. The Mogol Dam, which Iscor built in the 1970s was the first reliable and consistent irrigation source for farmers in the region. While under government ownership, Iscor maintained the dam and controlled the flow of water to the Grootgeluk coal mine, the town of Ellisras and to farmers on a quota basis. According to Loots: "If it wasn't for that [the dam] I think you would have seen probably 70% less farming activities in this area."[17] Dam building had at the time proceeded across the country to encourage crop farming. William Beinart estimates that by

[14]Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.
[15]Interview with Ponk Ellis, August 2013, Lephalale.
[16]Interview with Willie Loots, August 6, 2014, Lephalale.
[17]ibid.

1970 the proportion of South Africa's "channelled water" that was used for irrigation was among the highest in the world.[18]

During the 1960s the growing unfeasibility of cattle farming compounded the dire economic state of agriculture in Ellisras. An inspector who visited the district in 1965 encountered a district that was far from prosperous. A four-year drought from 1961 to 1964 had decimated cattle holdings, leaving farmers heavily indebted. The virulent spread of foot and mouth disease among cattle followed hot on the heels of the drought. Due to efforts to restrict the spread of the disease, presumably quarantine measures, farmers were unable to sell any cattle to repay their loans. The inspector discovered that the overgrazing of farmlands had encouraged soil erosion to levels that made recovery unlikely. To preserve their core herds, farmers had auctioned their cattle at a great speed, depressing livestock prices in the local market. Since farmers used the proceeds of these sales to pay their debts, they received no income from the transactions.[19] The inspector also reported that the main obstacle to successful crop farming was the region's low rainfall and the scarcity of man-made irrigation sources. Some farmers had experimented with "mixed farming" – both cattle and crop farming – with some success. But the volatility of revenue from crop farming meant that cattle farming remained a prized occupation and during the drought only those farmers who possessed cattle herds were able to keep their heads above water financially.[20]

Because commercial agriculture was not wholly viable, the region did not attract large numbers of white settlers. Low white settler density is one of the reasons that the white settlers failed to form a formidable front against the African communities residing in the district during the early part of the twentieth century. For Africans in the district, the story of the twentieth century is one of the gradual erosion of their economic autonomy. According to Sam Sekati, whose parents were born in the Ellisras district, the 1940s saw a discernible shift in the balance of power so that it tilted towards white settlers.[21] This coincided with the NP's assumption of power in 1948 and its concern to improve the lot of Afrikaners in the countryside, a constituency that had proven decisive in its electoral victory. The struggling white farmers of Ellisras received some material and legislative support for economic

[18]William Beinart, *Twentieth-Century South Africa* (Oxford University Press, 2001), 207.
[19]'Potensial van Ellisras,' November 1964; NASA, ACE 50 TS/18/18/1.
[20]ibid.
[21]Interview with Sam Sekati, August 4, 2014, Lephalale.

prosperity. For example, Ponk Ellis recalls that after 1948 the government assisted farmers by drilling boreholes on their land and parcelling out additional plots of land to encourage white settlement.

Sekati described the abrupt manner in which rights to land utilisation were wrested from the resident African communities:

> Yes you must remember the government was for the whites. So they came here, they're staying with you, you borrow [lend] them your cows to plough a portion and later on one morning when you wake up they will call all of them and tell them no, as from today I'm the owner of the farm … it's up to you to stay with me or go and look for another place. And white people were scattered all over now. Wherever you go you see the white owner is the owner of that place.[22]

White settlers won the land by dispossession through bureaucratisation. They demarcated the boundaries of plots of land through pegging its corners and then drawing up title deeds to serve as the ultimate proof of land ownership. Title deeds were backed by the legislative power of the state. This allowed white settlers to acquire economic power by gradually acquiring cattle from the African communities. African farmers had historically used the entire region to roam and graze their cattle, unconstrained by the demarcated property boundaries. Sam Sekati described the dispossession as a gradual process, where white farmers settled on the land in apparent parity with their African neighbours for a time before claiming ownership of the land and presenting a title deed as proof. Then in positions of authority they ordered individual Africans to reduce their cattle stock. As Sekati related:

> And then he will buy your cattle for far less, he will keep on reducing your cattle until you are left with nothing … until they kicked you out. But they don't just kick you out – they make sure the conditions are so difficult for you to live there then at the end you say no I better go and not live here with all these conditions. And then you will go to another place. You have 100, 200 cattle and then you are left with only four or five. And their tactic was that if you refuse to buy your cattle and then you decide to move to another place, another farm, the farmers will communicate. They will say, if a black person is

[22] ibid.

> coming to your farm, don't allow him to bring so many cattle. So that was the strategy; that there is nowhere to run.[23]

This is a familiar tale in the district, with one interviewee lamenting the fact while his father owned a large herd of cattle, he was left without even a chicken to his name.[24]

Nonetheless, despite some initial victories, farmers failed to form an entirely victorious front. Along with various marginal and under-capitalised farmlands in the Transvaal, African settlement on white farmlands in Ellisras stretched into the 1970s. Elsewhere in the Transvaal and in the Free State, black tenancy had been largely eradicated by 1969.[25] Loots recalled the presence of African informal settlements on the farmlands surrounding Ellisras before forced removals occurred:

> If you drive on the road to Mokopane, you'll see farms on both sides of the roads until you get to Shongoane. Now I can remember as a young boy, as you drove from here to Polokwane on the left hand side of the road, there were informal black settlements all along up to Shongoane. And that's like 25, 30 kilometres.[26]

While the exact nature of the economic activities African communities undertook on these farms is unclear, it is apparent that white farmers struggled to source farming labour. This is evident, for instance, in correspondence between government officials related to a group of "unlawful" squatters resident in the town in 1968. Some of the people in question had been working in the town for 18 years. One of the difficulties the responsible government officials faced was that the group was not ethnically homogenous and so could not be transplanted wholesale to a homeland. The group included "Hereros'" from South-West Africa (Namibia) who had migrated into the region in 1918 along with other "dorsland trekkers" or "desert migrants". The Bantu Affairs Commissioner thought that removals had to be cautiously approached because the potential shortage of labour would have a detrimental effect on farmlands and commercial concerns in the town. Removing the workers to farms or to the homelands would mean they had no right to work in Ellisras.[27] The same principle applied to the farmlands: enforcing racial segregation would have deprived white farmers of African labour. Thus Iscor's engineers arrived at a

[23] ibid.
[24] Johannes Mfisa, as part of a group interview with Johannes Mfisa, Hellen Kekae, Hendrik Ndebele, April Selema and Kgantshi Makubela (translator), August 25, 2015, Marapong (Lephalale).
[25] Beinart, *Twentieth-Century South Africa*, 210.
[26] Interview with Willie Loots, August 6, 2014, Lephalale.
[27] From Bantoesakekommisaris to Sekr van BA & O', May 9, 1968; NASA, BAO 3182 C39/1839.

district whose residents lacked the economic and technical means to fully comply with apartheid's urban regulations and segregationist legislation.

Agriculture and Cattle Farming

In Ellisras, as across the Transvaal, the government assisted farmers with improving their agricultural production, drawing them into the orbit of the country's capitalist economy. The report of the government official who visited the Ellisras district in 1965 to describe its economic conditions is couched in a discourse of belief in the modernising power of large-scale economic development.[28] The inspector was concerned to implement scientific methods in a bid to sustain the region's contribution to the national capitalist economy. Timothy Mitchell has remarked on this phenomenon in his historical study of Egyptian agriculture.[29] The inspector reported that the land had a "carrying capacity" of six morgen per large cattle which meant that a farm of the average size of 900 morgen could only hold 150 cattle. This was half the desirable quantity. He encouraged a greater use of scientific methods to improve the quality of the soil so that the area could realise its economic potential. In terms of cattle production Ellisras played a role of some national importance, with the *bushveld* of the North and North West Transvaal supplying 22% of the country's meat. But over-grazing had exhausted the cattle feed in the district and any expansion of the cattle economy meant that an alternative source of feed had to be found.

State financial assistance enabled some farmers to keep their heads above water during the 1970s. Johan Pistorius described the 1970s as a time of great strife for many of the farmers in the Ellisras district. As a member of the committee tasked with channelling government aid to struggling farmers, he traversed the district to investigate the state of the farmlands. He related that:

> We visited a lot of people, we met a guy, he told us with tears in his eyes, 'I'm here for 20 or 30 years and I never made a loss, every year there was a profit.' But the profit couldn't handle the inflation. So costs went up and they couldn't survive.[30]

[28] 'Potensial van Ellisras,' November 1964; NASA, ACE 50 TS/18/18/1.
[29] Mitchell, *Rule of Experts*.
[30] Interview with Johan Pistorius, March 2015, Lephalale.

Government aid took the form of "agricultural credit" with the first five years of the loan interest-free followed by a fixed interest rate of 2%. Pistorius recalled that this was successful in some cases in keeping farmers on the land. Preventing white depopulation of farms on the border was particularly important to the government. A strip of white populated farms along the banks of the Limpopo River was considered necessary to create a protective barrier against guerrilla attacks from the neighbouring countries of Botswana and Zimbabwe.[31]

As cattle farming became increasingly economically unfeasible, farmers adopted game farming as a more profitable occupation. The transition to game farming is a characteristic feature across much of the South African countryside.[32] For cattle farmers to regain their profitability, they had to increase the size of their farms to realise the benefits of economies of scale. Game farming did not require large properties depending instead on more expensive, but fewer, animals than cattle farming required. Game farming was thus to some extent an economic solution to the legal system of inheritance then prevalent in the Transvaal, where land was sub-divided among sons and the size of individual farm plots progressively diminished over the generations.[33] Apart from the problem of overgrazing, cattle farmers were adversely affected by the growth of a persistent cattle-poisoning plant known by its Afrikaans name of *gifblaar*. The *gifblaar* was toxic to cattle and sheep but relatively harmless to game. Between the years 1930 and 1960, he said, the government subsidised the costs of fencing for farmers who sought to fence off the portions of their land containing the plants to prevent cattle poisoning.

In 1974 Pistorius was one of the first farm owners to erect a game fence around his property. Fencing was an important step in the process of game farming because it endowed the game with a monetary value. As soon as a fence was erected around a property, the game within the fence boundary belonged to the property owner. As long as the land was unfenced, the game on the land was public property. Fortunately for the game farmers who invested in specialised and rare species, there was a strong foreign demand for hunting Southern African game. As Pistorius recounted, the first batch of hunters who frequented their farms were locals who considered hunting game cheaper than purchasing meat from the local butcher. Then around 1980 some game farm owners advertised globally, particularly in the USA, to attract foreign

[31] ibid.
[32] Nqobile Zulu, "An Analysis of the Post 1980s Transition from Pastoral to Game Farming in South Africa: A Case Study of the Marico District" (PhD Thesis, University of the Witwatersrand, 2015).
[33] Keegan, *Rural Transformations in Industrializing South Africa: The Southern Highveld to 1914*, (Johannesburg: Ravan Press, 1986) 103.

hunters to their game farms to hunt more exotic, expensive animals. The region now holds world renowned game farms, attracting foreign hunters and tourists on safari. It has also attracted foreign land ownership. For example, one private game reserve is owned by Saudi Arabian investors.[34] During the late 1980s, the state withdrew its enthusiastic support of white farmers, particularly small-scale farmers. But certain farmers adapted to the changing conditions of the free market, determined to retain the profitability of their operations.

Development of the Town

Ellisras's quest to acquire municipal status was a long, drawn out process. In 1957, a property owner in Ellisras, John Oswald Whelpton, applied to the government for permission to establish a town in Ellisras. According to Dries de Ridder, who has served as the Ellisras town planner since 1989, Whelpton was a businessman who took advantage of the fact that the government had placed a bus stop near his property:

> To provide basic goods to the people of Ellisras the South African Government instituted a once a week bus delivery service from Nylstroom, now Modimolle, to Ellisras. The bus stop, which was directly in front of Whelpton's house became a gathering point for the people of the area where they waited for the bus to arrive. Whelpton realized the business potential which was created by the bus stop and opened a small shop which he operated from his house.[35]

As the population of the small Ellisras town increased in density, the Reformed Church and the Dutch Reformed Church set up their operational structures approximately 700 meters away from each other.[36] Each Church wanted to be the center of the incipient, official town. Whelpton belonged to the Reformed Church and made his land available for the township development. In November 1957 a delegation of representatives of the Towns Board visited the town, as well as the Senior Health Inspector of Nylstroom, an urban planner and Mr Whelpton. They found that the proposed town was miniscule, containing three residential houses all with outbuildings, a post office, shop and a police station.[37] Whelpton's chief rationale for establishing the Ellisras town, which he constantly reiterated in his correspondence with government officials was that the main towns of the northern Transvaal were too far away to effectively service the white farmers

[34] Interview with Johan Pistorius, March 2015, Lephalale.
[35] Interview with Dries de Ridder, April 2015, Lephalale.
[36] ibid.
[37] From the Secretary of the Township Board to J. Whelpton', January 6, 1958; NASA, CDB 3209 PB4/2/2/1794..

of Ellisras. His application met the tepid bureaucratic hostility of the Towns Board. While the Towns Board approved the application in principle in 1958, this approval was subject to the existence of certain urban amenities that Whelpton was responsible for providing.[38]

Whelpton had to convince the Towns Board that the town had a suitable water supply source. This meant proving to a civil engineer that there was enough water to meet the town's household requirements. Regulations also demanded that there be enough water for "fire fighting" purposes. While borehole water could potentially supply some of the town's households, the plots of land were too small to ensure that septic tanks for sewage treatment were placed a suitable distance from the boreholes, so raising the risk of underground water pollution. In addition, Whelpton had made no provision for dumping grounds, a cemetery and a working sewage system.[39] The Department of Native Affairs insisted that any emergent town had to demarcate an area to establish a black location. But Whelpton was able to bypass this regulation by making a cash payment to the Department in place of setting aside a piece of land for a black township.

Visiting government officials bemoaned the directionless way that the town had developed. On 9 June 1959, the Commissioner for Urban Areas (*Stadsgebiede)* visited Ellisras to consider its municipal feasibility. When he arrived at the few desolate buildings that together constituted the centre of town, he found that no one was aware of his visit. Following his enquiries, the magistrate of the town Nylstroom alerted a representative from the Ellisras Farmers' Association to his presence who then appeared after 12 hours. The Commissioner's annoyance coloured his subsequent report. He criticised the haphazard "toadstool development" of the few buildings in the town, which he thought would result in irreversible urban zoning mistakes, such as a church where a factory should have been and houses in commercial districts. He argued that the fundamental fault lay in the absence of a local co-ordinating arm, which in other urban areas ensured that buildings developed in line with state regulations.[40]

In 1960 government proclamation declared Ellisras a "township", situated on the farm Waterkloof. Whelpton still had to fulfil certain conditions of service provision and local

[38]ibid.
[39] From HJ Combrink, Senior health inspector to the Head regional health official, October 30, 1957; NASA, CDB 3209 PB4/2/2/1974.
[40] From Stadsgebiedekommisaris to die Ondersekretaris, Native Affairs Department, *Verslag: Dorp Ellisras: Distrik Waterberg*, June 19, 1959; NASA, NTS 4572 1219/313.

administration.[41] He remained consistently at odds with the government. In 1964 he launched legal action in the Transvaal Provincial court against restrictive urban zoning regulations which, he argued, meant that businesses could not be situated where he wished. Eventually in June 1965 the government announced the establishment of the Ellisras District Development Association, which consisted of representatives of state departments and local residents. This was in line with the principle of co-ordinated and representative regional development which, as discussed earlier, was the government attitude to regional development at the time. Urban management in Ellisras later fell under the ambit of the Peri-Urban Areas Board. This was a provincial governance structure that administered small towns. It did not delegate urban governance to local authorities completely and allowed for a loose government oversight. It was only in 1986 that Ellisras gained full municipal recognition from the government. This was largely due to the rapid population growth of the 1980s as a result of Iscor and Eskom's activities in the district.[42]

The initial development of the town was not only haphazard, but also fraught with conflict.[43] In 1971, members of the Dutch Reformed Church attempted to proclaim a township on their land. These competing claims for the development of the town created a situation of fragmented urban development. According to de Ridder, the lack of coordination in the early development of town was clear when he arrived in Ellisras. The main commercial roads were structured in a peculiar "strip" manner rather than the conventional grid-like street system. De Ridder described the early settlement as follows:

> Only in 1971 two members of the Dutch Reformed Church eventually, namely Maans Oberholzer and Naas Fourie, made their land available for township development whereby Ellisras Extension 2 was created. As there was other land between the properties of Whelpton and that of Oberholzer and Fourie and the fact that they were not on a good footing with each other and did not get on well the three townships was separated from each other, no link between the three townships was planned for, exists or was created. Shortly after my arrival in Ellisras I created the first link by way of a high order road – J Louis Botha Drive – between the three townships. Even in 1989 the creation of this link was not easy as some of the land owners and residents were not in favor thereof. Even today the uncoordinated planning of the past (because of "factions"

[41] Proclamation', The Province of Transvaal Official Gazette, December 7, 1960; NASA, CDB 3209 PB 4/2/2/1794.
[42] Interview with Dries de Ridder, April 2015, Lephalale.
[43] ibid.

in Ellisras) influence Ellisras. However, over time and with proper planning this will disappear.[44]

Water

The uneven private provision of water prompted complaints from residents about its high prices and shoddy service. But despite efforts by the Peri-Urban Areas Board to supply water to the town, its ambition was only realised in the mid-1970s with Iscor's help. Whelpton left Ellisras shortly after his legal struggles with the government and headed over the border to settle in Botswana. He sold his farm to a private company called the Joubo Development Corporation (JDC) and left the company to represent his interests in the town. But residents of the town complained of shoddy service and irregular water provision. In November 1965, a resident of Ellisras, Mr LW Botha complained to the Department of Local Areas that water shortages forced him to travel a distance of four miles, sometimes twice a day, to fetch water.[45] After investigating the matter, the head of the Department of Local Areas reported that the JDC appeared to be looking out for their own interests and not that of the residents, charging residents the excessively high price of 82c per litre. His report recommended that the main local authority, the Peri-Urban Areas Board take over the land and water scheme already in place. But the pump system and water source was situated on a section of a farm owned by the JDC.[46] This continually provided the pretext for the Corporation's insistence on its capacity to supply water to the town.

The scattered and unreliable water provision to the town was discussed at a Peri-Urban Areas Board meeting in July 1967. During the rainy season at the start of that year, the pump had been submerged in a flood of water from the Mogol River resulting in a long period of disrupted water supply. Apart from the erratic supply, the pump equipment was so defective that even when water was available, it was too cloudy for normal consumption.[47] No lasting solution to the poor quality and unreliable water supply appeared until the year 1976. Michael Deats, acting for Iscor, promised to provide the town with a portion of the water and

[44] ibid.
[45]'From LJ Botha to Direkteur van Plaaslike Bestuur,' November 1965; NASA, CDB 3209 PB4/2/2/1974..
[46] Summary of Problems in Ellisras Town in Connection with Water, Cemeteries, Land Fill Ground and Location Ground,' April 4, 1966; NASA, TRB 2/4/57 G31/13/0.
[47]Ellisrasse Plaaslike Gebiedskomitee,' July 26, 1967; NASA, TRB 2/4/57 G31/13/0.

electricity that Iscor intended to channel to the Grootgeluk coal mine from the Hans Strijdom Dam and from Eskom respectively.[48] The dam was at the time still in its construction phase.

By August 1976, the PeriUrban Areas Board had received a number of different applications for the establishment of a town by various residents which it rejected because one of the conditions for town establishment was that the board had to ensure the town could be supplied with water within three years. The board refused permission for private parties to provide water to the town. But the completion of the Hans Strijdom Dam took longer than Iscor initially promised and applicants grew angry over the delay.[49] One of these applicants was the JDC which had by then formed a consortium with a company called the *Transmogol Belggings Beperk* (Transmogol Investment Company). The consortium was anxious to undertake the town establishment or *dorpstigting* on an extension of the original Ellisras town.[50] They planned to source water from the Mogol River which they felt could supply their proposed town with enough water to satisfy the board.[51] The board argued that since it had already assigned the role of water provision to Iscor, it was in no position to delegate the role. It also thought it wasteful and a duplication of efforts if the local authority organised its own electricity supply when Eskom was already working to supply electricity to Iscor's coal mine. Thus Iscor and Eskom overpowered private efforts to provide water and electricity to the town, asserting the infrastructural power of the centralised network. The extent to which private producers could have produced a reliable water and electricity supply is not clear. However, Iscor's assumption of the role cemented the dependence of the town's administration on their infrastructure for municipal service provision.

Iscor and Onverwacht

From the outset long-standing residents of Ellisras were suspicious of Iscor's intentions. Michael Deats stated that Iscor bought the farms it required for the Grootgeluk coal mine "for a song" because of the relatively sparse population settlement. But this is not entirely accurate. While the sparse settlement probably made acquiring land in Ellisras less complicated than in other parts of the Transvaal, farm owners still were reluctant to part with

[48]From MJ Deats, Konsult Mynbou-Ingenieur Yskor to die Sekrataris, Transvaalse Raad vir die Ontwikkeling van Buitestedelike Gebiede (Transvaal Board for the Development of Peri-Urban Areas), October 29, 1976; NASA, TRB 2/1/174 61/1/480.
[49]'From ID Potgieter to the Konsult Mynbou-Ingenieur, Yskor', 16 Aug 1976; NASA, TRB 2/1/177 61/1/480.
[50]From Louis Botha & Potgieter to the Hoof: Plaaslike Gebiede(Head of the Department of Local Areas),' April 7, 1977; NASA, TRB 2/1/177 61/1/480.
[51]From Hoof: Plaaslike Gebiede (Head of the Department of Local Areas) to Louis Botha en Potgieter', April 25, 1977, TRB 2/1/174 61/1/480.

their land. According to Joe Meyer, who was more intimately involved in the day to day operations of the Grootgeluk coal mine, the residents of Ellisras responded with some hostility at first:

> We weren't welcomed with open arms here at first. I was one of the team who came here with the lawyers to start the new developments here. The Ellisras people didn't necessarily want us here. They didn't want to sell us any land at Ellisras. The plots at Ellisras were very narrow and ran for kilometres from the river so as to have water rights to make farming possible. We were interested in some of these properties to create a township for our staff. They weren't happy to sell these plots to us. At that time there were a stigma attached to miners and they were scared we would disturb their peaceful life.[52]

In 1987, the issue arose of the newly proposed town establishment scheme by the Peri-Urban Areas Board, and deliberations there are useful in understanding the nature of land ownership on the Waterkloof farm.[53] Through processes of settlement and sub-division over the course of the twentieth century, the farm had fragmented into many small but long plots of land by 1970. Because the farm consisted of numerous small plots of land this meant that Iscor had to negotiate with and gain consensus from many different landowners.

Nonetheless Iscor found a willing seller in the owner of a massive farm called Onverwacht, which lay to the north of Waterkloof. Iscor used the land on its property Onverwacht to build the Grootgeluk coal mine, the African township, residential housing for its own staff and a business district which in more recent times has come to hold an open air shopping mall. In determining the site of its proposed town, Iscor was concerned with the designated flood line and the need to avoid building activity on potential mining ground. The nature of the flood line meant that Iscor could only build its town five kilometres away from the original Ellisras town.[54] This spatial division defied the government's policy of integrated town planning which mandated that new developments in urban areas build on pre-existing urban centres.[55]

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[52] Interview with Joe Meyer, March 17, 2015, Onverwacht.
[53]'Die voorgestelde besigheidsentrum te Onverwacht, Ellisras, Ellisras Plaaslik Gebiedskomitee,' December 15, 1980; NASA, TRB 2/1/174 61/1/436.
[54]'Ellisras Vergadering', July 3, 1975; NASA, TRB 2/4/57 G31/13/0.
[55] Interview with Dries de Ridder, April 2015, Lephalale.

To proceed with the construction of a separate "town" Iscor successfully sought special permission from the Department of Local Areas to develop Onverwacht.[56]

At a meeting held in Ellisras in July 1975 where residents of the town discussed the fragmented urban development, one of the committee members suggested that the restaurants, schools and the farming community would not readily give up frequenting the traditional business district of Ellisras. He argued that the mining towns of Evander and Kinross, both situated in the Eastern Transvaal or Mpumalanga, were representative of this since the farming communities there continued to support the original business centre, which functioned as a focal point for the towns' outward expansion.[57] But Iscor's developments split Ellisras' commercial life in half- resulting in two separate and antagonistic Chambers of Commerce, each representing the different central business districts.[58] As a businessman of the old, traditional business area of Ellisras, Loots and a business partner decided to develop a shopping centre with relatively low cost stores, geared to service an African clientele. But businesspeople in Onverwacht had also erected a shopping centre there and this created some competition between the two commercial centres. By 1980 the concerted involvement of Iscor and Eskom and their stimulating effect on the local economy had become apparent. In December 1980, the Peri-Urban Areas Board discussed the need to expand Ellisras' trading capacity considering the town's projected population increase. The Board hoped that Ellisras and Onverwacht would eventually merge to form a "single geographical unit.[59] This vision has yet to be realised.

As time wore on, long standing residents of Ellisras voiced their discontent over what they considered to be Iscor's intrusive presence. Residents complained over Iscor's proposed developments, which included building a new road to connect the two urban commercial centres. While it is unclear how much sway these complaints held, they are useful in gauging the opinions of local residents. One resident complained that the proposed road building would fragment his property and destroy his valuable agricultural installations. This included a sprinkle irrigation system whose pipes would fall under the tarred road, and make it no longer possible to irrigate his ground. In addition, a third road would ensure he was estranged from his adjoining plots of land situated further out in the *bushveld*. He proclaimed that "we"

[56]'Iscor's Rights in Onverwacht,' 1975, TRB 2/1/174 61/1/480.
[57]'Heil die Leser! Departement van Plaaslike Bestuur', May 25, 1978; NASA, TRB 2/1/174 61/1/480.
[58] Interview with Johan and Theo Pistorius, September 2014, Lephalale.
[59]'Die voorgestelde besigheidsentrum te Onverwacht,' Ellisras Plaaslik Gebiedskomitee,' December 15, 1980; NASA, TRB 2/1/174 61/1/436."

(presumably meaning himself and other longstanding land owners) held no interest in the proposed town, and were unimpressed by the so-called "boom" that Iscor promised. He asserted that they wanted to be left alone with their own problems. Rejecting the idea of a shared regional prosperity, he wrote that Iscor should develop where it liked and leave the old town and property owners to their own devices, even if this meant that Ellisras became a "ghost town".[60] Thus Iscor was forced to contend with local elites in the interests of co-ordinated urban planning, at times conceding to and at other times ignoring their demands.

Forced Removals

Once Iscor arrived, the black families living in informal settlements on white owned farmlands surrounding the town of Ellisras were banished to the Lebowa homeland. An informal black location had formed at the outskirts of town, referred to as the Pahama location. Government officials also targeted this location for forced removals. There are two apparent possible reasons for this. The first is Iscor's need for mining labour. Soon after Africans were forcibly removed from the white owned farms, Iscor constructed its hostel for single males. Thus the migrant labour system in existence almost everywhere else in the country was finally extended to its north western border. The second is the threat of an insurgency from the neighbouring African countries. Certain municipal and government officials thought that an African settlement within the town could easily be infiltrated by terrorists, posing a security risk to the white town.

The removal was a traumatic one for many. In 1979, the *Sunday Express* detailed the mass removals of an estimated 20 000 Africans from small towns in the Northern Transvaal, including those residing in black townships and locations.[61] Apart from Ellisras, the Northern Transvaal towns of Naboomspruit, Nylstroom, Vaalwater and Louis Trichardt were also affected. The removals were therefore part of the broader segregationist plans, which involved re-locating Africans out of white urban areas and into the homelands. This was necessary to bolster the viability of formally established black local authorities.

In addition, correspondence over "black spot" removal in Ellisras reveals the Commissioner for Bantu Affairs' frustration at the fact that he held no authority over Africans who were resident on white owned farms. The chief director of the Northern Transvaal Administration Board based in Pietersburg reiterated this point to reporters from the *Rand Daily Mail*. When

[60] From die Voorsitter, Dorperaad, 'Ellisras dorpsbeplanningskema,' April 7, 1987; NASA; CDB 9987 PB4/9/2, p3.
[61] "20 000 Are Banished to Dumping Grounds," *Sunday Express*, July 29, 1979.

these reporters visited Ellisras to report on the forced removals there, they struggled to locate the site of the informal location: "We had difficulty in finding the site of the former Ellisras location, two kilometres outside the town. At last we realised we had driven past it – it had been bulldozed flat, the ground surrounded by a two metre game fence. A few ostriches were stalking among the ruins."[62]

The newly erected hostel, painted a "vivid pink" was situated 20 kilometres out of town, close to the Grootgeluk coal mine and described as already populated with black single men. Their wives and children lived in Stelloop, which was in the Lebowa homeland and provided little employment opportunities. The government subsidised the cost of four-bedroomed houses but according to Sekati, living conditions remained unbearable. As a result, those who were financially able departed as soon as the dissolution of the apartheid regime rendered residential restrictions obsolete.[63]

Part of government's rationale for forced removals was that African settlements posed a health risk and encouraged the spread of disease in white areas. During the early 1970s officials from the Department of Health periodically voiced their concerns over the unsanitary conditions of the African informal settlements in the Ellisras district. The Health Department played a particularly prominent role in local governance. The first permanent official tasked solely with the town's administration in 1966 was officially titled a health official. Since the Ellisras local authority could only afford the salary of one official, it opted for a health official. He oversaw disease prevention through smallpox vaccinations, polio immunisation and measures to control TB, malaria and bilharzia. Apart from ensuring the requirements of the Department of Health were met, he also functioned as a building inspector and a Bantu Administrator Affairs official.[64] He thus had to maintain the sanitation infrastructure such as drainage and rubbish collection.[65]

The Ellisras Local Areas committee agreed to assume payment of the official's salary without assistance from the Department of Health because he was tasked with various other facets of the town's welfare. The initial agreement it reached with the government stipulated that the official's salary be funded by a government subsidy and the residential rates it would start

[62] ibid.
[63] Interview with Sam Sekati, August 4, 2014, Lephalale.
[64] Stationing a Permanent Health Inspector: Ellisras Plaaslike Gebiedskomitee', April 1, 1966; NASA, TRB 2/4/57 G31/13/0.
[65] From the Head Medical Health Official to the Ellisras Local Areas Committee,' September 10, 1965; NASA, TRB 2/4/57 G31/13/0.

collecting from July 1966. This arrangement was to persist until a "Bantu" local authorities system was established, which would then contribute to the official's salary in a proportionate manner. The town's administration contained a meagre staff contingent. In 1970 the administration's only black employee was responsible for the constant supervision of the engines for the water pump station. In addition, he kept the streets of Ellisras clean, oversaw the spraying of mosquito repellent and assisted the health inspector with various office duties; a load so heavy that he was unable to visit his family who resided in the homeland.[66]

Ellisras officially fell under the ambit of the Group Areas Board in 1966 and the unregulated presence of informal settlements on white owned land then swam into the government's focus. An inspector from the Group Areas Board who visited the town in 1966 found to his dismay that African families were spread all over the general district of the town. Many of the "squatters" occupied farmlands with the consent of the owners in tenancy arrangements. He insisted on proceeding with the establishment of a black township and began discussions with the Ellisras Area Committee to demarcate land.[67] Despite some consensus, the committee remained irresolute on the matter, much to the inspector's annoyance.

While local officials dragged their feet, by the early 1970s the arrival of Iscor was no longer in doubt, and the need for ordered urban development in response to the coming industrialisation became more urgent. Government officials cast renewed attention on the black families scattered in the general vicinity of the town. In 1975 the Commissioner for Bantu Affairs reported on the presence of black squatters on the farm owned by Mr Loots, which did not contain the necessary amenities for their residence. Loots was at the time in the midst of evicting the squatters from his land and the Commissioner feared that further evictions would hasten a desperate labour shortage for the town and its surrounding farmlands. Chastising the Peri-Urban Areas health inspector, he reiterated the need for the speedy development of a black township so as to effectively commence with the removals.[68] The Peri-Urban Areas Board responded that a member of the Northern Transvaal provincial government had promised in November 1974 that the building of the township would

[66]'Aanstelling van 'n addisionele Bantoe in diens van die Raad: Plaaslike Gebiedskomitee van Ellisras,' February 1970; NASA, TRB 2/4/57 G31/13/0.
[67]'Ellisras: Instelling van Groepsgebiede,' October 14, 1966; NASA, GMO 1/177 4.
[68] Commissioner for Bantu Affairs to the Health Inspector for the Peri-Urban Areas Board, October 24, 1975; NASA, TRB 2/4/57 G31/13/0.

commence in April 1975. Thus the forced removals required to realise the vision embedded within the country's segregationist legislation could only be brought about once the infrastructure of a township was available.

There is a clear link between the industrialisation thought to follow from Iscor's activities and the intense concern over health and hygiene in the town. On the 8 March 1976 the Health Inspector reported that generally unhygienic conditions prevailed in the African squatter camp, and daily generated complaints from the Ellisras white "public". The "squatter camp" in question was the informal settlement known as the "Pahama" location. In addition, he wrote, the arrival of Iscor heralded a more chaotic residential situation and was likely to create the perfect conditions for the spread of infectious disease such as polio, chicken pox, TB and diphtheria. The Health Inspector also visited the farms of two farm owners on which Africans lived – Mr van Rensburg and Mr Horn – and reported that while the immediate surroundings of the "Bantu" huts were clean, the "Bantus" on Horn's farm dumped their rubbish over the border fence. In addition, African residents drew their drinking water from the Mogol River and suffered from a general lack of sanitary services. He hoped the Commissioner of Bantu Affairs would co-operate in providing latrines and proper water supply. But more importantly, as the final solution for the sanitary problems associated with black informal dwellings, the health inspector sought assurance that plans for the black township had been finalised.[69]

While health officials continually expressed their concern, the Commissioner of Bantu Affairs for the Northern Transvaal succeeded in expediting the forced removals. This was in line with a broader national move to eradicate "black spots". His concern lay particularly in the fact that the office of the Commissioner for Bantu Affairs could not control the Africans living on white owned land and had no authority to dictate their treatment to the white farm owners. Again local officials in Ellisras responded that the fundamental obstacle to forced removals was the absence of alternative housing, which meant that forcibly removing the black families from the land would cause shortage of African labour in the town. At that time the Bantu Trust was about to purchase land in the vicinity of the town of Marken, roughly 70 kilometres away from Ellisras, for the construction of a black township. This proposed site would eventually become Stelloop. Since it was situated inside the Lebowa homeland,

[69]From Hoofmediese Gesondheidsbeampte to Hoofbantoesakekommissarie, March 20, 1976; NASA, TRB 2/4/57 G31/13/0.

government officials intended it to house the families of single males otherwise resident in the town's hostel.[70]

In 1976, Iscor promised that it would construct a hostel for single males on the Grootestryd farm and to build accommodation for 3% of African employees on a family basis. In the meantime the Pahama location was declared a temporary location and its residents earmarked for later relocation to the homeland.[71] The Northern Transvaal Bantu Affairs Administration Board applied to purchase a tiny section of the Grootestryd farm from Iscor to be used for a hostel that would house 600 single men who were ordinarily employed in the town.[72] Iscor retained 502 hectares of the property on which to situate a hostel that would provide temporary housing for workers employed by Iscor's sub-contractors.[73] The Board intended to move black families out of the Pahama camp because it hadn't provided them with suitable housing facilities and bus services. Thus the necessity for a black township remained, only to be resolved in the 1980s.

Homeland consolidation

At the same time the government urged the development and financial autonomy of local black authorities. This was in line with national attempts to increase the country's tax revenue during a time of panic over the spiralling inflation rate. In a bid to curb government spending, the Treasury urged the decrease of spending in the homelands through increasing the tax revenue of the homeland authorities. As a result government urged the local authorities to ensure that African workers paid taxes to the relevant local authorities. African workers in white areas posed a particular challenge because there was no systematic method in existence of collecting taxes from their wages.[74] This effort to improve the viability of the homelands was termed homeland consolidation by the government. The state had successfully purchased land to the value of R350 174 445 and added it to the various homelands of the country. The declared intention of the homeland consolidation was to promote national development of the "black states". Sticking firm to the principle of racial nationalism, the Prime Minister in 1979 announced in parliament that:

[70] Head Bantu Commissioner for Native Affairs to the Head Medical Health official of the Transvaal, Peri-Urban Areas Board, September 22, 1976; NASA, TRB 2/4/57 G31/13/0.
[71] Memorandum: Aanonafgehandelde sake, May 4, 1976; NASA, TRB 2/4/57 G31/13/0.
[72] 'From NA Lombard, Streekverteenwoordiger', May 8, 1977; NASA, GMO 1/177 5.
[73] 'Memo: To the Hoofdirekteur Bantoesake Administrasie', February 9, 1977; NASA, BAO 3/4074 A12/2/6/E10/15.
[74] 'Gesamentlike aksieprogram teen inflasie: Invordering van bantoebelasting,' October 7, 1976; NASA, TRB 2/4/57 G31/13/0.

> The attempt to unman the Afrikaner and make of him something that floats between heaven and earth will not succeed in the case of the Black man either. One can only make progress if one upholds and respects his cultural possessions, traditions and his own ideals."[75] He was not "prepared to tamper with the right to self-determination" of different people (black and white), and condemned the so-called liberalism of the United States where despite the repeal of discriminatory legislation, "35% of the Negro population are living below the breadline…[76]

To bolster the fortunes of the African homelands, government commenced with a wave of "black spot" removals, which elicited protests not only from the affected communities, but also from the homeland leadership of Lebowa. In a speech delivered in 1987, the Chief Minister of Lebowa, Nelson Ramodike, described his predecessor Cedric Phatudi as a liberation hero who had likened homeland "independence" to "self-strangulation" [77] Ramodike called for the Legislative Assembly to reject the notion of independence as part of the constitution of the Lebowa homeland. Lebowa was not an ethnically exclusive homeland, he argued, and would house people of different tongues within its borders. Despite the dissent, business proceeded as usual, and the government continued to consider Lebowa a homeland for "Northern Sotho's". In 1985 members of the Seleka community, who resided in a village near Ellisras, launched legal action against the Minister of Justice of the Lebowa homeland. They protested his declaration of the Seleka "tribal" land of Beauty, in the vicinity of Ellisras, as part of Lebowa in 1969. In addition the Seleka resented their official incorporation into a Northern Sotho homeland because they argued that as Tswana speakers, they did not fit in on an ethnic basis.

Government officials were also concerned at the time to protect the country's borders against guerrilla incursions from neighbouring African countries. Ellisras was an important strategic focus for border defence. Before the arrival of Iscor, Ellisras had already held a military airport housing fighter planes and other defence aircraft.[78] Nonetheless, the evidence that government officials urged the construction of Eskom's power station because of border defence considerations is not conclusive. In addition the extent of government's influence on Eskom's decision making is not entirely clear. As I discuss in Chapter Three, security

[75] Hansard, February 7, 1979, col 245.
[76] ibid, col 246
[77] 'Address by the new chief minister of Lebowa: The honorable MN Ramodike'; Lebowa legislative assembly: Lebowakgomo, October 21, 1987; NASA, MSB 706 3/5/10/3/8.
[78] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.

concerns were a disincentive to Eskom's engineers to building a power station in Ellisras because of the threat of sabotage and destruction. However, Iscor and Eskom's activities in the region assisted with bolstering the border presence of white South Africa and preventing the rapid depopulation of the farmlands.

The apartheid government at the time was concerned about the depopulation of the border areas. Following Mozambican independence and the coming of black majority rule in Zimbabwe, by 1982 the north-eastern Transvaal border areas were considered white "outposts."[79] The fact that the agricultural conditions of these farms were not particularly propitious did not help. The government gave concerted attention to the problem of securing the border areas, a persistent concern from the late 1970s to the 1980s. In 1978, the newspaper *Die Transvaler,* quoting figures from the District Agricultural Union, showed that 60% of the farms in the Ellisras district had no white farmers on them. In the nearby town of Thabazimbi, the percentage was higher, at 75%.[80] While these figures may have been exaggerated, the report would still have stoked fears of depopulation. The Johannesburg-based newspaper, *The Citizen*, reported that 10 000 square kilometres of farms in Ellisras had been sold or abandoned by white farmers resulting in high levels of depopulation. Apparently, the Civil Defence Unit had ensured that farmers could access medical supplies, food, fuel and ammunition in a secret location in case of an invasion. The District Agricultural Union had applied to the Minister of Agriculture, Hendrik Schoeman, for government loans at reduced interest rates so that the remaining farmers could purchase two-way radios and erect security fences around their farms.[81]

The security threat was not groundless. Newspaper articles from the 1980s detailed incidents of bombings. In one case police shot and killed a suspected "terrorist" after he allegedly attempted to throw a hand grenade at them.[82] In 1986, a land mine in a farm in the Stockpoort district exploded and killed an elderly couple. The chairman of the Ellisras Farmers' Association told the *Star* that unoccupied farms in the district provided a safe haven for "illegal immigrants" and were breeding grounds for terrorist activity.[83] In 1984 the Ministry of Constitutional Development and Planning approved R34-million in expenditure over two

[79] "Tvl Border Areas Now A 'white Border Post,'" *Pretoria News*, February 4, 1982.
[80] "Grensplase Ontvolk [Depopulation of Border Farms]," *Die Transvaler*, May 26, 1978.
[81] "Massive Exodus from Border Farmlands," *The Citizen*, August 21, 1978.
[82] "Police Kill a Suspected Terrorist," *The Star*, August 7, 1984.
[83] "Idle Farms Get Blame for Mines," *The Star*, January 7, 1986.

years to "stabilise" the border region of the North Western Transvaal by improving its "agro-economic conditions". These improvements included infrastructural development such as the electrification of the district and road building schemes. [84]

But apart from the incidents described above, there is little to indicate an impending insurrection. A newspaper article that farms on the Botswana-South Africa border farms as being on the "frontier" stated that it was "difficult to find two white-occupied farms in a row. One white ranch manager told me he did not have a white neighbour for 20 kilometres." Nonetheless the main interviewee in the article, seventy year old Piet Pretorius denied feeling under any threat, downplaying the paranoia of the "townspeople" and describing his friendly relationship with the chief across the river.[85] According to Pistorius, landmines were at times encountered on farms that lay on the border:

> There are a lot of farmers in our area who were lost at that stage. In 1980 especially, de Beer, I was on his farm with the credit committee investigation and we travelled the farm and had a good look and then said we're going back. And then the next morning his father in law and his wife were driving on the farm and drove over a landmine and they were killed. And that was the same road we drove on the previous day. So that was a big problem, especially the landmines. There were a lot of landmines that they picked up.[86]

This fear of terrorism shored up support for the NP during a time of severe fragmentation of the Afrikaner nationalist project. The NP held campaign rallies across the Transvaal to reassure the embittered electorate that the party held their interests at heart. In one of these, held in Ellisras in November 1978, the Prime Minister PW Botha appealed to NP members for unity in the face of mounting claims from his own camp that a split would be an essential component of the party's "purification" process. He nonetheless defended the need for policy changes.[87] The Northern Transvaal was a notorious site of support for the emergent Conservative Party (CP), which broke away from the Nationalist Party in 1982, who opposed the compromise the latter appeared to make to racial segregationist policies and its concessions to big capital. The NP had to particularly defend its parliamentary concessions,

[84] "Government Approves Plan to Boost Border Security," *The Citizen*, December 12, 1984; "R34 Budgeted to Stabilise Transvaal Border Areas," *The Star*, December 13, 1984.
[85] "SA's Frontline Dwindles," *Sunday Tribune*, January 20, 1980.
[86] Interview with Johan Pistorius, March 2015, Lephalale.

[87] "PW and the Gamble That Failed," *Sunday Express*, November 26, 1978.

which allowed blacks a greater participatory role. The policy of homeland consolidation was also controversial, because of the perception among some rural Afrikaners that their land was being expropriated for the purpose of enlarging the homelands.

Conclusion

While chiefly concerned with the successful operation of the Grootgeluk coal mine, Iscor's engineers had to acquire the consent from local elites to construct the infrastructure network that the mine required. This was won in part by Iscor's engineering and financial prowess which promised tangible economic benefits for the white townsfolk and farmers in the town. Iscor's infrastructural network overpowered the efforts of private producers to develop municipal service delivery infrastructure. While forced removals of black informal settlements coincided with Iscor's arrival in the town, Iscor was not the driving force of the removals. Iscor's presence made industrialisation a more urgent threat, forcing local officials to pay more attention to urban and municipal regulation. Government officials intended stringent urban regulation to ward off the perils of industrialisation, such as the spread of infectious disease and environmental pollution. Forced removals were also in line with the government's prerogative to improve the fiscal viability of the homelands. Iscor's arrival hastened the process already afoot to bolster black local authorities across the country. This meant, in particular, the removal of so-called "black spots" in areas legally demarcated for white habitation across the countryside. Thus the extension of state power was mediated by the parastatals, whose engineers enjoyed a significant degree of autonomy in their activities at the local level. They consequently became one among various other power players in the Ellisras district.

Chapter 3: Eskom and the Matimba Power Station

Introduction

This chapter describes the development of the Matimba power station in the Ellisras district, a power station that set the stage for the construction of the Medupi power station in the region twenty years later. The exceptionally hot and water-scare environmental conditions of the Waterberg posed a particular challenge to Eskom's power station development. The Matimba power station, built during the 1980s, was a high-risk proposition using special technology that Eskom had little experience in handling. While this did not represent a major compromise on Eskom's part, the fact that Eskom's engineers had a high tolerance for risk made the construction of the power station possible. As described in Chapter One, in the case of Iscor and the Grootgeluk coal mine, Eskom easily tolerated this risk because it was in the interests of national development. The Matimba power station was the fifth of six new power stations that Eskom built during the 1970s and 1980s. This massive expansion of its power generation capacity was occasioned by Eskom's need to meet the massive increase in national electricity demand that it had forecast. But the load forecast, which rested largely on the fickle fortunes of the country's gold mines, eventually proved inaccurate because it had over-estimated future demand. While critics later argued that Eskom lacked accountability to the public during this period, they were primarily concerned with the need to achieve economic self-sufficiency. Thus techno-politics were enacted under conditions of a heightened appetite for risk-taking. Eskom's engineers also played a techno-political role in Ellisras to mould the town in accordance with their vision of a prosperous and stable workforce. In the late 1980s, Eskom's engineers considered apartheid's segregationist dictates to be inimical to the development of a suitable black workforce. They thus initiated the development of family housing for African workers in the Marapong township with special permission from President FW de Klerk in 1989. This marked the start of racial transformation and efforts at social integration, which will be discussed further in the following chapter.

In Thomas Hughes' comparative study of metropolitan electrification he describes the reverse salient as a method of dealing with uncertainty. [1] The reverse salient is a term generally used

[1] Thomas Parke Hughes, *Networks of Power: Electrification in Western Society, 1880-1930* (John Hopkins University Press, 1993), 79.

in the military, to describe bottlenecks in the advance march of military soldiers. The bottleneck slows the progress of the entire cavalry, forcing those at the front to halt and correct the disturbance. In the context of large technical systems the reverse salient refers in a similar way to the processes of revision by engineers. Rather than a seamless configuration of parts, the large technical system is an incrementally formed patchwork requiring constant negotiation among the key players. Hughes describes systems buildings in post-war America as initially driven by the insatiable military appetite for new defence technology, and later appropriated by more "politically and environmentally sensitive" engineers after the 1960s.[2] The complexity of systems building, which incorporated both social and technical factors, gave rise to unforeseen challenges. American engineers were particularly concerned with the need to control technology. This was not to prevent an apocalyptic future of machine domination but to align the technology more closely with the ends that its designers intended it to fulfil. The collectivism of systems-builders differed fundamentally from the pattern of technological development generally described for the nineteenth century.[3]

In the case of the Matimba power station, I argue that the dire effects of uncertainty were cushioned by the high levels of co-operation among corporations within the South African power station construction industry. This situation contrasts with the construction of the Medupi power station twenty years later, which did not enjoy the same level of coordination among industrial corporations. Also in contrast with the Medupi power station, demand for power stations globally was low at the time that Matimba was built. As a result Eskom enjoyed a better bargaining position in its relationship with the foreign engineering companies responsible for the provision of specialized engineering power station equipment.

This coordination in industry was also a product of the focus on nation-building. For countries around the world, national infrastructure development had to contend with the interests of European or American-based specialised engineering contractors and the price volatility of the global market. The parastatals resisted being drawn into the orbit of global engineering dependency. The role of autarky in determining technological design is not particular to South Africa. Gabrielle Hecht has demonstrated, for instance, in her study of nuclear power in France that French nationalist sentiment was too weak to determine the

[2] Thomas P. Hughes, *Rescuing Prometheus: Four Monumental Projects That Changed Our World* (New York: Vintage, 2011), 26.
[3] See the Introduction to this thesis for a more detailed discussion of this transformation in technological development.

country's ultimate choice of nuclear reactor.[4] The water-reactor system, for which French corporations required a license from the American-based firm Westinghouse, won the day despite heated resistance from trade unions and other civil society organisations that claimed the deal would strike a blow to French autarky. In South Africa however, it is possible that the drive for national self-sufficiency, buoyed by growing international hostility to the apartheid regime, encouraged the collaboration and co-operation among corporations. Eskom in particular was compelled by the government to channel supply contracts to South African manufacturers where the capacity existed.

This chapter also describes the development of the Matimba power station in the context of the development of a national centralised electricity grid. Centralisation meant that Eskom's electricity generation network assumed responsibility for electricity generation over that of the various regional bodies. While it is tempting to consider the mode of electricity centralisation as a mechanism through which the state enabled the transmission of state power throughout the country, there is no evidence to suggest that the government assumed the driving role. Rather Eskom initiated centralisation to realise economies of scale in response to the changed international climate for investor funding. The autonomy of Eskom's engineers is further demonstrated in their technological choice for the Matimba power station. Rather than being deterred by the potential security risk of the region, they adapted the power station design to meet it. Thus the politically tenuous context was not enough to inhibit Eskom's power generation expansion. In his parliamentary announcements, the Minister of Economic Affairs defended Eskom's decision to centralise electricity provision on a national grid. He cited the Borckenhagen Report, made available in 1968,[5] whose authors argued that electricity provision by a single entity contained numerous cost advantages particularly with the possibilities opened up by long distance electricity transmission.[6] As will be discussed below, Eskom's decision to construct Matimba in the Ellisras district was conditioned by a whole range of technical and environmental factors, many of which Eskom's engineers failed to anticipate during the initial planning stages.

[4] Hecht and Callon, *The Radiance of France*.
[5] *White Paper on the Reports of the Committee of Enquiry into the Financial Relations Between the Central Government, the Provinces and the Local Authorities: The Borckenhagen Reports* (Pretoria: Republic of South Africa, 1971).
[6] Hansard, June 3, 1968, col 6411

Eskom and the CGU

The Matimba power station was built against the backdrop of Eskom's implementation of a centralised national electricity grid. Before this, regional authorities had been responsible for generating and distributing electricity. But the Sharpeville massacre of 1960 had laid bare the brutal reality of apartheid and Eskom's risk profile increased as foreign investors viewed South African utilities with greater trepidation.[7] Ian McRae, who oversaw the development of Central Generation Undertaking (CGU), described the creation of the national electricity grid as a strategy to attract foreign funding.[8] The CGU assisted in improving investor confidence by creating greater economies of scale through the separation of electricity generation from its distribution. The inter-connected grid allowed electricity to travel in an even manner, from the areas of electricity generation to the regions where demand was highest, even if the geographical region where the power station was situated did not coincide with the region in which its electricity was consumed. The centralised network also required less electricity in reserves than the cumulative requirement of each individual regional undertaking. It thus allowed Eskom to expand its electricity generation by building new power stations despite the hostile international financial context.

Raising Capital

To spurn dependence on volatile inflows of financial capital, Eskom sought to harness the power of domestic revenue sources. The Capital Development Fund (CDF) functioned as a "sort of capital savings scheme"[9] into which Eskom deposited amounts of up to 3% of its outstanding debts. Electricity consumers – households and businesses – paid higher electricity tariffs to fund these tariffs. Eskom had justified higher electricity tariffs on the basis that consumers would in future benefit from lower electricity tariffs, which did not carry the burden of funding heavy capital expenditure. Because Eskom was officially a non-profit body, it had to gain parliamentary approval to create the CDF. Approval was duly granted in 1971, under the auspices of the Electricity Amendment Act of 1971. In 1972, the first year of the Fund's operation, a 7.3% hike in electricity tariffs, added R1- million to the fund. This tariff increase was followed by a spectacular 20% increase in each year for the

[7]StephenR. Conradie and L. J. M. Messerschmidt, *A Symphony of Power: The Eskom Story* (Johannesburg: C. van Rensburg Publications, 2000), 141.
[8] Ian McRae, *The Test of Leadership: 50 Years in the Electricity Supply Industry of South Africa* (Muldersdrift: EE Publishers, 2006), 31.
[9] Conradie and Messerschmidt, *A Symphony of Power*, 142.

next five years.[10] While the CDF was a significant source of capital income for the expansion plan, the increased electricity tariffs were the beginning of public consternation at Eskom's seemingly all-powerful place in the national economy.[11] Grove Steyn dates Eskom's unpopularity with the general public to this period; an unpopularity that reached its apogee with the de Villiers Commission of Inquiry into the Supply of Electricity in South Africa of 1984. As Steyn writes, Eskom's ability to harness domestic sources of revenue for its expansion programme, and reduce its dependence on foreign loans, created the financial conditions for its risky investment decisions, and for its "further unchecked growth".[12]

By 1973 Eskom had successfully centralised electricity provision on the national grid. The year was also a turning point for Eskom's operational efficiency as the utility adopted electronically driven management systems particularly for planning and coordination purposes. On the back of these efforts at fund raising and operational improvement, Eskom embarked on a large-scale expansion drive. The newly-commissioned power stations were collectively dubbed the "six-pack," because they were built at the same time or within a short space of each other. The simultaneous construction allowed Eskom to enjoy the benefits of bulk purchasing which meant that the power stations boasted equipment of a similar design. With the exception of Matimba, the new power stations were built amid the coal fields of the Eastern Highveld, known today as Mpumalanga. Most of the collieries in the region, which were also Eskom's coal suppliers, were owned by Anglo American as part of their decades-long monopoly of the national coal industry.

Load Forecast

The vacillations of the commodity prices played a crucial role in the relentless drive of Eskom's engineers to achieve national self-sufficiency. This historic importance of the gold mines for South Africa's economy and their demand for electricity has lent credence to the idea of the Minerals-Energy Complex. Ben Fine later reflecting on the main conceptual influences of the MEC wrote the following:

[10] ibid.
[11] Anton Eberhard, "The Political Economy of Power Sector Reform in South Africa" (Programme on Energy and Sustainable Development, April 2004). In *The Political Economy of Power Sector Reform: The Experiences of Five Major Developing Countries* (Cambridge ; New York: Cambridge University Press, 2007).
[12] Grove Steyn, "Governance, Finance and Investment : Decision Making and Risk in the Electric Power Sector." (Ph.D thesis, University of Sussex, 2001), 96, http://ethos.bl.uk/OrderDetails.do?uin=uk.bl.ethos.390926.

> …The first two things more or less that came my way in terms of reading were a Government Report on ESKOM, de Villiers (1984), and Duncan Innes' (1983) book on Anglo-American. From these, it was inescapable that there was an integral partnership between state and private capital, and an equally integral connection between a core set of activities around mining and energy, straddling the public/private divide.[13]

Eskom's expansion project during the 1970s and 1980s, which necessitated the construction of the six new power stations, was based on its own estimates of the country's electricity demand. The electricity demand of the gold mines formed a large component of these calculations. During the 1970s the country's electricity demand was the highest it had been since the immediate post-war period. This was largely due to the South African government's intensified efforts to encourage mineral exports and the infrastructure projects that were expected to facilitate them. Eskom promised a slew of new power stations in response and cast an eye out for alternate sources of energy, contemplating the electricity-producing potential of neighbouring Southern African countries. One of these, which subsequently proved a reliable source of electricity for South African consumers, was the hydro-electric Cabora Bassa dam in Mozambique.[14] But Eskom's demand forecast proved to be a serious miscalculation, when it became clear at the end of the 1980s that Eskom had too much electricity generating capacity. One of the newly constructed power stations, the Majuba power station, had to be mothballed because Eskom had enough electricity generating capacity to satisfy the country's demand. Thus electricity supply had overshot demand.

Eskom's failure to effectively predict demand was not for lack of trying. Revisions of the load forecast were a recurring point of discussion in its correspondence and memorandums from the period. The report of the de Villiers Commission, released in 1984, blamed the erroneous load forecasting on Eskom's use of econometric forecasting methods. Econometric forecasting is a method that relies on past patterns to predict future behaviour and the report criticised the model for not accounting for the discontinuity of the unprecedented oil crisis of 1973. But this is not an entirely fair critique.[15] Archival records demonstrate that Eskom also conducted a qualitative analysis of the economy's electricity needs. Calculations were also

[13] Ben Fine, *The Minerals-Energy Complex Is Dead: Long Live the MEC*, 2008, Unpublished paper https://eprints.soas.ac.uk/5617/1/MineralEnergyComplex.pdf.
[14] Conradie and Messerschmidt, *A Symphony of Power*.
[15] Willem Johannes De Villiers, "Report of the Commission of Inquiry into the Supply of Electricity in the Republic of South Africa" (Government Printer, 1984).

based on a collation of each regional administration's assessment of the needs of the industry and of the populace within its territory. In 1978 Eskom's management board decided that its previous estimates of future demand had been too low. This was because of the electricity requirements of Swawek, Eskom's electricity generating equivalent in South West Africa, which had previously been discounted, and of new uranium enrichment projects that were then in their infancy. The Board thus laid to rest debates over whether or not to downscale Eskom's expansion project and reduce the number of power stations in the pipeline, resolving instead to see the power stations to completion.[16]

Apart from uncertainties surrounding electricity demand in the country, Eskom was also concerned about the reliability of its electricity supply. The departure of the Portuguese colonial authorities from neighbouring Mozambique following its independence in 1975 had cast a shadow of uncertainty over South Africa's access to the electricity generated by the Cabora Bassa dam. The construction and design of the dam, which Eskom had contributed towards, began while the country was still under Portuguese rule. The receptiveness of the Frelimo-led government to apartheid South Africa's continued presence was then unclear. In addition some of Eskom's own power stations, including the newly built Koeberg nuclear power station, were experiencing technical and licensing difficulties which adversely affected their ability to generate electricity.[17]

The South African mining industry was a major source of uncertainty. In 1989, Mike Davis, then Eskom's General Manager for Finance told the *Financial Mail* that the sudden and unexpected collapse of commodity prices threw Eskom's load forecasts into disarray. This situation became apparent in 1985. In response to the drop in commodity prices, mines across the country had reduced their output and their electricity requirements declined. Since the mines as an industry constituted Eskom's single largest electricity consumer, their decreased electricity demand hit Eskom's customer base hard.[18] The gold price played a particularly destructive role in promoting uncertainty. As a gold-producing country, South Africa had previously benefitted from the relative stability of the gold price, which had bolstered investor confidence in infrastructural investment. Once the USA, under the Presidency of Richard Nixon, opted to unpeg the dollar from the price of gold in 1971, the gold price became subject to the same price cycles as any other commodity. Nonetheless, by 1980 gold

[16]"Memorandum: Updated Programme for Expanding Eskom's Generating Capacity," April 24, 1978; Eskom Corporate Archives, 2L-10 KS 258.
[17] ibid.
[18]"Eskom's Tap-Dance," *Financial Mail*, August 18, 1989.

mines had not noticeably decreased their production. In 1980 Eskom again revised its load forecast upward and its assessors stated that the main areas of uncertainty were in the regional calculations of the Rand and the Orange Free State, both of which were centres of gold mining activity. [19] The argument in favour of an upward revision was that gold mining productions was not likely to see a significant decline in output in the near future. In a memorandum detailing the load forecast and the economic fortunes of the gold mines, its authors asserted that:

> The present uncertain conditions on the gold market made long term growth predictions frivolous. He was not unduly perturbed by the possible decline of total gold production because most mines would probably mine at greater depths and would thus have bigger pumping loads. A sharp decline in gold production was simply not envisaged, not even for the next decade, provided the price of gold remained on a sufficiently high level. If the price of gold was high enough productions costs would also increase proportionally, which in turn would change the total pattern. Thus, the bigger the working profit, the higher the surges on prices.[20]

Thus Eskom continued to display confidence in the fortunes of the gold mines. This was a large part of the reason for its overly optimistic predictions of electricity demand and the unnecessary capital expenditure on new power stations.

About Matimba

Matimba was a landmark power station for its time, using innovative design to survive the hot, arid conditions of the Waterberg. The use of innovative technology was however a high risk and costly endeavour. Thus Eskom's ability to construct a power station among the Waterberg coal fields was conditioned by its organisational appetite for high risk-taking. In his study of the institutional context of risk taking within Eskom, Grove Steyn demonstrates that its engineers at the time enjoyed significant scope for autonomous decision making in designing the power stations:

[19]Minutes of meeting of Electricity Supply Commission, 5 March 1980, Eskom Heritage Department Archives, Minute book no. 18.

[20] ibid.

> The stations Eskom ordered in the early 1980s employed a range of new, and in many cases only partly proven technologies. Alex Ham explained that in many ways Eskom engineers were given "incredible freedom to do what you [they] wanted.[21]

The Matimba power station was originally named Ilanga and intended to lie among the coal fields of the Eastern Transvaal. Eskom was forced to change its location following firm protestations from the chief air pollution officer of the Department of Health. The Eastern Transvaal was historically the region that Eskom preferred for its power stations and as a result had high levels of air pollution. To better survive the arid conditions of the Waterberg, Eskom decided to construct Matimba using dry-cooled technology. A dry cooling system required substantially less water than Eskom's traditional wet-cooled power stations and so was a convenient choice for water-scare contexts. As with the development of the Grootgeluk coal mine a decade earlier, the Matimba power station was beset with obstacles. Apart from protestations from the air pollution officer, the drying up of funds at the end of 1976 stalled its development. The prospects for raising finance on the international loan market fell suddenly and Eskom had to curtail R235-million of spending for 1977 and defer its power station projects in the pipeline.[22]

Air Pollution

Despite its organisational autonomy the limits of Eskom's power was exposed when the air pollution officer objected to the number of power stations it constructed in the Eastern Transvaal. Eskom's grand plans to construct the power station six-pack were unexpectedly scuppered by the Chief Air Pollution Officer of the time, whose portfolio fell under the ambit of the Department of Health. The Air Pollution Officer was concerned about the concentration of sulphur dioxide in the Eastern Transvaal, a gas emitted by the coal combustion processes of Eskom's power stations. Sulphur dioxide caused acid rain when mixed with the water in the atmosphere. White farmers, an influential political constituency for the NP, complained about the destructive effects of acid rain on the quality of the soil on their farms and thus on their agricultural produce. Eskom challenged the Officer's estimations of the air pollution levels in the Eastern Transvaal but, despite lengthy negotiations, the Air Pollution Officer refused to grant Eskom permission to build the power station there.

[21] Steyn, "Governance, Finance and Investment," 82.
[22] Minutes of meeting of Electricity Supply Commission, November 23, 1976; Eskom Corporate Archives, 2L-10 KS 257.

At an international level, systems-builders were generally annoyed by environmental organisations, as demonstrated in a report from Eskom's Chief Engineer in Systems Planning in which he detailed his visit to a meeting of the International Council on Large Electric Systems in Paris (Cigre).[23] Cigre was founded in 1921 as a forum for large-scale electricity producers from across over the world.[24] His report on the conference proceedings details a distinct suspicion of environmental organisations, as well as trade unions, because they threatened the efficacy of long-term planning. His report stated that: "It is clear from the experience in America and Australia that great care should be taken in South Africa to avoid the environmentalists becoming a major factor in planning. Possibly this can best be achieved by taking all reasonable steps to preserve the environment so that opposition was reduced to a minimum."

According to the report, a delegate to the conference had said "that engineers must rebel against uneconomic and impractical standards." Faced with a similar situation of heavy industrial demand, the Australian electricity utility was prevented from building a new power station where it had planned on the grounds that it would "wastefully use water". Trade unions prevented their construction of a natural gas power station and public opposition to a nuclear power station meant that the utility had to rely chiefly on hydro-powered electricity.[25] Thus to systems planners, who relied on long term planning stability, the pressure from protest groups was a hazard. As I demonstrate in later chapters, Eskom and its large technical systems had to incorporate these pressures into its strategic planning.

In February 1977 the Air Pollution Officer ruled against the proposed site of the Eastern Transvaal. [26] Unconvinced by his calculations, Eskom argued that because of the scarcity of water and coal sources elsewhere in the country it would struggle to find a replacement site outside of the Eastern Transvaal. However, it decided against formally appealing the decision or requesting Cabinet to repeal the legislation in its favour.[27] By September 1977, Eskom remained determined to appease the Air Pollution Officer, or at least discount his conclusions, and began investigations of its own into the sulphur content of the coal that

[23]Minutes of meeting of Electricity Supply Commission, October 12, 1976; Eskom Corporate Archives, 2L-10 KS 257.
[24]http://www.cigre.org/What-is-CIGRE
[25]Minutes of meeting of Electricity Supply Commission, October 12, 1976; Eskom Corporate Archives, 2L-10 KS 257.
[26]Minutes of meeting of Electricity Supply Commission, February 15, 1977; Eskom Corporate Archives, 2L-10 KS 257.
[27]Minutes of meeting of Electricity Supply Commission, February 15, 1977.

would supply Ilanga.[28] Eskom's engineers also interrogated his methodology, leading to his admission that his calculations were not entirely conclusive. In defence he argued that his own requirements were lenient when considered against the global norm. He was nonetheless convinced that the proposed power station would raise the level of air pollution in the Eastern Transvaal to more than double the limit set by the World Health Organisation. [29] The indeterminacy was partly due to the fact that only the sulphur content of the coal was measured and not the sulphur dioxide emitted during the actual coal combustion. Reaching the required level of certainty would have meant constructing 40 testing stations at a cost of R60 000 each. [30] Eventually, in June 1978, Eskom's own investigations concluded that the air pollution levels would indeed be intolerable if Ilanga were to be situated in the Eastern Transvaal, and it was forced to concede.[31]

Government's concerns over environmental damage prevented Eskom from developing the power station in the Eastern Transvaal. Thus it is not entirely accurate to attribute Eskom's decision to enter the Waterberg primarily to government prodding in this direction. Eskom vehemently protested the Air Pollution Officer's decision until it had no option but to comply. To coincide with its site change from Eastern Transvaal to the Waterberg, Eskom's engineers changed the name of the power station from Ilanga to Matimba. As the Tsonga word for "power", they considered the name Matimba a more appropriate social fit for the languages spoken in the Waterberg.[32]

Diversification of Fuel

A power station built outside of Eskom's traditional stronghold of the Eastern Transvaal would likely utilise a novel source of coal. Thus Eskom's Board considered the feasibility of "diversification of coal use", which in effect meant purchasing coal from companies other than Anglo-American. At a board meeting in January 1978, board members recognised that alternative and secure coal supplies were an urgent necessity but thought it best that Eskom not take the lead in exploiting new coal supplies. The costs of coal mine exploitation would

[28]Minutes of meeting of Electricity Supply Commission, September 27, 1977, Eskom Corporate Archives, 2L-10 KS 258 .
[29]Minutes of meeting of Electricity Supply Commission, October 25, 1977, Eskom Corporate Archives, 2L-10 KS 258.
[30]ibid.
[31]Minutes of meeting of Electricity Supply Commission, June 13, 1978; Eskom Corporate Archives, 2L-10, KS 259.
[32]Minutes of meeting of Electricity Supply Commission, April 22, 1980; Eskom Corporate Archives, Micro-films.

ultimately be heaped onto electricity tariffs and board members thought best avoidable.[33] Coal in the Eastern Transvaal was plentiful and relatively cheap, and the region well equipped with the necessary transport infrastructure. By contrast, if Eskom were to exploit virgin coal fields, it would have to carry the heavy costs associated with establishing connecting infrastructure such as roads, rail and telecommunications. In the particular case of the Waterberg, the fact that the coal fields were "unproven", or the depths of the coal reserves and the ease of mining were uncertain, mitigated against confident planning.

During deliberations of Iscor's offer of the poor quality Grootgeluk coal, some of Eskom's board members suggested that Eskom was obliged to assist Iscor to serve the national interests. In this case, parastatal collaboration would ensure that Iscor could sustain a steady supply of steel and keep prices low. Thus to some extent the Waterberg coal fields were an attractive proposition because Eskom could share the costs of coal exploitation with its fellow parastatal Iscor. However, the hot, arid and water-scarce conditions of the Waterberg meant that Eskom's traditional wet-cooled power station design would not have sufficed. Rather Eskom would have to construct a dry-cooled power station, which utilised less water. But Eskom had only an experimental familiarity with dry-cooled systems at the time and the move was fraught with danger. Another concern expressed at the meeting was that Iscor might prove unreliable and fail to see the development of the Grootgeluk coal mine to completion. However, this fear was somewhat alleviated by the fact that Iscor had already invested a significant amount in the colliery. Finally, the threat of terrorist attack threatened viability of a power station in Ellisras. The Department of Defence had earmarked the region as a security risk because of its proximity to the Botswana border. As a dangerous region, Eskom would struggle to attract suitably skilled staff because they would have to live in a "confined environment in the power station township."[34] Thus defence considerations made a power station in the Waterberg less attractive rather than more, so rendering unlikely the supposition that Eskom was driven to the region by the apartheid government's concern for the defence of its borders.

In August 1979 Eskom accepted Iscor's offer to supply it with coal from the Grootegluk coal mine. But the Waterberg coal contained different material characteristics to the coal found in the Eastern Transvaal. This introduced novel concerns for the power station's designers,

[33]Minutes of meeting of Electricity Supply Commission, January 24, 1978; Eskom Corporate Archives, 2L-10 KS 258.
[34]Minutes of special tender board meeting, August 23, 1979; Eskom Corporate Archives, O9 KS 242.

particularly in the boiler equipment. As will be discussed in more detail in the following chapter, the boilers were a subject of recurring consternation throughout Matimba's early years of operation. An Eskom memorandum discussing the relative merits of different tenderers for the supply of boilers for the Matimba power station highlighted the peculiar nature of the coal in Ellisras that was to be used: "The coal which will be fired in Matimba boilers will be highly abrasive and often difficult to manage, both from aspects of physical consistency and combustion behaviour, therefore it is essential that the boiler plant which is selected is the one best suited to ensure a maximum of availability coupled with maintenance requirements which will be neither intensive nor demanding sophisticated skills."[35]

Coal Price Agreements

The coal purchase agreements between Matimba and the Grootgeluk coal mine were initially drawn up as long term coal contracts, in line with Eskom's traditional contractual methods. In his study of the historical development of South Africa's coal and energy policy, Andrew Marquard draws on Fine and Rustomjee to explain the political function of long term coal contracts as an instrument through which the NP's vision of transferring private capital into Afrikaner hands was realised. Fine and Rustomjee mark the 1970s as the decade that Afrikaner capitalists successfully made inroads into the traditionally English-dominated private sector. This assertion is tied to their broader argument that the coherent linkage between national economic and political capital allowed the government to realise its economic developmental objectives. Afrikaner capital accumulation in the mining sector was a largely successful endeavour, and by the 1970s, the Afrikaner mining capital firm Genmin, formed by Federale Mynbou, controlled the single largest coal-producing company in the country, TNC.[36] Eskom's official explanation for drawing up long term contracts with its coal suppliers was based on simple financial logic: that long-term coal contracts protected the domestic coal price from radical increases in the global coal price. In the case of the contractual relationship between the Grootgeluk coal mine and the Matimba power station, the underlying rationale of coal contracts as providing the opportunity for Afrikaner capital to gain a foothold in the economy because both parties were parastatatals and concerned to protect what they considered the "national interest". Thus capital accumulation was not their chief priority at this stage.

[35]'Report on Tenders for Matimba Power Station', June 5, 1981; Eskom Corporate Archives, O9 KS243. 27.
[36]Andrew Marquard, "The Origins and Development of South African Energy Policy" (PhD Thesis, University of Cape Town, 2006), 159, http://webdav.uct.ac.za/depts/erc/Research/publications/06Marquard%20PhD%20Thesis.pdf.

The nature of the coal contracts differed from power station to power station, as Eskom assumed varying degrees of responsibility for the operational costs of the supplier collieries. Anton Eberhard describes the difference between cost-plus or fixed coal contracts.

> In the cost-plus contracts," he writes, "Eskom and the coal supplier jointly provide capital for the establishment of the colliery. Eskom pays all the costs of operation of the colliery and the supplier is paid a net income by Eskom on the basis of a return on the capital invested (ROI) by the coal supplier in the colliery. …In the fixed price contract, coal is supplied at a predetermined price (i.e a base price which is escalated by means of an agreed escalation formula).[37]

At the Grootgeluk coal mine, Iscor assumed the capital costs of operating the coal mine, and Eskom drew up a fixed cost coal contract for the coal supply. The archival records demonstrate that Eskom assumed some responsibility for very particular coal mine equipment. In addition, components of the mine's operational costs were heaped onto the coal price in the coal contracts, the extent of which Eskom and Iscor hammered out on the negotiating table. The relationship between the two parastatals was intimate because the changes that Iscor introduced to its coal mine operations affected the quality and price of the coal that Eskom received. Because Eskom had no other source of coal, its only option was to negotiate with Iscor's managers to achieve its desired product at a reasonable price.

Despite their tussling over the price of coal, Eskom paid a relatively low price for the Grootgeluk coal. As Joe Meyer related, "Those prices that they are paying with the clauses in the contract that we set up for them, I can tell you that Matimba is the lowest cost producer of electricity in the world."[38] This low price continues to the present day. In March 2004 the *Business Day* reported that Eskom's statistics showed the Matimba had the lowest operating cost of all its power stations. This was largely due to the low price it paid for coal.[39] Kumba Mines, which by that stage owned the Grootgeluk coal mine, hoped Eskom would expand its power generation in the Waterberg for that reason. As I will discuss in more detail in Chapter Four, the relationship between Iscor and Eskom was consistently tenuous with each side looking to protect their financial interests. Eskom negotiated a low coal price during the early 1990s, a time when its concern with commercial efficiency was a pressing one.

[37] Eberhard, "The Political Economy of Power Sector Reform in South Africa."
[38] Interview with Joe Meyer, March 17, 2015, Onverwacht.
[39] "Kumba sees big potential in the Waterberg", *Business Day*, November 23, 2004.

Equipment and Contractors

In contrast to the buoyant global market that Eskom encountered during the construction of the Medupi power station, Matimba benefitted from a depressed global demand for power station equipment during the 1980s. Amid a handful of corporations vying for control of the market, West German corporations played a particularly prominent role in the South African market. This was partly due to their government's decision to back export credit guarantees to South Africa. Export credit guarantees are a form of insurance policy in which a country's export promotion entity carries the risk of payment default from the importer. Bonn had introduced the incentive to stimulate employment in the German engineering sector.[40] For the Matimba power station in particular, Bonn had guaranteed R341-million worth of turbine and generator sales to South Africa. West Germany's renewed amenability to South Africa was driven by a depressed engineering sector which had been hard hit by the postponement of German nuclear power stations. German engineering companies have historically held a large presence in the South African engineering industry, from its inception, even in the early days of the parastatals, where even a cursory overview reveals the strength of the German linkage, importantly through training many of the prominent parastatal engineers at German universities.[41]

Matimba utilised specialised high-tech innovative technology, which Eskom had little experience in handling. The specific power station model its engineers chose was determined by the region's environmental constraints as well as security considerations. A special edition of the magazine *Engineering Week* appeared in November 1987 commemorating the engineering feats of the Matimba power station. For the early construction period of Matimba, this section utilises the insights gleaned from the publication which highlighted Matimba as the "Project of the Year '87".[42] The special edition featured interviews with some of the leading engineers responsible for the construction of the power station. As a commemoration of the technical feats performed by Eskom's engineers, the articles lack any critical engagement with their opinions or activities. The publication nonetheless provides valuable historical insight into the design and construction of the power station. Alec Ham, Eskom's general manager of engineering who oversaw the completion of Matimba, stated that the power station's world class technological features made it "yet another 'world first'

[40]"Bonn Guarantees R341-m for Second SA Power Scheme," *The Star*, October 8, 1981.
[41] G. R. Bozzoli, *Forging Ahead : South Africa's Pioneering Engineers* (Johannesburg: Witwatersrand University Press, 1997), 172.
[42] "Matimba: Project of the Year '87," *Engineering Week*, November 1987.

for South Africa."[43] Once operational, he said, the power station would have a 4000 MW power generation capacity, rendering it the largest power station in the Southern Hemisphere. Ham described the engineering team at Matimba as pathbreakers, because they had "converted an untried concept into what has become a world leader in dry cooling for power generation."[44]

Cooling systems were necessary features of a power station design to control the massive quantities of heat required to generate electricity. In the normal electricity generation process of a power station, the heat generated during the coal combustion process heated the water in the boilers. The steam from the evaporation process was then forced through the boiler pipes to drive the turbines, which in turn generated electrical energy. The cooling system condensed the steam and the water formed through condensation was recycled and returned to the boilers. According to Ham, without a cooling mechanism, the waste heat emitted from the combustion process was comparable in quantity to that emitted by a massive forest fire. Wet-cooled condensers, Eskom's traditional choice, were cheaper than dry cooled systems but this technology only in conditions where water was plentiful. A dry-cooled system operated through fan-like structures and used a portion of the electricity generated by the power station to drive the system. While it was attractive for its water saving qualities, its novelty rendered it a risky option.[45]

Eskom had no operational experience with a dry-cooled power station with Matimba's envisioned generating capacity. Nowhere in the world was one in existence. The closest comparable power station- with a generating capacity not nearly as large as Matimba's projected capacity- was a 375 MW direct dry-cooled unit that formed part of the Wyodak power station in Wyoming, USA. Other examples of dry-cooled power stations using forced mechanical draughts included the van Eck power station in Namibia (then called South West Africa) and the Utrillas power station in Spain. These power stations had been constructed by the German-based firm of GEA. Eskom had conducted its own experiments into the feasibility of dry-cooling technology in power stations with a limited generating capacity. One of these, the Grootvlei power station was situated near the small town of Balfour in the Eastern Transvaal, and boasted two 200MW units which used the "natural" or "indirect" method of dry-cooling. In the indirect dry-cooled system, the steam is cooled by a natural

[43] ibid, 1.
[44] ibid.
[45]Minutes of meeting of Electricity Supply Commission, April 1, 1980; Eskom Heritage archives.

draught of air that is formed within a large cooling tower. These cooling towers were necessarily high to effectively cool the steam, relying on the principle that the warm, moist air would necessarily rise, thereby creating a constant draught. This differed from a "direct" dry-cooled system in which large motor-driven fans generate a draught large enough to cool the hot steam passed over from the turbines. This system was at the time in operation at the van Eck power station in Namibia. The successful operation of the dry-cooled units at Grootvlei inspired Eskom's engineers to expand the generating capacity of its dry cooled power stations.[46] In April 1980 Eskom's engineers detailed the findings of new experiments undertaken by the overseas turbine manufacturers, and stated their conviction that the construction of a 600MW dry-cooled unit was feasible. It would however be an estimated 7% more expensive than a wet-cooled unit.[47]

In 1982, Eskom settled on a direct dry-cooled system for the Matimba power station. In financial terms, the direct cooling system offered lower capital but higher operating costs. The cost of coal made up a large proportion of the operating cost estimates. Eskom's decision to opt for a direct dry-cooled system was thus one that favoured higher operating costs over capital costs. This was possibly rendered feasible by the low cost of Waterberg coal, although this is not explicitly stated in the records. Defence considerations played an important role in Eskom's choice between an indirect and direct cooling system. An indirect dry-cooled system required extraordinarily large cooling towers to be built at the power station site. Because of their gigantic proportions, the cooling towers were likely to be easy targets for terrorist activity in the stark *bushveld* and reconstruction of a damaged tower would entail unnecessary cost and time delays. Smaller cooling towers were more desirable, but these were more expensive.[48] A direct dry-cooled system however did not require the construction of tall cooling towers. Thus the region's security threat, a product of the apartheid government's system of racist exploitation, was not enough to deter Eskom from its relentless path of generation expansion. Instead, Eskom tailored its technological choices to counter the security threat and ensure the longevity of the power station.

[46]JL Rothman, *Memorandum: Dry cooling of turbines with reference to future Eskom applications* from Senior Manager (New works) to General Manager, January 17, 1980; Eskom Corporate Archives, Micro-films.

[47]Minutes of meeting of Electricity Supply Commission, April 22, 1980; Eskom Heritage Archives.
[48] Minutes of meeting of Electricity Supply Commission, April 1, 1984; Eskom Heritage Archives, Minute Book 19.

Turbine Design

Since the delegation was comprised of engineers, the team had a substantial grip on the technical requirements and the performance expected of the parts. Helped by a downturn in the global market for power stations, Eskom had significant leverage. This situation differed from the instances of exploitation by foreign firms described in the case of the Inga hydro-electric scheme in the Congo under the Presidency of Mobutu sese Seko. There, consortia of foreign companies acted in a largely autonomous fashion without rigorous technical accountability to government entities concerned with protecting the "national interest".[49] In the case of the Inga scheme, the project floundered because of extended construction work which surpassed initial forecasts and resulted in escalated costs that the government could ill afford.

The turbine design of the dry-cooled power station posed a particular challenge for the Matimba power station. The turbine featured rows of blades which rotated as the fast moving steam passed over it. Since wet-cooled power stations were more commonly used globally, engineering firms tended to specialise in turbine design best suited to it. The turbine posed the most serious technical challenge to the effective design of the dry cooled power station. The blades in the back row of the turbine were required to withstand a higher back pressure than in a wet cooled system, where low back pressures were ordinarily desirable. Few engineering companies had a proven track record in supplying reliable turbines for dry-cooled power stations. The tender evaluation records detailed the investigations of Eskom's engineers. The following section excerpt shows the careful consideration Eskom's engineers applied to selecting the appropriate contractors for the power station:

> Engineers from the Turbine Plant Group (New Works Department) undertook a three-week tour of turbine manufacturers in October 1979 to understand the developments in creating turbines with high back pressure, including Brown Boveri (Swiss), KWU and MAN (Germany), GEC (UK), Toshiba, Hitachi and Mitsubishi (Japan). All the companies said they could create high back pressure turbines, as expected, but with the exception of MAN could not show that they have proven their design under actual running conditions. It is generally agreed that the critical component is the last stage low

[49] Young, *The Rise and Decline of the Zairian State*.

pressure blade; this is where the development work for dry-cooling applications must be concentrated.[50]

The fact that the efficacy of the system had yet to be proven made the undertaking an intensely risky one, given Matimba's envisioned electricity output.

The tender for turbine manufacture was eventually awarded to a consortium made up of the German company MAN, and the French Alsthom.[51] MAN was attractive because it had some experience with the South African design and construction industry. The company had supplied two turbo-generators to the Grootvlei power station. It had also, in partnership with the Swiss electrical engineering company Brown Boveri, formed an engineering equipment company, which could satisfy the supply requirements for Matimba's turbo generators. To enable coordinated planning between the corporations, MAN had initiated talks with the company that was contracted to supply boilers to Matimba, with the view to designing an all-encompassing control and instrumentation system that integrated the boiler and turbine generator operation. Communication between the two companies was however helped by the fact that MAN partly owned EVT, the boiler contracting company.[52] Thus the greater integration of corporations functioned to mitigate risk, which made the contractor appear more attractive to Eskom.

Local Manufacturers

Matimba was built during a time of a booming South African construction industry. In the 1980s the threat of sanctions against South Africa had become a reality and local manufacturers picked up the pace, benefitting from the windfall of global isolation. The severe depreciation of the rand from 1985 provided additional economic impetus to domestic manufacturers. Since the weak rand made imported products expensive, South African manufacturers stepped up to the plate with the creation of massive industrial projects all across the country. Some of these were encouraged by President PW Botha, such as the oil from gas project *Mossgas*. The power station construction industry was similarly filled with obliging suppliers. An engineer who preferred to withhold his name, and worked at the Matimba power station construction site during the 1980s, described the decade as the

[50] JL Rothman, *Memorandum: Dry cooling of turbines with reference to future Eskom applications* from Senior Manager (New works) to General Manager; Eskom Corporate Archives, Micro-films.
[51] Minutes of meeting of Electricity Supply Commission, August 27, 1981, Eskom Corporate archives, Micro-films.
[52] Minutes of meeting of Electricity Supply Commission, October 7, 1981, Eskom Corporate archives, Micro-films.

"golden age of power generation."[53] His colleague, who also preferred to remain anonymous, echoed this sentiment: "I think if you go back to the time when Matimba was being built, the boiler industry in South Africa was really at its peak. We had four boiler companies that had their own facilities where things were getting done. The industry was really at its height."[54]

Local manufacturing also benefitted from Eskom contracts. The government compelled Eskom to support local manufacturers by awarding them equipment supply contracts. Thus international contractors were compelled to incorporate local suppliers into their supply chain, often to their chagrin. On 5 May 1982 Eskom board members reported a downturn in the electricity generation market during the 1980s and that competition was high among engineering contractors for turbo generators and boilers. [55]

Boilers

The local subsidiaries of the global companies who were responsible for supplying the power station's specialised engineering equipment were represented by a company called Industrial Machinery Supplies (IMS). IMS had long experience as a supplier to Eskom's power stations, having first supplied the steam turbines for the Komati power station in 1961. The role of the company, as stated in its own advertising, was the "fusion of proven technology with local manufacturing, contracts management, and quality assurance services." In 1989, the Financial Mail detailed IMS's spectacular rise in fortunes. Over the preceding five years, its annual turnover had increased from R30-million to R150-million.[56] The depreciation of the rand had encouraged the company to improve its local manufacturing capacity.

The boiler contracts were eventually awarded to a consortium of Steinmuller and EVT, both German engineering firms. The resultant consortium was called Sieva, and IMS held a 6% stake in its operations. The fact that the consortium had included a South African company made it more appealing to Eskom. The inclusion of local manufacturers was an explicit component of Eskom's tender specifications and Sieva's promotion of local industry improved its overall appeal. By August 1981, the consortium had improved its offer and made an effort to establish a better local presence. As reported in a management committee

[53] Interview (anonymous), Johannesburg Country Club, 25 June 2015.
[54] ibid.
[55] Minutes of meeting of Electricity Supply Commission, May 5, 1982; Eskom Heritage Archives, Minute Book 19.
[56] "In the Pound Seats," *Financial Mail*, May 14, 1989.

meeting: "Stein/EVT had taken active steps to establish themselves locally and had formed a local company SIEVA in conjunction with Industrial Machinery Supplies."[57]

Sieva assumed overall responsibility for the boiler installation and coordinated the main subcontractors responsible for the mechanical and civil works. While Sieva was a consortium of largely foreign firms, it gradually adopted a more local staff complexion by incorporating South African engineers into its ranks. During the boiler design phase, the consortium had appointed a project supervisor to coordinate the different companies. This supervisor was based in France until 1986 when Sieva's personnel assumed the role in South Africa. It boasted that one of its main contributions to local manufacturing was the creation of the Boiler Component Manufacturers of South Africa (BCM) in 1982, chiefly to manufacture boiler pressure parts. But this model of creating separate companies for certain project components was not always desirable.[58] Were all the erection work conducted on an in-house basis, or at least by the main contractor, the work would not be passed on to South African corporations. Thus only where in the absence of existing capacity elsewhere in the country for certain components of the project, then only the creation of an entirely new company to perform that function was justifiable. As such, the remainder of the erection work was sub-contracted to various specialist companies, including LTA for the civil works, Genrec for steelwork, and Steinmuller for the erection of boiler pressure parts and pipework.[59]

Matimba and Ellisras

Siting of Matimba Power Station

This section considers the choice of site for the Matimba power station in the Ellisras district. The main sources are an article published in the *The Civil Engineer* describing the process of site selection and a memorandum considering the site selection in the context of the placement of an African township. [60] These analyses provides useful insight into the cost-benefit approach Eskom's engineers used where priorities were evaluated through a series of trade-offs and eliminations.

To determine the site of the power station, Eskom drew up a matrix of factors during the 1980s. The main considerations for the initial site were that: the power station should not be

[57] Minutes of meeting of Electricity Supply Commission, August 5, 1981; Eskom Corporate Archives, Micro-films.
[58] 'Local boilers for Matimba' in "Matimba: Project of the Year '87," *Engineering Week*, November 1987, 19.
[59] 'Local boilers for Matimba' in "Matimba: Project of the Year '87," *Engineering Week*, November 1987, 19.
[60] "Matimba Power Station Site Selection," *Civil Engineering* 29 (1987).

located atop coal deposits, the effects of air pollution had to be minimised; and the power station be situated as close as possible to its sources of supply, particularly its coal supply. Seven potential sites were identified, each of which fulfilled some requirements but fell short on others. Eventually the choice was narrowed down to include a site, H1, located on the farm Grootestryd, which was however disadvantaged by its "marginally higher air pollution and of a more costly and vulnerable coal conveyer system" and site A1, which was the only site located atop a coal deposit. Site H1 was estimated to cost R9.51-million more than site A1. Site A1 offered the lowest operating costs, because it required the least expenditure on conveyor systems and coal transportation. Apart from being more expensive, longer supply lines also from the coal mine were vulnerable to terrorist attacks and thus posed a security risk. The remaining sites under consideration were located off coal deposits and were south of the coal fault. Their distance from the coal mine meant that longer supply lines had to be constructed.

Nonetheless Eskom discounted site A1 in acquiescence to the Government Mining Engineer who railed against the so-called "immobilisation" or "sterilisation" of the coal deposits. In this case 36-million tons of coal would have been rendered untouchable were Matimba to be built at the site. In the end, the cost differential between site H1 and site A1, which were largely due to the extra 3km of conveyer line that would have to be built to transport coal an extra distance, was too marginal to warrant building the power station above the coal reserves. The air pollution output at H1 was slightly higher than at another possible site B1, but because air pollution in the district was far from saturation point, the consideration was not too pressing. Environmental aspects were discussed in the government memorandum. Ellisras was more than 50 kilometres away from another Eskom power station, and was thus outside of the "SO^2 embargo area." Pollution from the chimneys was related to the direction of the wind, which usually arrived from the North East and thus was not likely to blow the smog into the residential district.

Hospital

Eskom's involvement in Ellisras surpassed the bounds of the power station. To ensure its workforce had access to suitable social amenities, it was forced to contribute to the development of these facilities in the town. There was a sore need for the development of a hospital in the vicinity to service its staff contingent, which was expected to sizably increase the town's population and thus increase the strain on municipal service provision. Eskom and Iscor grudgingly accepted the responsibility following the intransigence of the Transvaal

provincial administration to construct suitable hospital facilities for both whites and blacks. Eskom was not permitted by law to operate the hospital because it was not a core part of its operations, but it agreed to contribute to its construction.[61] Iscor and Eskom would share the estimated cost of R1.7-million. Eskom, however, agreed to finance its portion on condition that the provincial administration assumed responsibility for the operation of the hospital, preferably on a lease agreement so that Eskom could gradually recover its capital expenditure.[62]

Development of Marapong

During the construction of the Matimba power station, Eskom's executive management had begun to consider the possibility of encouraging mixed-race neighbourhoods in the vicinity of its power stations. In 1980 a memorandum written by its personnel manager described as urgent the need to provide housing for married African workers.[63] While it carried cost implications for Eskom, he thought that the costs could be offset by a "stable and content" workforce. He also emphasised the importance of Eskom's decision to review its housing policy in view of the recommendations of the Riekert Commission of Inquiry of 1979. According to the memorandum:

> Aspects which have an impact on the current situation are Eskom's policy of elimination of racial discrimination and the recommendations of the Riekert Commission of Inquiry, which, inter alia, provides for the greater mobility of the black labour force on the condition that the worker has employment and suitable accommodation.[64]

The Riekert Commission encouraged the development of permanent African residential neighbourhoods in urban areas and the development of an African middle class. Critics of the Riekert Commission's recommendations argued that it created a fenced-off minority of prosperous Africans in nominally white urban areas. Sheena Duncan, writing in the South African Labour Bulletin, argued that this group would effectively function as a "buffer" against unrest from the impoverished residents of the homelands.[65] The Commission's recommendations, which animated Eskom's policy of racial transformation

[61] Minutes of meeting of Electricity Supply Commission, July 7, 1981; Eskom Corporate Archives, Microfilms
[62] Minutes of meeting of Electricity Supply Commission, July 14, 1981; Eskom Corporate Archives, Microfilms
[63] From Personnel Manager to the Senior General Manager, *Eskom housing for non-white employees*, September 24, 1980; Eskom Corporate Archives, Microfilms.
[64] ibid.
[65] *The Recommendations of the Riekert Commission are Tabled*, South African History Online, http://www.sahistory.org.za/dated-event/recommendations-riekert-commission-investigate-employment-conditions-black-workers-are-t, accessed November 12, 2016.

contained echoes of the "stabilisation" policy Fred Cooper has described. British colonial officials encouraged "stabilisation" in response to waves of worker unrest that swept across the major commercial centres of their colonies during the 1930s. Cooper describes "stabilisation" as essentially a system of "separation"[66] serving to distinguish between the rural poor and the urbanised African working class.

In Ellisras, the Matimba power station manager estimated that 1 100 permanent black workers were required to service the power station when it came into operation and 5 000 temporary workers during the construction period.[67] Matimba's white workforce amounted to 600 families that were to be housed in Onverwacht alongside Iscor's white labour contingent. But a different housing situation prevailed for African workers, who by government regulation were not allowed to reside in family quarters. In accordance with the prevailing migrant labour system, only single males were accommodated in the Ellisras district while their families remained in the homeland. During the construction of the Matimba power station, the law stipulated that only 3% of married blacks could be housed in the region of the power station. The main black township, Mokerong, which was situated 50 kilometres away from Ellisras within the borders of the Lebowa homeland, made daily transport to and from the town economically unfeasible. Eskom argued for the need to instate a black township because it expected to employ 1200 black workers by the year 1991. [68] By the dictates of then current legislation, the power station could only accommodate 20 workers on a family basis in the vicinity of the Matimba power station. Stelloop, the settlement where the victims of forced removals had been relocated, was an impractical location. It was 120 kilometres away from Ellisras which meant there were high transport costs. In addition, the paucity of infrastructure at Stelloop made it an unappealing site for the continued accommodation of its workforce.

Iscor was at first reluctant to support Eskom's bid to establish a black township. JP Deetleefs, Iscor's general manager of open cast mines objected on the grounds that the proclamation of a black township was not in the immediate interests of the coal mine. He also stated that Iscor was not willing to break the government legislation on housing segregation.[69] In addition,

[66] Cooper, *Africa since 1940*, 34.
[67] From JGG Strydom to die Sekrataris, *Ellisras Distrikontwikkelingsvereniging*, November 20, 1986; NASA, RLA 745 20/5/E36/1.
[68] ibid..
[69] From JP Deetleefs to Mynbestuurder, *Grootgeluk Steenkoolmyn*, September 4, 1986; NASA, RLA 745 20/5/E36/1.

Iscor would have to carry a significant portion of the capital costs for family housing when, Deetleefs argued, Iscor owned enough houses, property and facilities to service its own labour force. Importantly, the development of a black township defied the sentiment of the townsfolk and risked alienating influential white members of the Ellisras town. Nonetheless Iscor eventually acquiesced and agreed to jointly fund the development of the black township with Eskom. Together they sought the consent of the chief stakeholders in Ellisras. Eskom owned two farms at that stage, which it had purchased earlier in the event that it had to construct a second power station in the region. Since these plans had not materialised, Eskom could situate the township on the property. The availability of land was convenient because there was no need to incorporate land ordinarily intended for agricultural use. One option which Eskom considered was to situate the township on a plot at the southern side of Ellisras, thereby bypassing the current site of the Marapong township, which was then an informal township. This option entailed significant extra costs because the site would have to be developed as a township from scratch. Eskom's engineers worried that the site of the Marapong township was directly behind the Matimba power station, posing a security risk to the power station. In addition the township was situated at the northern side of Ellisras and was thus closer to the Botswana border. In discussions over the location of the black township, Colonel Vorster, the Head of Security, mandated that the township be placed two kilometres away from the power station, and that the security guards who would be placed to provide an air of intimidation should not be themselves housed in the township.

Local residents however protested the creation of a black township in Ellisras. On 18 September 1987, community newspaper *Die Kwevoel* detailed the conflict between the various constituencies of Ellisras.[70] The main body representing famers in the district, the Distrik Landbou Unie (DLU) or the District Agricultural Union, had begun a petition that was signed by its own members and various town residents that were against the development of the township. The DLU expressed its concerns over the availability of water in Ellisras to service the needs of the township dwellers. It also argued that land consolidation in the homelands was enacted in part to prevent the need for a black township in Ellisras.[71] Half the town's registered voters had signed the petition that was due to be handed to the Minister of Agriculture. While the HNP and KP had already voiced their protest the DLU was particularly proud that their petition represented the voices of residents across political party

[70]'Ellisras Kommentaar', *Die Kwevoel*, September 18, 1987; NASA, CDB 2138 PB3/13/2/152.
[71]From WA Lewis, Secretary of the Distrik Landbou, *Memorandum insake swartdorp te Ellisras*, (undated); NASA, RLA 745 20/5/E36/1.

lines. Dr AB Treurnicht, the Waterberg representative in parliament also set out his clear opposition to the project in a memorandum to government.[72] Finally, the Mogol Kommando[73], which was the decades-old quasi-military body staffed by white residents of Ellisras, refuted the feasibility of a permanent black labour force. It argued that migrant labour was a commonly-used labour system across the world. Creating a permanent black population in white urban areas would only worsen the labour shortages in rural districts by improving the mobility of African labour. They argued that efforts at reform should focus on improving the bus system from the various homelands to Ellisras.

At the time that the DLU submitted the petition, Iscor, Eskom, the town council and the two Chambers of Commerce in Ellisras had already agreed in principle to proceed with the black township. Eventually President FW de Klerk granted approval in 1987. He wrote to Chris Heunis, the Minister of Constitutional Development and Planning that after thorough consultation between members of parliament and his office, they came to a unanimous decision to approve the creation of the black township. Thus following special permission from the President, Eskom and Iscor proceeded with its development.[74]

Conclusion

This chapter has demonstrated the relative cohesion of engineering forces during the period of high apartheid. As discussed in Chapter One, underlying Eskom's power station construction spree was a desperate drive by parastatals to achieve national economic self-sufficiency. Eskom's engineers were concerned to promote the country's national self-sufficiency and they resisted a complete submission to the orbit of global technological expertise. In this context of desperation, Eskom's engineers leapt over the hurdles that would otherwise have scuppered the construction of the Matimba power station. These hurdles included the definitive opposition from the Air Pollution Officer, concerned over the high levels of acid rain in the Eastern Transvaal, and the water-scarce conditions of the Waterberg where the power station was relocated. The environmental constraints of the Waterberg compelled Eskom to adopt risky technological systems in its power station design. Risk and uncertainty were however offset by a favourable global market for power station and development and by a remarkable degree of coordination among key suppliers of the South African construction industry. As such, Eskom functioned as a parallel but autonomous body

[72]From AB Treurnicht to Minister JC Heunis, December 4, 1987; NASA, RLA 745 20/5/E36/1.
[73]Mogol Kommando, *Memorandum: Voorgestelde swartdorp in die Marapong area* (undated)*;* NASA, RLA 745 20/5/E36/1.
[74]From FW de Klerk to Minister JC Heunis, July 15, 1987; NASA, RLA 745 20/5/E36/1.

of government. This was reflected in its bid to develop an African township in Ellisras in defiance of the majority of the white townsfolk and of segregationist residential legislation current at the time.

Chapter 4: Privatisation and Democratisation

Introduction

This chapter describes the changing nature of the parastatals in the 1990s; an era in which the twin prerogatives of economic liberalisation and democratisation loomed large. The most obvious portents of "neo-liberalism" were the increasing power of "commercial" reformers, and the serious attention that government paid to parastatal privatisation. Once the construction of the Matimba power station ended in the late 1980s and it began electricity production, its managers faced the pressure of maintaining the equipment in a cost-efficient manner. In this context, technological innovation was a manner of achieving greater technical efficiency and attaining improved output through the least cost possible. Eskom was also concerned with the imperatives of racial integration driven by its executive management, at Megawatt Park and across its fleet of power stations.

During the late 1980s the impetus for privatisation arose from the apartheid government's severely straitened finances. Lacking a deep ideological commitment to the privatisation of the parastatals, the government prioritised operational efficiency over an actual transfer of ownership. Privatisation during this period was a curious process, driven primarily by domestic influences, rather than foreign imposition. It also coincided with an ethic of commercial efficiency embedded within the reformed, *verligte* Afrikaner nationalist movement. This was in stark contrast to the period of privatisation during the late 1990s under the presidency of Thabo Mbeki. During the later period, the government demonstrated an ideological commitment to the principle of privatisation and the privatisation of Eskom in particular. The main question then became of the transition from the nationalised system of state provided infrastructure to a privatised one purely based on a user-pay principle. But this proved unworkable in the context of the post-apartheid state's developmental priorities in which low cost electricity had to be provided to poor households. Thus the network remained intact albeit through having absorbed the prerogatives of cost-cutting and of racial transformation into its inner workings.[1]

[1] M. Anne Pitcher, *Transforming Mozambique: The Politics of Privatization, 1975-2000*, (Cambridge: Cambridge University Press, 2002), 5. Anne Pitcher has similarly highlighted the manner in which domestic agents negotiated the terms of privatisation in Mozambique during the 1980s so that it became an essentially *political* process.

Patrick Bond argues that the political transition of 1994 saw an actual transition in economic and political elites through the modalities of the neo-liberal economy.[2] But rather than being a purely macro-economic change, I highlight the way in which neo-liberal principles affected the modus operandi of the Matimba power station and of Eskom. The transition had a deep-reaching operational impact on organisations such as Eskom. The previous chapter described Eskom's engineers heightened appetite for risk taking that ultimately enabled the construction of the Matimba power station with its peculiar structural features. But a heavy capital investment accompanied this ethic of courageous decision making, and by the mid-1980s Eskom confronted a hostile public concerned that the investment had been excessive and unnecessary. Public distress was bolstered by the fact that Eskom charged higher electricity tariffs to fund the capital expenditure. This compelled Eskom to demonstrate a commitment to organisational reform in a manner that would improve its cost efficiency. Thus the respected position the network had held for decades before, elevated for its role as the bearer of modernisation, changed as the pressures for public accountability grew. While complete privatisation never occurred, Eskom's engineers worked to absorb the prerogatives of social development and political inclusivity into the normal operations of the network. As part of its promise for reform, and having avoided outright privatisation, Eskom adopted a more commercial, business-oriented stance. At the Matimba power station, this change came in 1992 with the appointment of a new power station manager, Clive le Roux. He was tasked with implementing a decentralised cost-revenue balance sheet model and overseeing racial transformation at the power station.

This period initiated the beginning of a neo-liberal governmental style at the power station in the sense described by Michel Foucault.[3] He suggests that the neo-liberal era encouraged greater instances of judicial interventions and processes of litigation because of its emphasis on competition and the multiplication of corporations.[4] Matimba experienced extended litigation processes during the 1990s. As part of its commercial reform, Eskom encouraged its power stations to curb their spending. This had a particular bearing on the repair and maintenance of power station equipment. Uncertainty over the causes of technical failure led to uncertainty over whether Eskom or the contractor would bear the cost of the repair. These were matters for the courts to resolve. In the following chapter I discuss the gradual erosion of the system of paternalism and dependency that underpinned labour relations at the power

[2] Patrick Bond, Elite Transition: From Apartheid to Neo-Liberalism in South Africa, (Pluto Press, 2001)
[3] Foucault, *The Birth of Biopolitics.*
[4] ibid, 176.

station. It was replaced by the principles of the free market, premised on the idea of the subject as a consumer.

Debt Crisis of 1985

The concerted attention to privatisation occurred in the context of the debt crisis that hit South Africa in 1985. The decade as a whole had seen a sea change in the nature of foreign loans to the country. Startled by the 1976 Soweto uprising, international creditors had curtailed their loans but a gold price boom between 1978 and 1980 brought in sufficient foreign exchange earnings to tide the country over and allow it to continue purchasing oil and arms. When the gold price fell, causing a drastic decline in export earnings, short-term loans financed imports between 1981 and 1982.[5] The diminished generosity of foreign creditors made a world of difference to the nature of capital investment in South Africa. While the abundance of foreign long-term loans in the 1970s had encouraged infrastructural and technological investment, the short-term loans of the 1980s were more suited to fund operations in a patchwork manner and served largely to plug the hole in the country's growing balance of payments deficit.[6]

But the downturn in investor confidence and generosity did not discourage South African corporations from seeking foreign loans. From late 1981 members of the South African public and private sector went on what Vishnu Padayachee terms "an orgy of borrowing from private international banks directly and from the international capital market via bond issues"[7]. While South Africa's credit rating had since improved following the 1976 Soweto uprising, banks in the United States began to watch the country nervously from 1984 as mass unrest in South Africa gathered force. This frenzy of borrowing and then renewed uncertainty led to the debt crisis of 1985. On 1 August of that year, the New York-based Chase Manhattan Bank placed a moratorium on all further credit extension to South Africa. Its decision precipitated the cessation of loans from other US-based banks. The South African government responded to the show of no-confidence by declaring its inability to repay its outstanding debts until March 1986. While the withdrawal of funds from US banks had a significant impact, South Africa also relied heavily on the loans of a cluster of West German and Swiss banks. By 1985, even these once reliable funders had isolated South Africa. Eskom was not immune to the debt crisis. In July 1985, it confronted a crushing lack of foreign

[5] Padayachee, V 'International Financial Relations' in Gelb, *South Africa's Economic Crisis*, 101.
[6] ibid..
[7] Vishnu Padayachee, "Private International Banks, the Debt Crisis and the Apartheid State, 1982-1985," *African Affairs* 87, no. 348 (July 1, 1988): 363.

investor enthusiasm for a bond issue. This was in stark contrast with the unruffled investor confidence it had enjoyed only a year earlier. During 1984 Eskom, in the midst of its power station building spree, had become the country's largest borrower of medium-term funds. In 1984 it secured a R50-million loan without the guarantee of the South African government, a rare achievement for its time.[8]

While the financial crisis provided the incentive for parastatal privatisation, privatisation was not an inevitable outcome. Ben Fine has described the debt crisis of 1985 as the beginning of the end for state owned corporations. The sale of state assets would enable the apartheid government to rescue itself from imminent ruin by allowing it some liquidity to continue its strategic expenditure. Fine describes the process of privatisation as one of "selling-off the family silver in order to finance the funding of the apartheid regime."[9] While it is undoubtedly true that the financing crisis prompted the government to pay attention to the commercial efficiency of the parastatals, privatisation was not the inevitable outcome of the reform process. Fine's description of the turn to privatisation as essentially an austerity measure, driven by desperate, utilitarian motives, does not adequately account for the long years of debate and hesitation on the question of privatisation in government circles. Records of parliamentary debates demonstrate that it was a careful, measured process. Politicians debated the need for privatisation in parliament with remarkable regularity over five years, from 1987 to 1992. Parliamentary debates do not reveal a desperate urgency for privatisation. Negotiations and investigations over privatisation continued until 1992 when South Africa was largely out of the red. If nothing else, the urgency associated with "selling off the family assets" would have necessitated a speedier resolution.

While the drying up of foreign loans created a context of crisis that was most conducive to fundamental reform, Fine does not describe the actual link between crisis and reform. In many other African counties for instance, austerity measures were part of the World Bank's loan conditionality leading to its controversial structural adjustment policy. There is little to suggest that the World Bank played a similar role in South Africa.[10] It is also not clear that the government was compelled to adopt privatisation measures to appease their foreign creditors. Most accounts of Western leaders' interventions in South Africa during this period describe their abhorrence for apartheid and pressure on the NP to institute democratic

[8] ibid, 367.
[9] Ben Fine, "Privatisation and the RDP: A critical assessment," *Transformation*, no. 27 (1995): 9.
[10] Anton Eberhard, "From State to Market and Back Again: South Africa's Power Sector Reforms," *Economic and Political Weekly* 40, no. 50 (December 10, 2005): 5309–17.

reforms. While Margaret Thatcher promoted privatisation in the United Kingdom, it is not clear that she imposed the concept on the South African government. She had come to be a reliable, though often chiding international ally for the NP, and held off imposing sanctions against South Africa for as long as she could.[11] If Thatcher encouraged greater private sector involvement in the economy, it is clear that she left the details of this process up to the South African government.

In 1987, the government released its White Paper on Privatisation and Deregulation[12] which criticised the high levels of public spending in the South African economy over the preceding decades. Public spending had substantially increased since 1975 to constitute the bulk of national spending.[13] Much of this government spending had funded its reformist initiatives, such as increasing services to black townships and encouraging industrial decentralisation. The underlying rationale of privatisation was to correct this imbalance and allow the commercial restructuring of the state corporations. In May 1990, The Minister of Public Enterprises announced in parliament that the government was not concerned with the privatisation of state-owned parastatals as an end in itself. Rather, he emphasised the managerial efficiency that would flow from "commercialisation" as opposed to the transfer of ownership. He announced that: "The full benefit of these advantages such as greater efficiencies in the market and new entrepreneurial opportunities – will flow from the broad commercialisation process and not necessarily from the event of transfer of ownership alone."[14] Thus privatisation was not the only response to the financial crisis of the late 1980s. The South African government was concerned to resolve its revenue dilemma and it was prepared to do so through means other than the sale of state assets where this was possible.

Wim de Villiers and Commercial Reform

Rather than a foreign imposition, it is useful to consider the domestic roots of the turn to commercial restructuring and privatisation. Reining in the parastatals reflected a turn in the nature of Afrikaner nationalism, which had by that stage embraced the principles of capitalism and the free market. The Nationalist Party embodied this ethic in a split in which its core ridded itself of the *verkrampte* Afrikaner elements then calling for a return to the

[11]Dan O'Meara, *Forty Lost Years: The Apartheid State and the Politics of the National Party, 1948-1994* (Johannesburg: Ravan Press, 1996), 399. O'Meara writes that Thatcher warned FW de Klerk that "she would not be able to sustain her anti-sanctions stance forever."
[12]"White Paper on Privatisation and Deregulation in the Republic of South Africa" (Government Printer, South Africa, 1987).
[13]ibid, 4.
[14]Hansard, May 10, 1990, col 8623.

unity and communitarianism of the Afrikaners (*volkseenheid*). Fitting in with the international pattern, the parastatals – Iscor and Eskom in particular - confronted a hostile public that was concerned about excessive expenditure. Electricity consumers felt the effect of higher tariffs during the 1980s to fund Eskom's power station construction spree. As Grove Steyn writes, "For as long as the drive of Eskom engineers to build ever larger power plants financed by cheap loans, was successful in reaping economies of scale, and this coincided with an insatiable demand for power in the economy, the system worked. When financing constraints threatened this trajectory in the early 1970s Eskom was successful in getting its governing statutes changed to allow it to build up internal reserves in the Capital Development Fund."[15]

To look into the feasibility and practicalities of privatisation the government created a Ministerial Committee for Privatisation and Deregulation, headed by a critic of the state corporation model, Wim de Villiers. Having long proclaimed his disdain for the low-wage paternalist system which dominated the South African economy of the twentieth century, he was particularly critical of the global post-war Keynesian ideology that informed the creation of the parastatals. In an interview with the *Business Day*, he described what he considered the peculiar structural foundation of the parastatals: "A strange sort of organisation has emerged," he said. "It is a functional organisation that does not divide into business units, demands no profits and delegates no powers. Its blind concentration on function has led its management to spend freely on the most technically advanced equipment, irrespective of the capital cost or the resultant output."[16]

An engineer by training, de Williers served as manager of Anglo-American's Rokahana copper mine in Zambia during the 1950s. He returned to South Africa in 1961 and subsequently became renowned for his role as the chief executive of General Mining Union Corporation (Gencor) during the 1970s and credited with its transformation into a centrepiece for Afrikaner large-scale capitalism and commercial efficiency.[17] He also served as the director of the defence equipment manufacturing corporation Atlas where he was reputedly successful in "reinforcing realistic manufacturing capabilities there."[18] On the back of his

[15]Grove Steyn, "Governance, Finance and Investment : Decision Making and Risk in the Electric Power Sector." (Ph.D thesis, University of Sussex, 2001), 96.
[16]"De Villiers Wants to Make Capital Work," *Business Day*, March 14, 1989.
[17]"The Man from Gencor," *Rand Daily Mail*, June 17, 1982.
[18]"De Villiers Wants to Make Capital Work."

proven record of commercial restructuring, de Villiers was charged with improving the efficiency and profitability of the parastatals.

In the report of the commission of inquiry released on 25 May 1988, de Villiers detailed his views on the privatisation of Eskom, the South African transport services, and the Post and Telecommunication Services.[19] He was above all concerned to prevent "natural monopolies". A distinguishing feature of a natural monopoly is its exceptional reliance on technological prowess. The requisite capital intensive investment and economies of scale is so high as to bar entry to new arrivals. De Villiers warned that a privatised parastatal could continue to dominate the market and thus constitute a private monopoly. One of his main criteria for the advisability of privatisation was the potential for competition in the sector in which the parastatals were to be privatised. Because of the parastatals' decades-long dominance of their respective sectors, and accumulation of capital and expertise over the years, new competitors had little chance of survival. This view was not without its critics. Frank Verhies, a lecturer in business economics at the University of the Witwatersrand opined in the *Financial Times* in November 1990 that: "Wim de Villiers is a big fan of 'natural monopolies'. He used this hoary old myth last year to recommend against allowing competition for the telephone network. So we're stuck with bad service, scratchy lines and outrageously high overseas charges."[20] Verhies argued that it is impossible to pre-determine whether or not a privatised corporation would become a natural monopoly.

De Villiers drew widely and exclusively on the British experience with privatisation as a basis for comparison. He argued that the South African energy market differed fundamentally from its British counterpart because there were no pre-existing electricity providers that could offer consumers an alternative to the national electricity utility. Eskom was thus likely to constitute a natural monopoly once it was privatised. The fact that the electricity network was already established meant that any attempt at duplication by private investors would prove economically unfeasible. In 1989, he told the *Business Day* that: "In Britain we are looking at industries that used to compete but were subsequently nationalised. In this country we are looking at monopolies."

[19]Wim de Villiers, "Privatisation of Eskom, SA Vervoerdienste, Pos En Telekommunikasie," May 25, 1988; NASA, MPP 2 1/3/1.
[20]"Debunking the Eskom myth," *Financial Times*, November 2, 1990.

White paper on Privatisation

On the question of the reform of Eskom in particular, de Villiers' report was published in 1984.[21] His recommendations were implemented without any apparent opposition, although they were not dramatic enough to arouse any real indignation. He recommended not the privatisation of Eskom, but the creation of a two-tiered management board to oversee Eskom's commercial restructuring. De Villiers had concluded, during his time in Zambia, that Africa's growth was constrained by a shortage of management skills and capacity. On further investigation, he came across an executive management model then operative in certain European companies, particularly West Germany, which adopted a two-tier management structure. One of the tiers allowed for a non-executive board and allowed for the direct consultation of "consumer-interest directors."[22] De Villiers' report also argued that Eskom's use of econometric load forecasting models was to blame for its failure to predict the country's electricity demand accurately. But this is not an entirely fair diagnosis. Eskom's management used to regularly re-assess its load forecast and did not solely rely on an econometric load forecasting model. As discussed in more detail in the previous chapter, one of the key obstacles to gaining certainty around the projected load demand was the uncertain prospects of the country's gold mines, which as a sector constituted Eskom's largest customer.

In May 1990 the Minister of Public Enterprises announced in parliament that while the privatisation of Eskom was still under review, the government was not at that stage convinced of its necessity. He praised the improved efficiency wrought by Eskom's reform efforts. This was brought about by placing Eskom under a "strong policy forming and supervisory council" staffed with businessmen experienced in management.[23] The Minister described the valuable role that Eskom played in bringing together the warring parties of Renamo and Frelimo in Mozambique. Eskom had also extended its electricity grid beyond into the neighbouring Southern African countries, making possible a network "which will stretch from the equator right down to the Cape."[24] Thus Eskom avoided outright privatisation because the benefits of remaining a state corporation had overcome the benefits of privatisation. Government valued its techno-political role too seriously to sanction its organisational dissociation. Eskom had also improved its financial fortunes, largely through

[21]Villiers, "Report of the Commission of Inquiry Into the Supply of Electricity in the Republic of South Africa."
[22]"De Villiers Wants to Make Capital Work."
[23]Hansard, Assembly debates, 10 May 1990, col 8626.
[24]ibid, col 8685

its reduced capital expenditure in the late 1980s. This lack of capital investment continued into the ensuing decade and in the period 1992-1997 Eskom's revenue exceeded its capital requirements.[25] Anton Eberhard argues that the absence of large-scale capital investment during this period allowed Eskom to stabilise its debt burden. Lower electricity tariffs he suggests were more a product of the lack of large capital investment than greater operational efficiency.[26]

The debate over the privatisation of Eskom faded into the background thereafter, with no definitive pronouncement on its final fate. Wim de Villiers passed away in 1990 leaving an organisational lacuna. By 1992 Eskom had suitably demonstrated its commitment to organisational restructuring and preventing increases in electricity tariffs, which assisted the embattled government with its efforts at inflation reduction.[27] While the expected inflation rate for 1992 was 14%, Eskom announced a lower increase in electricity prices of 9%. Thus Eskom managed to quell the hostile public sentiment targeted at high electricity tariffs. The impending political transition of the early 1990s influenced the outcome of the privatisation efforts. Eberhard has provided another explanation for the government's eventual reluctance to privatise Eskom. Following PW Botha's exit from office in 1989, FW de Klerk began negotiations with the ANC in exile, which took the question of privatising Eskom off the table.[28] Newspaper reports from the period expressed the view that Eskom's privatisation would be viewed as an act of bad faith during political negotiations with the ANC and Cosatu, both of which called for Eskom to remain in public hands.[29] If the latter was the true determinant of the decision not to privatise then this would mean that timing played an important role in the decision. Eskom thus escaped privatisation because government had not come to a decision on its fate by the early 1990s.

On the other hand, Iscor was wholly privatised. It is difficult to glean the exact reason for the privatisation of Iscor from debates in parliament and from the various reports of de Villiers' investigations into its feasibility. Nonetheless, it was privatised in the late 1980s and its shares were made public on the Johannesburg Stock Exchange. Unbundling functioned partly

[25]Grove Steyn, *Investment and Uncertainty: Historical experience with power sector investment in South Africa and its implications for current challenges*, March 15, 2006, Working Paper prepared for the Management Programme in Infrastructure Reform and Regulation at the Graduate School of Business, University of Cape Town, 41.
[26]Eberhard, "The Political Economy of Power Sector Reform in South Africa," 16.
[27]Hansard, May 6, 1992, col 6328
[28]Eberhard, "The Political Economy of Power Sector Reform in South Africa," 8.
[29]Drew Forrest, "SA Unions Set for Big Battle with Privatisation," *The Star*, March 29, 1990.

as a mechanism to release value, by separating the loss-making steel manufacturing plants from the more profitable mining operations. In Ellisras while the Grootgeluk coal mine fell under the management of private corporations, first Kumba and then Exxaro Resources, the effect of privatisation on the normal operational functioning of the coal mine is not immediately apparent. The Grootgeluk coal mine continued to invest in housing and social amenities for its workers even after it fell into private hands.[30] The privatisation of Iscor was undoubtedly more complex than stated above. However, this thesis focuses mainly on the transformation of Eskom and the Matimba power station and does not detail the transformation of Iscor in more depth.

The Privatisation Debate of the 1990s

The question of privatising Eskom fell under the spotlight again during the presidency of Thabo Mbeki, who succeeded Nelson Mandela as President of the country in 1999. This period is associated with the ANC's abrupt turn from its Reconstruction and Development Programme (RDP) as long-term policy for economic development to its Employment and Redistribution (Gear), heralding what is widely considered to be the ruling party's neo-liberal embrace.[31] In contrast to the concerns of commercial inefficiency that drove the privatisation process of the late 1980s, this resurgent attention to privatisation emanated from a small group of technocrats within Cabinet who were influenced by neo-liberal ideologues. These advocates of privatisation, as Anton Eberhard writes, were "observing international trends in power sector reform, and were beginning to be concerned with the potential problems of monopoly power."[32] They also encouraged economic liberalisation to open space for the entrance of emergent businessmen.

While the decision over whether or not to privatise Eskom was pending, government discouraged the utility from any further capital investment in generating new electricity capacity. This decision was primarily to blame for Eskom's supply crisis a decade later.[33] In 2007 Mbeki apologised for the country's electricity supply crisis and the consequent load shedding at an ANC fundraising dinner in Bloemfontein, declaring that "Eskom was right and government was wrong."[34] The government had been occupied with diluting Eskom's monopoly control of the energy market. In 1998 the government released its white paper on

[30]Interview with Joe Meyer, March 17, 2015, Onverwacht.
[31]Patrick Bond, *Elite Transition: From Apartheid to Neoliberalism in South Africa* (London: Pluto Press, 2000).
[32]Eberhard, "From State to Market and Back Again," 5314.
[33]William Mervin Gumede, *Thabo Mbeki and the Battle for the Soul of the ANC* (Zebra, 2007), 119.
[34]"Mbeki Apologises for SA Power Cuts," *Independent Online*, December 12, 2007.

the supply of electricity in the country,[35] which argued that a departure from the supply-heavy preoccupation of past energy policy was needed. It emphasised the importance of focusing on the demand side aspects of the energy in the country in a bid to follow the international pattern of increased competition and commercialisation.[36] Apart from the need to dilute monopoly control, the White Paper was also concerned with reviewing the country's energy policy to better fit the dictates of governance in a democratic society. The authors of the White Paper noted that democracy meant that the demands of a large number of stakeholders had come to the fore, and these warranted inclusion. In part this meant gearing electricity supply to more effectively service the majority of households in the country, especially poor households, and away from its traditional focus on the mines and heavy industry.

Following the government's turn to privatisation, certain senior managers at Eskom were tasked with investigating the viability of an entirely privatised Eskom.[37] Clive le Roux, an employee of Eskom who had served as the Power Station Manager at Matimba in the early 1990s was part of a team that investigated the then current European Union (EU) rules on competitive industries. Le Roux had visited Germany in the immediate aftermath of the Berlin Wall. He described the stark difference between East and West Berlin:

> I was privileged to move from West Germany to East Germany one week on a visit ... And it was the October just before Christmas so they'd put up all the Christmas decorations in West Berlin – everything was green, gold and red. All the windows were bright sparkly, shiny colours of green and red for Christmas and it was bright tinsels and excesses. Germany was very rich then. And I went to visit an East German plant so I crossed over the Brandenburg gate under those Prussian guards, and as I crossed the gate it was like walking over a line on the earth where there were forests and greenery and birds singing and suddenly there was death and broken tree stumps and grey –no colour. And as you crossed over there was nothing in any shop window, no decorations, nothing other than old concrete colour with black marks on it from not having being cleaned and having that pollution on it.

[35]"White Paper on the Energy Policy of the Republic of South Africa." Pretoria: Department of Minerals and Energy, December 1998." (Pretoria: Department of Minerals and Energy, December 1998).
[36]ibid, 7.
[37]Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.

These commercial prescriptions dictated that a market was deemed competitive on the basis of the market share held by each corporate entity within it. The more entities there were, the lower the market share of each, and the more competitive was the market in its entirety. The team discovered that for a privatised Eskom to conform to these requirements it had to fragment its various functions and split into seven different business entities, each of which would constitute a company in itself. This effort to create a viable privatised electricity sector was ultimately unsuccessful, largely because no investor was willing to buy the utility, or at least portions of it, and then produce electricity at the low tariffs required to hasten mass electrification of households in the country. According to le Roux: "The price was too low, nobody would buy them and the whole thing was scrapped."[38]

In August 2001 the government passed the Eskom Conversion Bill which ensured that Eskom fell under the provisions of the Companies Act of 1973.[39] This transformed Eskom into a public company with share capital that was wholly held by the state. Cosatu had voiced its objection to the Conversion Act, arguing that it paved the way for the privatisation of Eskom. In his submissions to the Parliamentary Monitoring Group against the passage of the Eskom conversion Bill, Cosatu's assistant general secretary argued that privatisation would increase the costs of electricity and that "it was Cosatu's great concern that the question of electrification should remain in the hands of the electorate and be governed by it."[40] Eskom was not taken further down the road to privatisation thereafter. Eberhard has suggested that the failure to implement effective liberalisation was in part due to the fact that there was never any strong political will to unbundle Eskom and proceed with actual privatisation and that the initial impetus was provided by a small group of analysts.[41] In addition, strong resistance to the idea came from Cosatu, a member of the governing tripartite alliance, which vehemently resisted the removal of Eskom from public hands.

Matimba

Commercialised Power Station Structures

The 1990s and the arrival of Clive le Roux signalled a new era for the Matimba power station. As the new power station manager he arrived with a mandate from Eskom's head of generation to bring Matimba in line with a commercial model that had been introduced

[38] ibid.
[39] *Eskom Conversion Act* [No 13 of 2001], Government Gazette, August 3, 2001.
[40] Parliamentary Monitoring Group, "Eskom Conversion Bill: Cosatu Input; Department Briefing on Additional Amendments," June 12, 2001, https://pmg.org.za/committee-meeting/596/.
[41] Eberhard, "From State to Market and Back Again."

everywhere else in Eskom. Eskom's executive management ingested the de Villiers' Commissions' recommendations for commercialisation, and put in place mechanisms to ensure cost saving and production efficiency. In 1985 John Maree replaced Jan Smith as the Chairman of Eskom. In a break from the traditional qualifications of Eskom's chairmen, Maree was not an engineer by training but held a degree in Commerce from the University of the Witwatersrand. As le Roux argues, Eskom changed from an "engineering organisation" to a "business".[42]

As part of its renewed commercial orientation, Eskom introduced a decentralised cost-revenue accounting method across its power stations. In line with this model, power stations were treated as business units and had to report their annual costs and revenue. Revenue was calculated on the basis of the volume of electricity sold multiplied by the price of transfer. The model was an attractive cost-saver because it allowed the power station manager to zero in on the sites of wastage and Le Roux appreciated the cost control it allowed. By contrast, a centralised budget sheet, where Eskom's head office paid all the costs, encouraged excessive spending. In the particular case of equipment maintenance and repair, he said: "…The centralists didn't know how to control it because they don't make the decision on whether to fix, repair or buy a new part when something fails. The first line supervisor makes those decisions, the technician, and if he doesn't have a business focus, his job is easier if he just replaces it and throws away the one that's got a little scratch on it. But if he has an account on the budget and a financial result and his performance contract depends on it and his bonus depends on it he will consider twice whether he can't just fix that part rather than throw it away or if he can't just buy a new part. Now he doesn't care –he just buys a new part –who cares?"[43] As such the commercially-oriented model cast a new light on the nature of maintenance at the power station.

Contractors and Technical Faults

Le Roux was appointed by senior managers at Eskom's head office in Megawatt Park with a directive to correct mechanical faults that were impeding the power stations' productivity. While Matimba was one of the newest power stations in Eskom's fleet, utilising cutting-edge technology for its time, its actual performance was below par, and senior managers at Eskom thought that the contractors required tougher management. Together with Matimba's head of engineering, le Roux oversaw the replacement of various failing components of the power

[42] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.
[43] ibid.

station. This often involved halting the power station's operations by taking the plant offline so that the necessary repairs could be made. In some cases, where serious and costly repair were required, the contractors dug in their heels on accepting responsibility, instead forwarding competing interpretations of the reasons for technical failure. Following years of litigation, le Roux concluded that conflict with contractors almost always ended with both parties sharing the blame and carrying half of the cost of repair or replacement. This was because the cases rested on competing versions of expert analysis which was often beyond the courts' ability to resolve on a strictly legal basis.

The crackdown on the power station's costs directly impacted on its technical functioning and the scope for risky decision narrowed considerably. Once the Matimba power station was operational, unpredicted technical failure came to the fore as the various components of the power station adjusted to their new operating environment. This meant that Eskom couldn't easily shoulder the costs of repair. But neither would the contractors. It was often difficult to determine the root causes of technical failure and thus to ascertain which party had to bear the blame. Despite investigations into technical breakdown there remained a substantial degree of indeterminacy which had to be negotiated by the interested parties. In the absence of a proper diagnosis of the technical fault, a necessary step towards repair, engineers from the contracting company and from Eskom alike often disagreed on the root problem of the technical failure.

Boilers

One of the most litigious conflicts related to a crack that surreptitiously appeared in the boiler exhaust ducts. The crack was large- an estimated six to seven meters long- in a massive pipe that was 60 metres in length. The chief problem lay in the nature of the economiser. The economiser is a heat-saving mechanism installed in the boiler exhaust duct and extracts heat from the waste gases emitted during combustion processes in the boiler. The heat is extracted as the gases pass through the economiser and as much of it as possible is returned to the boiler. The material used for the exhaust duct was however limited in its application for high temperature. According to le Roux, the designers of the boiler placed the economiser at the bottom rather than at the top of the boiler exhaust duct. This different placement raised the temperature in the pipe to 410 degrees under normal operating conditions; a level that exceeded the pipe's maximum design temperature of 390 degrees. One of the main reasons for the design fault was that the consortium had no experience in designing a boiler of the

size that Matimba required. [44] Thus the Matimba power station had to later absorb the pressures of the high risk-taking that characterized its construction period in the 1980s.

The matter of the cracks in the boiler exhaust ducts had arisen years earlier. In 1991 an internal memorandum addressed to the manager of the Matimba power station, le Roux's predecessor, stated that "No agreement could be reached between Eskom and the Consortium on the results of the tests performed on the Corten-HT material on unit four. Eskom's standpoint is firm that the Corten-HT material on all six boilers will have to be replaced from the economiser upwards. This is disputed by the Consortium." [45]

Corten-HT, otherwise known as "weathering steel" is a steel alloy designed to resist rust and erosion. It gained popularity in the United States during the 1930s when it was used in coal transporting railway wagons.[46] According to an engineer who worked for the Sieva consortium at the time of construction, a chief problem was that the material has not been suitably handled at the time of installation. "They made it out of Corten and it cracked because Corten is a funny material. When you weld it you kind of have to stress relieve it. And because they didn't do that they had lots of cracking and had to replace the ducting pretty early in the life of the boiler."[47]

During the subsequent stretches of litigation between Eskom and the contractor under le Roux's tenure, the contractor disputed the need for a complete overhaul. It argued instead that the boiler exhaust ducts simply required regular repair work. As le Roux related, the contractor's prescriptions would have significantly impeded the power station's productivity and its consequent ability to contribute electricity to the national grid:

> And the contractor said they could prove that the cracks would grow to 20 metres before it falls and therefore all we have to do is take the boiler off every six months, check the cracks, what their size is, and when they get to 20 metres long then we shut down and we weld them up. And we said that's not what we bought – we bought a machine that would run for two years at a time. We're not taking it down, waiting for it to cool down for three days, then going in and doing inspections, and if the cracks are long then weld them up, and that's three months later before we come back on. That's not what we

[44] ibid.
[45] From P de W la Grange to Matimba Power station manager, *Flue gas exhaust ducts*, 6 June 1991; Matimba Power Station Document Centre, 4066123
[46] http://allsteelsculpture.com/history-of-corten-sculptures
[47] Interview (anonymous), Johannesburg Country Club, 25 June 2015.

signed up for. We signed up for a car that can actually run. So we disagreed. But they insisted that was the solution – it was a small change to the maintenance, and it was no problem. Well the courts couldn't say whether it was or wasn't a problem. We ended up paying 50% of that repair.[48]

Improved Productivity

In 1997 Matimba power station was awarded the National Productivity Award from the National Productivity Institute. In his initial submission for the award, le Roux detailed the changes he had overseen at the power station to raise its productivity in operational and financial terms. [49] The power station's efficiency was demonstrated by the fact that it operated with relatively few disruptions to its activity. In 1996 it ran all 6 units for 80 days in one stretch, beating the world record for uninterrupted operation. Greater productivity at Matimba, he argued, translated into an 18% reduction in the cost of electricity production over the preceding five years. The additional 20% of power station availability on the national grid improved the fortunes of Eskom's shareholders albeit in a hypothetical manner. This allowed for the "indefinite deferral of capital" otherwise required for a 767 MW power station, which was the capacity technically required to make up for the shortfall in electricity supply had Matimba not improved its availability.

Changes made to the power station's maintenance routine, which resulted in improved productivity, were a particular point of pride. The maintenance team had adopted a "proactive approach" to maintenance, which meant that safeguards were implemented to prevent technical failures. This differed from the retroactive approach of previous practice where dysfunction was treated only after it had become apparent. The proactive approach meant that the power station improved its investigative capacity and developed an "occurrence investigation system to identify the root cause of incidents, and to propose actions to prevent re-occurrence."[50] Preventative mechanisms were implemented to include, for instance, placing protective shields on the boiler tubes to alleviate the effects of general wear and tear processes.

At times the maintenance of core components of the power station meant that the power station had to be taken "offline" and cease production. But since it generated such large quantities of heat, the cooling down process was long and tedious. Part of its claim to

[48] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.
[49] "1997 National Productivity Awards"; Matimba Power Station Document Centre, 4075785.
[50] ibid.

improved efficiency in 1997 was that the power station had sped up its cooling down and starting up processes.[51] Under normal operating conditions, the boiler pipes channelled a continuous stream of hot steam. An innovative forced cooling process, which involved cooler steam being forced into the boiler pipes, encouraged the optimisation of production. Matimba's engineers boasted that they had successfully cooled down the power station in 18 hours, a record time for all the power stations in Eskom's fleet.[52] As related by le Roux, a black novice power station engineer was responsible for developing the innovative process. The engineer will remain anonymous and will be referred to here as William.[53] Le Roux recruited William to Matimba's employ during the process of staff overhaul he initiated at the power station. While a qualified engineer, William had no prior experience of work at a power station. He had been previously employed as an assembly line manager at a Lever Brother's toothpaste factory on the East Rand. As the only black engineer at the power station in a notoriously conservative section of the country, William found that his colleagues were unwilling to act as mentors. Le Roux first placed him to work at what was considered to be the simplest part of the power station. But there he encountered open hostility from the white employees rather than technical guidance. After he encountered the same hostility in different departments, and in response to his eventual exasperation, le Roux promoted him to the production manager of two generating units. For le Roux, this was a calculated risk because Matimba's productivity had by that stage improved to allow some relaxation of the incessant drive for technical excellence. Taking advantage of William's general intelligence as well as his technical naivety, le Roux set him on what was broadly considered an impossible technical feat. He described it as follows:

> In that time, the average time to repair the boiler when one of the tubes burst was 84 hours ... So I said to William I want you to find a way to repair the boiler in 42 hours. Why? Because William didn't know that it couldn't be done. And I didn't believe my guys that it couldn't be done in less than 24. But I didn't want William to do it in 82, I needed a real step change, that's why I said half, in 42. William went out there, but it took a few months before he got his first tube leak on unit three. And he did the repair, and he did it in 47 or 48 hours. Now that was the record, it was the record by 20 hours. Fastest tube leak repair ever. Because he spent the next two months asking "stupid" questions: Why does it take you 35 hours to cool the boiler? And they said because the

[51] ibid.
[52] ibid.
[53] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.

> air that we're pushing through the boiler is hot and it takes a long time to cool a boiler down before we can go in to inspect where the tube is broken first. He said: Isn't there a way to cool it down quicker? And they'd say: No, that's just the way we do it. Conservativism. And the more and more he asked questions, the more they were not giving him logical answers and because he was a very clever man, he found the illogic in their answers. So he questioned them further and further and further. And he found a way to do it quicker, to speed up different parts of the process.[54]

Eventually William repaired the boiler in 18 hours, and the new methodology spread throughout Eskom's fleet of power stations to become engrained operational wisdom. As a result of his proven technical competence, white employees at the power station warmed somewhat towards William, allowing for some loosening of the occupational racial barriers. Le Roux brought in a particular style of management. Describing it as a "liberal" view, he contrasted it with the more "conservative" approach of some of his contemporaries. "Technological innovation was at odds with a centralised command approach, which he termed a "disempowering process", praising instead the power of individual autonomy in solving mechanical problems and ultimately towards enhancing the power station's efficiency.

At the time of writing, the current leadership at Matimba faces the similar challenge of achieving technical excellence in a context of cost constraints. This challenge was particularly pressing following the electricity supply crisis of 2008 which increased the pressure on Eskom's power stations to improve their generating capacity. A former power station manager at Matimba, who assumed the position in 2012, described innovation through engineering excellence as a key component of improved productivity. His expectations from the engineers at the power station are based on autonomous and innovative problem solving:

> If you are an engineer here your job is to solve problems, not to say you want to shut the machines down. You need to come up with innovative solutions. Shutting down the machine should really be the last resort, when it's not safe to operate it and when it's a danger to people's lives … It's like trying to fix a car while it is running. That's the type of expectation I have for egineers … The time of a pit stop was for the old engineers, that time is gone. Your job is to fix it while its running.[55]

[54] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.
[55] Interview with former Matimba power station manager, March 2016, Matimba Power Station, Lephalale.

Thus successful innovation was measured through its ability to enact cost efficiency and improved productivity at the power station.

Racial Transformation

When le Roux when hired employees, he insisted that prospective employees had the right "value system" and this trumped any consideration of race. Prospective employees had to appreciate the value of autonomous decision-making rather than rely on commands from management. He had undertaken further studies through the University of South Africa, which emphasised "information management" and "key performance indicators". The emphasis on "performance indicators" and on decentralised decision-making echoes the precepts of the new public management discourse that Ivor Chipkin and Barbara Lipietz describe as gaining ground in South African public administration circles during the 1990s.[56] While their analysis is centred on the transformation of state bureaucracy, it is likely that state corporations were similarly influenced by the emergent managerial discourse.

After a review of Matimba's staff contingent during the first few months of his arrival, le Roux fired nine out of the ten managers who reported directly to the power station manager and then began a rehiring process to replace them. He subsequently turned his attention lower down the hierarchy to dismiss 70 out of 100 of the first line managers. To observers such as the National Union of Metalworkers in South Africa (Numsa) representative at the power station Stephen Kekana, le Roux had made a clean sweep of it: "Then the role that he played here was that he removed all heads of section, heads of function, and heads of department. He removed them all."[57]

This attitude informed his thinking on le Roux's racial transformation. According to Stephen Kekana, le Roux had left a lasting impression on workers long employed at the power station, as the bearer of transformation. One of the initiatives to encourage racial integration was a weekend retreat for power station workers with well-known TV personality Freek Robinson as a special guest. Robinson was known as the face of the popular current affairs TV show, *Fokus,* then broadcast across South Africa. It was also, at times, coercive, as Kekana related:

> On a bus with three seats on one side and two on the other you'd find a black wouldn't sit with a white and there'd be empty spaces. When Clive saw this, he said the bus must

[56]Barbara Lipietz and Ivor Chipkin, "Transforming South Africa's Racial Bureaucracy: New Public Management and Public Sector Reform in Contemporary South Africa," Paper presented at the *Wits Interdisciplinary Seminar for the Humanities*, University of the Witwatersrand, 2012.
[57]Interview with StephenKekana, March 16, 2016, Matimba power station, Lephalale.

> stop and then put us one, one, one, one. He said he didn't want to see two blacks sit together or two whites sit together.[58]

Le Roux carried a mandate from Eskom's management to encourage racial integration and employment equity at the power station. This was a time when Eskom had appreciated its own autonomous role in hastening racial transformation within its operative domains. As discussed in Chapter Three, it had also recognised the reality of a permanent African population in urban areas. Fitting with the apartheid government's techno-political project after 1976, Eskom embarked on a quest to electrify the townships.[59] In his memoirs, former Eskom CEO Ian McRae describes his clandestine meeting at the Regina Mundi Church in Soweto, presumably in the late 1980s, to make contact with ANC members. His first point of contact was with John Rees and Bishop Peter Storey at the Central Methodist Church in Johannesburg, who then accompanied him to Soweto where he met with ANC leaders. Apart from his driver Moses Metsweni, no one at Eskom was aware of this meeting. Nonetheless, while he lacked any official mandate from Eskom for his trip to Soweto, Eskom chairman John Maree had prioritised racial transformation among the staff contingents at Megawatt Park and at the power stations across the country. McRae was personally struck by the glaring squalor of the black townships in the Johannesburg periphery and the worrying implications of material inequality for a successful democratic transition.[60] Eskom's efforts at racial transformation preceded the official political transition and the statutory removal of racial segregation. Thus they were in a position to deliver the material basis for political change.

Le Roux had some experience with initiating such a project. Before Matimba, Ian McRae had appointed him the manager of the Majuba power station in 1987. The Majuba power station was built during the 1980s as part of Eskom's power station six-pack but its completion coincided with Eskom's dawning realisation that it had an over-supply of electricity. Thus Majuba was mothballed after its construction. This made it an attractive site for an experiment in racial integration because the white trade unions there enjoyed less bargaining power. Work stoppages of white artisans and specialist skilled workers were to no avail, because there was no pressure on the power station to produce electricity. Their protests at the loosening of racial segregation in residential areas and in the workplace therefore fell on

[58] Interview with Steve Kekana, March 16, 2016, Matimba power station, Lephalale.
[59] Antina Von Schnitzler, "Travelling Technologies: Infrastructure, Ethical Regimes, and the Materiality of Politics in South Africa," *Cultural Anthropology* 28, no. 4 (November 1, 2013): 670–93.
[60] McRae, *The Test of Leadership*, 13.

deaf ears. Le Roux was tasked with introducing racial integration in the Eastern Transvaal town of Volksrust, which was the nearest town to the power stations. In particular, this meant the loosening of residential restrictions in the formerly white districts. He was assisted by an oft-ignored clause in the Group Areas legislation at the time, which exempted Eskom from the Act. Eskom's staff residential districts could thus legally be racially mixed.

In 1992, when le Roux arrived in Ellisras[61], the NP was in negotiations with the ANC and government had begun the process of scrapping the Group Areas Act. Le Roux found it of immense value to solicit the support of the Ellisras police station commander. Having failed to enlist the support of the police station commander at Volksrust, during his tenure at the Majuba power station le Roux found that violent sabotage was visited in the night on the property of the few black employees who ventured to inhabit houses in the white residential areas. He felt that the support of the police chief in Ellisras would prevent official legitimation of vigilante activity. He achieved this by convincing the station commander of the legality of mixed race settlements and by alleviating his fears that the impending transition would give rise to a black onslaught.

Coal Purchase Agreements

Despite the fact that both Iscor and Eskom were state corporations, the price of coal was continually negotiated. Nonetheless, the two enjoyed an intimate relationship because Eskom had no other source of coal in that region, so its only option was to negotiate with Iscor's managers to achieve its desired product and at a reasonable price. The parties were "locked-in"[62] to their relationship. As a result, Eskom had a direct interest in the operational changes Iscor effected at the coal mine. Coal contracts involved a large amount of tussling between the power stations and the coal mines. Rather than the fluid, flexible and dynamic market relations associated with the neo-liberal era, there emerged a relatively stable relationship that was strong enough to withstand the vicissitudes of the privatisation of the coal mine in the 2000s. Each side was concerned to hedge against risk and ensure its own operational stability.

From its inception, Matimba was intended to function as a base load power station. Those power stations that were cheapest to operate occupied the lowest place on the merit order and were termed base load power stations. The merit order is a mechanism commonly used by electricity suppliers across the world to describe the hierarchy of power stations. A base load

[61] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.
[62] Hirschman, *Exit, Voice, and Loyalty*.

power station could operate at maximum capacity without any fluctuations in output to meet the minimum, and often easily predictable, level of national demand. Those power stations with more expensive operating costs were termed "load following" power stations and contributed to the grid only during times of high demand.[63] In Ellisras, the managers of the Grootgeluk coal mine were concerned to sell as much of the steam coal, suitable for power station combustion, as possible. Matimba would thus ideally fit into Eskom's fleet as a base load power station because it would have to handle large quantities of coal, and thus produce large quantities of electricity. But the technical faults of the power station equipment, before they were systematically dealt with during the course of the 1990s, constrained its ability to achieve the generating reliability required of a base load power station.

In the late 1980s Michael Deats, one of the founders of the Grootgeluk coal mine (see Chapter One), resigned from Iscor to assume a new position as Eskom's Fuel and Water Manager. He thus oversaw the coal supply of power stations across Eskom's fleet of power stations. At Matimba he encountered what he considered a problematic coal contract between Matimba and the Grootgeluk coal mine. In a letter written in 1993, Deats noted the problematic nature of the coal contract: "Matimba has for some time been artificially elevated in Eskom's merit order[64] for base load power stations, largely in order to accommodate the coal supply agreement." But the power station had been experiencing load losses, due to stoppages in production and Deats warned that if the power station experienced any more load losses, it would be downgraded on the merit order. This meant that it would be required to generate less electricity and utilise less coal. Deats detailed his experience of switching employment from Eskom to Iscor as follows:

> Suddenly I was a customer; previously I was a seller of coal. And I found Ben Alberts on the other side of the fence. And I found some of my people now working for me at Eskom had made some startling concessions to Iscor. And I said that'll be the day. Based on what? Why have these concessions been given?"

These concessions included:

> Increased tonnage that would mean increased revenue for them and so forth. This is a 'you scratch my back I scratch your back arrangement.' So I said let's get Iscor in here

[63] "1997 National Productivity Awards."
[64] "Merit order power stations were a commonly used hierarchy and fell out of favour during the privatisation period in Britain and was replaced by an electricity pool."

> and have a discussion. After that Ben Alberts said, If you ever go near Mike Deats make sure your pockets are zipped ... He'll rob you blind. I said, Ben, say what you like, but you guys are taking Eskom for a ride. Anyway, we built, they built the colliery, Iscor, to supply 14-million tonnes of steam coal a year and 2-million tonnes of coking coal and I was now a customer for the 14-million. And it was our cheapest coal. When I left Eskom, the price of coal was R70 a tonne. And Grootgeluk was R30 a tonne so it was by far the cheapest.[65]

Mike Deats' interventions followed a period of relative crisis in the Matimba stable in August 1991. Defective flue gas exhaust ducts had wrought a short period of power station inactivity. This was because "temper embrittlement of the steel used in their construction has[d] led to numerous cracks appearing in these flue ducts and consequently they will have to be replaced."[66]An unexpected stoppage was termed a "force majeure" or "act of God" situation, in the coal contract. This was a built in contractual clause intended to provide Eskom with a reprieve from paying for what would be unused coal while the power station was off line.[67] Deats initiated a comprehensive review of the pricing components embedded within the coal supply. While constrained by the original coal contracts, Deats was however able to suggest enough changes to cause a "stand-off" between Iscor and Eskom.[68]

In earlier years, negotiations over tonnage were related to the cost of coal. If Eskom proposed that the colliery reduce the amount of coal it supplied to Matimba, Iscor was likely to increase the price of coal.[69] A memorandum from Iscor's manager of mining operations in 1990 said as much: "The price of coal is primarily influenced by a few major factors, the most important being the annual coal tonnage offtake by Eskom."[70] Iscor was prepared to re-open negotiations on the "alternative and volume variances…provided that Iscor's financial position as it was envisaged in the existing draft agreement is left unchanged."[71] In February 1990, one of the Matimba's senior managers complained that the coal contract then in existence clearly favoured the Grootgeluk coal mine and that "certain clauses" could create

[65] Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.
[66]From MJ Deats to BC Alberts, *Coal Supply Agreement,* August 20, 1991; Matimba Power Station Document Centre, 556238
[67] Gabrielle Hecht, *Being Nuclear: Africans and the Global Uranium Trade* (Cambridge, Mass: The MIT Press, 2012). Hecht has described force majeure clauses in contracts over uranium.
[68]From MJ Deats to CR le Roux, *Coal and water supply contracts,* November 5, 1992; Matimba Power Station Document Centre, MPS, 4069206
[69] ibid.
[70] From JP Deetleefs, Manager Mining Operations to MJ Deats , Fuel and Water Manager, *Coal Supply Agreement,* June 19, 1990; Matimba Power Station Document Centre, 4058417.
[71] ibid.

significant financial embarrassment for Matimba.[72] The matter of tonnage supply was particularly onerous. He wrote that: "The mine's cash flow is over-protected and the power station's cash flow has not been taken into consideration. If the power station cannot receive the coal, its generation is reduced with negative effects on its income and on top of that, a fine must be paid for the coal which cannot be received." Despite the fact that the agreement was a fixed-price contract rather than a cost-plus contract, Eskom was still bound to make capital contributions to the colliery. The senior manager wrote that the "75% fixed cost element of the coal price is exceptionally high; especially if Eskom's capital contribution to the mine and the fact that Grootgeluk doesn't only produce for Matimba is taken into account."[73] The above-mentioned capital contribution related to the ownership of the coal beneficiation plants at the Grootgeluk coal mine. Iscor cited a "cost of asset replacement clause" in the coal purchase agreement, and insisted that Eskom owned some of the machinery at the coal mine, the coal crushing plants and blending beds, and would thus be partly responsible for replacing faulty components. In financial terms, Eskom's capital share in the mine's equipment amounted to an increase in the coal price of R 0.30 per tonne.[74]

Matimba was also adversely affected by factors beyond the price of coal. Managers at the power stations accused Iscor of delivering coal of an unsuitable quality to the power station. On one level, Eskom had no experience in handling the type of coal that the Grootgeluk mine yielded. The coal had a particularly high ash content, and this was considered the justification for one of Matimba's engineers to visit England to study the workings of power stations there which utilised a similarly type of coal.[75] The chief impact on the unusual coal quality was on the equipment and installations when burned, which would experience a more rapid deterioration utilising a different coal from that of their original design parameters.[76] The coal also contained an intolerably high moisture content.[77] Matimba's managers complained of sporadic deliveries of coal with high moisture content which causes problems with the

[72] From HP Steyn to Kragstasie Bestuurder, *Steenkoolkontrak tussen Matimba en Yskor,* February 16, 1990; Matimba Power Station Document Centre, 4060876
[73] ibid.
[74] Iscor placed an offer on the table for Eskom to hand over ownership of the plants to Iscor in return for an increase 0.30 per ton in the price it would then have to pay for coal.

[75]*Proposed visit to United Kingdom: Mr K Watson,* July 19, 1989; Matimba Power Station Document Centre, 4059825
[76]Interview with Joe Meyer, August 2015, Onverwacht.,
[77]From MJ Deats to J v/d Merwe Grimes, *Moisture Content and Fine Material,* 5 March 1993, 4069465.

transport of the coal, due to a fault in the pipeline.[78] This emerged after Iscor altered the Grootgeluk I coal beneficiation plant, without effectively communicating the change to Eskom. Changes in the plant affected the quality of coal supplied to the power station which in turn experienced "trips and load losses" and some damage to installations. In March 1993 Deats decried Iscor's intransigent stance, because it failed to communicate its reasons for insisting on certain crucial aspects of the coal agreement. Eventually in August 1993, Deats reached a new, and tougher, agreement with Iscor, detailed in a renegotiated Heads of Agreement.

Conclusion

This chapter has detailed the implications of the privatisation era on Eskom's electricity network and its activities in Ellisras. The privatisation debate of the late 1980s differed fundamentally from the debate over privatisation that occurred during the next decade. This was because the former was characterised more by the need to realise commercial efficiency, while a more concerted neo-liberal ideology drove the privatization process of the 1990s. Thus Eskom escaped complete privatisation during the 1980s because of its valuable techno-political role and because it had polished its financial image. During the 1990s, privatisation was scuppered by the fact that electricity supply in the country had to remain affordable for low income households.

Nonetheless during the late 1980s Eskom was forced to implement a programme of reform that prioritised cost saving. In this model, engineering innovation was a prized method of ensuring cost efficiency. Exercising its techno-political power, Eskom implemented racial transformation in the notoriously conservative district of Ellisras in advance of the official political transition. The network was thus able to absorb the various political and economic imperatives of its time so that it took a particular form within the actual enactment of the technological developments in Ellisras. This will be discussed in the following chapter, which considers the transformation of labour relations in the town.

[78] From GJJ Strydom to die Myn Bestuurder, Grootgeluk Steenkoolmyn, *Steenkool voorsiening na Matimba kragstasie,* 24 Nov 1989; Matimba Power Station Document Centre, 4059831.

Chapter 5: Labour in Lephalale

Introduction

The previous chapter described the effect of the twin processes of "neo-liberalism" and democratisation during the late 1980s on Eskom's activities in Ellisras. Rather than a sharp break with the past there emerged instead a remarkable level of continuity as the network of large technical systems, both at a local and national level, incorporated the changing prerogatives of the political transition. The 1990s also saw a substantial transformation in the nature of labour relations as political liberalisation enabled the growing assertion of rights by the country's black majority. This chapter details the transformation of labour relations in Ellisras from a system based on cheap migrant labour to one that recognised the existence of a permanent black workforce. From the 1970s the migrant labour system, which governed labour relations for much of the twentieth century, began to lose its steam. Both industry and organised labour recognised the possibility of a settled, and permanent black workforce in the urban industrial areas nominally reserved for whites.

Dynamics in Ellisras closely resemble those that Stephen Sparks details in his study of the company town of Sasolburg.[1] Sparks describes a situation of labour relations structured on "paternalist" lines rather an on an entirely coercive regime under apartheid. However, while this system of labour relations rested on a degree of consensus between managers and labourers, it was also fundamentally hierarchical. An examination of labour relations in the mine and power station in Ellisras during the 1970s and 1980s suggests that the impact of personalised labour relations was variable and that workers enjoyed few official channels to improve their working conditions. There were thus limits to the concessions African workers could win in a context of large-scale land and capital dispossession. This dispossession is expressed in a recurring debate over the removal of graves from the region. I argue that the formal recognition of independent black trade unions fundamentally improved the bargaining power of African workers. This argument is however largely based on the historical experience of labour relations at the Matimba power station where the most detailed evidence is available.

[1] Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town."

From 1992 regular meetings between management and trade union representatives occurred at the Matimba power station. Records of these negotiations reveal the persistent demands for Eskom to gear its services and skills development to the local, Ellisras-based populace. This sentiment was at times strong enough to transcend racial barriers in the interests of improving the fortunes of workers and residents of the region. They also reveal that a distinctive neo-liberal style of governance was implemented at the power station. As Foucault notes, one of the main concerns of neo-liberal governance is to mould the individual into a private agent that is removed from the responsibility of bearing the collective risk.[2] Trade unions assisted with the navigation to a regime of consensus that was nominally based on the dictates of the free market.[3] But this threw up a wary realisation of the perils of "neo-liberal" freedom among power station management and trade union officials alike some years before the end of apartheid. While the scrapping of the Group Areas Act meant the formal end of racial segregation, spatial inequality persisted, based instead on the constraint of affordability. Enacting neo-liberal reform in a context of large-scale dispossession posed significant challenges for the large technical systems and created a tension between transformation and the efficient workings of the power station. This tension persists to the present day, despite the efforts of managers to hasten transformation. Thus, entrenched in the functioning of the large technical systems was a deep history of dispossession and desperate under-skilling.

Labour Relations during the Twentieth Century

For most of the twentieth century, industrial corporations in South Africa relied on a deeply embedded system of low-wage migrant labour. The system was sustained by a bureaucratic coercion that rested on a convoluted body of labour legislation, rather than a consistent and brutal show of force. But the 1970s signalled a sea change in the nature of South African labour relations. Firstly, South African industry came under pressure to reduce its reliance on migrant labour from neighbouring Southern African countries and encourage the "South Africanisation"[4] of the black workforce. Processes of decolonisation in Mozambique and growing signs of unfriendliness from Malawian authorities and from Lesotho raised the possibility that these countries would close their labour-sending channels to South Africa.[5]

[2] Foucault, *The Birth of Biopolitics*; Faeeza Ballim, "The Pre-History of South African 'Neo-Liberalism': The Rise and Fall of Co-Operative Farming on the Highveld," *Journal of Southern African Studies* 41, no. 6 (November 2, 2015): 1239–54, doi:10.1080/03057070.2015.1093835.
[3] Foucault, *The Birth of Biopolitics.*
[4] Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town."
[5]Leger in Gelb, *South Africa's Economic Crisis*, 143; Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town.," 215.

In addition, as corporations invested in machinery their demand for unskilled labour fell. The government encouraged mechanisation, particularly in the agricultural sector. There, farmers benefitted from a number of government-sponsored incentives designed to ensure that they had sufficient access to agricultural machinery. Mines across the country opted for capital intensive, automated operations. But this also gave rise to a shortage of skilled labour and corporations in the private sector began calling, in ever greater numbers, for the relaxation of the colour bar. By virtue of the colour bar, only a minority of white workers, and later "coloureds" could be trained to perform artisanal and professional work. Greater racial integration of the workplace was only successful, as Feinstein writes, in the smaller industries where belligerent white trade unions were relatively scarce.[6] Another reason for the slowdown in labour demand was the growing assertiveness of the African labour force and the growth in wages paid to black workers. Wages for black workers began to rise in the mid-1960s largely in the manufacturing sector, and this encouraged the increasingly confident trade union movement of the 1970s. As a result of the concerted upward pressure on the wages paid to black workers, they steadily expanded their share of the national wage bill. While they still earned far less than their white counterparts, the gap between the two narrowed.[7]

The migrant labour system that predominated for much of the twentieth century was not solely based on brutal state-employer coercion, but on some degree of worker consensus.[8] We should not exaggerate the sheer coerciveness of the earlier system. Dunbar Moodie has described the "moral economy" governing relations between managers and workers on the gold mines during the 1940s. He writes that: "The mobilisation of the entire workforce in moral outrage was an infrequent and hazardous exercise. But it did happen, and the fact that it might happen placed definite limits on complete autocracy."[9] As this chapter demonstrates it was only with the formal recognition of trade unions during the 1990s that African workers were able to enter into negotiations with management on equal terms. Describing the workings of paternal management in nineteenth century France, Donald Reid writes that: "For the worker...paternal power-affective, arbitrary, and discretionary-was exercised at all

[6] Feinstein, *An Economic History of South Africa : Conquest, Discrimination, and Development*, 232.
[7] Dubow, *Apartheid, 1948-1994*, 178.
[8] Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town."
[9] Dunbar Moodie, "The Moral Economy of the Black Miners' Strike of 1946," *Journal of Southern African Studies* 13, no. 1 (1986): 3.

levels within the firm."[10] While paternal labour management allowed workers a degree of leeway, the absence of bureaucratic norms meant that its impact was variable and dependent on personal relations between workers and management. Reid also discusses the fact that in some cases employers resented the interference of external forces, such as that of the military, and called on them reluctantly during times of worker unrest.[11] In addition as the term "paternal" suggests, management viewed African workers as child-like dependents.[12] I draw a distinction between this paternalist imaginary of the worker with the notion of the worker as an autonomous agent in the liberal sense of the word. I argue that it was only with the formalisation of trade union engagement during the 1990s at the Matimba power station that African workers were able to enter into negotiations with management on an equal footing.

This combination of the declining low wage migrant labour system and the greater demand for skilled labour encouraged the "stabilisation" of the black labour force. "Stabilisation" entailed the recognition of a permanent black labour force in the regions of industrial activity together with the development of social amenities to serve black workers and their families. As I discuss in Chapter Three, the Riekert Commission report of 1979, tasked with investigating the implications for African influx control of the changed labour regime, urged the recognition of a permanent black, skilled and semi-skilled workforce in urban areas. Stephen Sparks has closely considered "stabilisation" in his study of Sasol's company town of Sasolburg. While Sasol's initiative to implement stabilisation coincided with the government's strategy to appease Africans through limited service provision, its managers also held particular visions of African urban development. Sparks notes that Sasol's managers argued that good quality housing for blacks was essential to "developing a middle class black employee group."[13] Frederick Cooper has detailed the stabilisation pressures faced by both colonial and post-colonial governments. Rather than invest in social services for African workers, the colonial powers opted to withdraw entirely and retain only a financial hold where it was profitable. In contrast with Cooper's model, where colonial and post-colonial leaders failed to bear the developmental burden, this chapter demonstrates the efforts by industrial corporations to encourage stabilisation on a continual basis.

[10] Donald Reid, "Industrial Paternalism: Discourse and Practice in Nineteenth-Century French Mining and Metallurgy," *Comparative Studies in Society and History* 27, no. 4 (1985): 588.
[11] Ibid., 585.
[12] Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town.," 21.
[13] Ibid., 217.

Antina von Schnitzler describes the efforts of late apartheid era politicians to couch their political reforms in the language of neo-liberalism, so ensuring the survival of the apartheid regime and its policy of racial segregation. She describes the work of an influential economist, Jan Lombard whose book on the subject was published in 1978. He argued for a neo-liberal reform that would mould racist principles to recognise the black population as a pool of consumers.[14] In Ellisras, Eskom's stabilisation efforts were succeeded almost immediately by its organisational reform in the direction of commercial efficiency. The onset of democratisation in the 1990s also brought with it the rise of trade unions in Ellisras. This had a fundamental effect on labour relations at the Matimba power station and the transition to the free market was negotiated in partnership with the trade unions.[15]

The pressure for stabilisation also increased the pressure for "localisation" or for the employment and developmental opportunities offered by the power station to benefit the residents of the region. This was due to the existence of a permanent African population in the immediate vicinity of Lephalale who were invested enough in the region to agitate for better service provision. This relatively permanent workforce was invested with a loyalty to their locale and lacked the easy "exit" strategy envisioned by Hirschman.[16] Home ownership in Lephalale was one of the guarantors of stability. While this was an ordinarily desirable outcome, it also encouraged demands for local development of people and things. These demands were to come to the fore at a local and national level during the construction of the Medupi power station during the 2000s.

Bureaucratic Coercion

Despite its remote position in the country's north-west border Ellisras was a heavily securitised pocket of the *bushveld*. As discussed in Chapter Two the apartheid state prioritised border defence in the 1970s and 1980s in response to the threat of guerrilla incursion from neighbouring African countries. In Ellisras, a military force stationed at a nearby military base bolstered the power of the town's police station commander. Because of the high security risk, the Matimba power station was considered a "national key point". This

[14] Antina von Schnitzler, *Democracy's Infrastructure: Techno-Politics and Protest after Apartheid* (Princeton University Press, 2016), 53.
[15] Andries Bezuidenhout and Sakhela Buhlungu, "From Compounded to Fragmented Labour: Mineworkers and the Demise of Compounds in South Africa," *Antipode* 43, no. 2 (March 1, 2011): 237–63. Sakhela Buhlungu and Andries Bezuidenhout argue that the dissolution of the compound system at the mines has fragmented the workforce and posed an organising challenge for the National Union of Mineworkers. While important to note, it is difficult to draw comparisons here because I describe a different industrial sector.
[16] Hirschman, *Exit, Voice, and Loyalty*.

meant that it enjoyed special military protection. When construction at Matimba began, the *Rand Daily Mail* described the intensive security measures at the power station site as such: "9.5 kilometres of double, barbed wire-topped security fencing around Matimba's l00ha [hectare] site, with patrol roads on the perimeter and para-military guards at all access points."[17] According to Stephen Kekana, who worked at the power station during the 1980's, the security guards at the power station were a force to be reckoned with: "The security [at Matimba] then trained like soldiers," he said.[18] Labour strikes, which were technically illegal, were easily curtailed by a show of force.

A plethora of labour legislation underpinned this system so that it operated through a form of bureaucratic coercion. In 1979 the Riekert Commission remarked on the unnecessary complexity of the labour legislation. As Feinstein writes, the Commission "was particularly struck by the extensive, complicated, and in many respects, fragmentary and overlapping measures i.e statutes, regulations, administrative rules and practices having a bearing on manpower matters in South Africa."[19] The Department of Labour ensured that corporations complied with the legislation by conducting routine inspections. During Iscor's initial prospecting work in Ellisras in the early 1970s, a labour inspector visited the district at regular intervals to investigate the housing and disciplining of African workers. The inspector's reports provide useful insight into the nature of the bureaucratic coercion that structured labour relations. They reveal that his chief preoccupation was to avoid labour turbulence and the consequent loss in productivity. This meant ensuring that the management of labour contained an optimal combination of coercive control and worker consensus.

When Iscor began its prospecting work for suitable sites to situate the coal mine in the region during the late 1960s, many of the African workers were re-deployed from Iscor's iron ore mine in the nearby town of Thabazimbi.[20] By the nature of the prospecting work, the site of operations constantly shifted so that workers were housed on a temporary and makeshift basis, generally in huts built of zinc. Iscor had to gain the Department of Labour's approval for these houses. In its initial application, it requested clarity on the amount of "air space" each black worker was allowed by government regulation.[21] In response the Director of

[17] 'SA ready to stake billions on dry-cooled answer to energy problems,' *Rand Daily Mail*, 23 July 1983
[18] Interview with Stephen Kekana, Matimba power station, April 14, 2015.
[19] Feinstein, *An Economic History of South Africa : Conquest, Discrimination, and Development*, 242.
[20] Hendrik Ndebele, group interview with Johannes Mfisa, Hellen Kekae, Hendrik Ndebele, April Selema and Kgantshi Makubela (translator), August 25, 2015, Marapong (Lephalale).
[21] From DCU Conradie, Yskor personeelbestuurder, to Direkteur van Bantoe-Arbeid, December 8, 1966; NASA, BAO 2541 C31/3/1151/10.

"Bantu Labour" wrote that each hut ought to house 6 workers, so that there was "200 cubic feet of air space per person".[22] A few months later, in June 1971, a labour inspector, visiting a hostel under Iscor's control, descried the labour conditions he encountered. He found that though the temporary hostel for black workers had been approved in April 1971, it had not yet fulfilled the requirements of the Regional director of State health services. He also ordered the demolition of "self-erected" zinc huts housing three families. Despite the fact that the huts had been recently constructed at the time of the inspector's visit, he thought it probable that they were already "smothered with germs".[23] The inspector was however most bothered by a strike that was in process at the time of his visit. Workers on strike agitated for better wages, complaining that the daily rate they were paid of R0.50 was too low.

Following another visit in March 1972, the inspector reported that conditions at the hostel had vastly improved. He praised the efforts of the new hostel manager who had properly fenced off the living quarters of black workers and increased the number of policemen on site. He also reported on an improvement in the quality of the food served to black workers. By "improvement of living conditions" the inspector meant that black workers had become acquiescent and that appropriate measures had been taken to prevent future strike action. The inspector also suggested that the labour situation was assisted by the presence migrant labourers from Botswana who sought employment at the coal mine at the time. It is not clear from the archival record the extent to which workers from Botswana were available in general but at that point it appeared that the labour supply exceeded demand. This played a role in reducing the bargaining power of the workers housed in the hostel.[24]

Graves and Spirits

One of the recurring community complaints has been around the exhumation of graves and bodies at the coal mine and at the sites of the power stations. In the context of the large-scale capital and land dispossession (see Chapter Two) struggles over the recognition of burial sites can be considered a channel that allowed African families to stake their claim of belonging. This legacy formed the founding mythology of the African township, whose name "Marapong" translates into "place of bones". When Iscor's workers initially excavated the site for the establishment of the Grootgeluk coal mine, they uncovered the bones of people

[22] From Die Hoofbantoesakekommissaris, Pietersburg, to Die Personeelbestuurder, Yskor, December 12, 1966; NASA, BAO 2541 C31/3/1151/10.
[23] From Mnr Adendorff to Hoofbantoesakekommisaris, June 7, 1971; NASA, BAO 2541 C31/3/1151/10.
[24] From Inspekteur van Bantoe-Arbeiders: Noordelike Gebied to Hoofbantoesakekommisaris, March 20, 1972; NASA, BAO 2541 C31/3/1151/10.

who had not received proper burials and were likely to have perished alone. When Seodisa began work at Grootgeluk coal mine, workers digging up the soil at the site of one of the mine shafts uncovered numerous sets of human bones. Community members identified one of these, by the cloth found in its immediate surrounds, as a woman called Sara Moloantoa. She hailed from the nearby village of Seleka. She had gone missing after she left her family on 24 December 1953 to visit her brother who lived on a nearby farm for Christmas. Travellers on foot would have faced a vast expanse of dry *bushveld* and deep darkness after sunset and it was thought that she had lost her way and perished.[25] According to Seodisa, workers uncovered other bones at the site they thought were most likely to have been the remains of people from the neighbouring countries of Botswana and Zimbabwe. These travellers would have crossed the border into South Africa with the hopes of finding work at the iron ore mine of Thabazimbi, or heading further South to the gold mines on the Johannesburg Rand. In addition Seodisa believes that fighters from the ANC's armed wing Umkhonto we Sizwe (MK) who died in the Ellisras district were buried at the current site of the Medupi power station. In more recent years, a group from Marapong, led by Seodisa were at the time of the interview trying to gain an admission from the managers of Medupi that they had come across the bones of human bodies during the excavation of the site. These bodies were thought to belong to MK fighters who had died and been buried on the site. According to Seodisa,"Remember they were using their fighter names…Now the veterans they start to say, we know this number with this names, they are the ones who we buried – we buried them there."[26]

In the early years of Iscor's prospecting, he thought that the angry spirits sabotaged the establishment of coal mines at various sites. Workers had considered digging shafts in a site close to the Seleka village, and another close to the dumping grounds in Onverwacht. At these sites water flooded out of the first holes that workers dug, and Seodisa interpreted this as a sign that the spirits were unhappy at the rude disturbance. At the site of the Grootgeluk coal mine, excavated during the early 1970s, workers insisted that the bones be exhumed and relocated to nearby gravesites. Iscor's management watched as traditional healers performed cleansing ceremonies during the burial.[27] A proper burial was considered necessary to lay the spirits of the dead to rest, without which they would wreak havoc for the living. Seodisa argued that the spirits had to be approached with reverence and caution if the mine was to

[25] Interview with Dr Lazarus Seodisa, translated by Kgantshi Makubela, March 2015, Marapong (Lephalale).
[26] ibid.
[27] Meyer recalled the cleansing ceremonies that occurred at the excavation site.

successfully sink a shaft. The unrest of the spirits has become an important interpretive theme for Seodisa in his narrative of events in the region. As part of his current work as a traditional healer in the community he has lobbied the Department of Traditional Affairs to consider the relocation of graves at the site of the Medupi power station. At Medupi, he argues, the spirits of the bodies who have not been laid to rest caused supernatural incidents and freak accidents for the workers at the power station, particular those on the night shift. He argued that workers at Medupi who were born and bred in Marapong were generally aware of the role of spiritual forces in the region[28]

Worker Organisation

This section details the changes in labour relations over the transition from the 1980s to the 1990s. Correspondence around the development of the township at Marapong provides some sense of the ethnic and geographical spread of the labour contingent at Eskom's Matimba power station. The Magol Kommando[29] estimated that in October 1986 the total black workforce at the construction site was 692 strong, with 687 workers resident at the hostel. Approximately 80% of the workforce came from the black township of Mokerong which was part of the Lebowa homeland and North Sotho speakers made up 68% of the workforce.[30] Iscor's workforce numbered 1650 at the time, and was drawn mainly from Mokerong. Thus the power station and coal mine relied heavily on migrant labour from the nearby homeland.

Once the Grootgeluk coal mine was established and fully operational from the mid-1970s, anecdotal evidence suggests that a paternalistic approach to labour relations reigned. The balance of power between management and labour was variable and heavily dependent on contingencies. A current resident of the Marapong township, Lazarus Seodisa, described his experience serving as a "general officer" at the coal mine. Seodisa was part of the prospecting team that initially traversed the Ellisras district in search of a suitable site for a coal mine before he was employed at Grootgeluk during the early excavation of the coal mine. During certain instances of labour strife, he assumed the role of an informal mediator between management and workers. He took advantage of the presence of an Australian mine manager at Grootgeluk who he considered to lack the racist attitudes of his Afrikaner counterparts and was more inclined to take seriously the demands of African workers. He also realised the

[28] Interview with Dr Lazarus Seodisa, translated by Kgantshi Makubela, March 2015, Marapong (Lephalale).
[29] The Mogol Kommando is discussed in more detail in Chapter Three.
[30] "Arbeidsmagontleding soos in Oktober 1986 by Yskor/ Eskom (Matimba) werksaam," Aanhengsel 6 (Attachment 6) to the Magol Kommando, *Memorandum: Voorgestelde swart dorp in die Marapongarea*; NASA, RLA 745 20/5/E36/1.

value of playing off tensions between the Australian manager on site and the Afrikaner managers, calling on the former's assistance when black workers were mistreated by the Afrikaner workers on site. As Seodisa related: "I told the manager, no that guy is wrong…you know that fight between the white people… So these Afrikaans people they don't like the Australian people. And that one don't like them. They like us, black people."[31] He recalled the occurrence of two strikes during his employ at the coal mine. At times he acted as an advisor to the Australian manager, stating that: "I say manager, the people are coming to strike, so you know what, just give little bit 2% money, then the work must run."[32]

Nevertheless this paternalist labour regime rested on an intrinsic hierarchy of power that was structurally intolerant of dissent. African workers could not always rely on the manipulation of inter-personal relationships and there were limits to the concessions African workers could gain. Another early employee of the coal mine and current resident of Marapong, Hendrick Ndebele, recalls an instance in 1981 when African workers at Grootgeluk went on strike to protest the single-male hostel accommodation, demanding that housing for married couples be provided. Workers wanted their families to be able to reside with them and seek employment in the Ellisras locality. Iscor implemented heavy controls on access to the hostels so that only employees of the mine were allowed onto the hostel premises. There was thus little opportunity for workers to reside with their families informally beneath the official radar. Ndebele argues that recurrent pressure from black workers led to the development of Marapong. While the impact of these protests is not clear, it is likely that they encouraged Eskom to create the Marapong township.[33]

The hostel was also situated in a far distant location, necessitating daily transport from the hostel to the mine. Ndebele remembers being made to stand upright in the back of the truck. Despite worker discontent, buses with seating places were only introduced during the 1990s.[34] Thus there were limits to the concessions worker unrest could achieve, and reforms were enacted at the behest of management. Melton Mothoni, who worked at the Matimba power station during its construction period and later became the National Union of Mineworkers' (NUM) main representative at Matimba, descried the absence of formal negotiation structures for African workers within the power station during the1980s. As a

[31] ibid.
[32] Interview with Dr Lazarus Seodisa, translated by Kgantshi Makubela, March 2015, Marapong (Lephalale).
[33] This is discussed in more detail in Chapter Three.
[34] Hendrik Ndebele, group interview with Johannes Mfisa, Hellen Kekae, Hendrik Ndebele, April Selema and Kgantshi Makubela (translator), August 25, 2015, Marapong (Lephalale).

result management was not obliged to seriously consider the demands of the African workforce.[35] Stephen Kekana, who joined Matimba's employ in 1985 and introduced the Metal and Allied Workers Union (Mawu) to the power station, described black worker activism as tepid and directionless before the arrival of the trade unions. Workers, he argues, were like a "flock of sheep".[36]

There were however clear instances of strike action during this period. They were either ended by a show of force or taken seriously if management deigned to consider workers' demands. Stephen Kekana detailed his struggle to organise workers during the 1980s at the Matimba power station at a time when strikes were headed off by the power station security and the police force. When Kekana first began to work at Matimba in 1985, there were a few trade unions that organised workers at the power station. One of these, the Electricity Workers Union was an internal union sponsored by Eskom. According to Kekana, workers easily lost faith in its organisational structures because they perceived them to be too closely tied to management. Another was called the Boiler Makers Union. While it had a multiracial membership, its leadership was white so that black workers easily left its fold once an alternative emerged. According to Kekana, employees that sought to unionise workers could submit stop order forms to management for distribution to workers. This would allow the subscription to be paid from workers' salaries to the incipient union. But there was a perception that management discarded the stop order forms if they disliked the idea of the proposed union. "We didn't have structures," he says. "It was difficult to organise workers those years because we were not protected."[37]

The legislation governing strike action and the mobilisation of black workers was complex and for budding trade unionists, open to manipulation. Kekana recounts his strategic manipulation of labour laws, revealing that when challenged the body of bureaucracy governing African labour tripped itself up. For instance, one of the arguments they used in court when workers were indicted for illegal strike action involved exploiting the contradiction of African rights to citizenship. By law, Africans lacked citizenship rights outside of the homeland borders and were considered foreign workers in the white districts of industrial activity. "…They told us we were in an illegal strike but we said no and they say yes you did not come to work and you had an illegal strike but we told them no – those laws

[35] Interview with Melton Mothoni, April 2015, Matimba Power Station, Lephalale.
[36] Interview with Stephen Kekana, Matimba power station, April 14, 2015.
[37] ibid.

don't bind us because we did not have the right to work. That's how we used to argue." The complicated tangle of labour bureaucracy ran to the end of its tether when faced with the assertion of rights from the African workers it intended to hold in place.

Trade Union Activity

In 1979 the Wiehahn Commission paved the way for South African corporations to recognise black trade unions. The arrival of independent black trade unions, the National Union of Mineworkers (NUM) and the National Union of Metal Workers (Numsa) fundamentally transformed the nature of labour relations at the Matimba power station, by improving the bargaining power of African workers. The introduction of collective bargaining practices for African workers, which corporate managers accepted as a measure to alleviate industrial conflict, was a decided break from the past.[38] Black trade unions emerged in a disparate manner during the 1970s with many struggling to gain recognition from management and legitimacy in the eyes of the workers. Their power grew apace and they demonstrated their full force when they cohered under the banner of the Congress of South African Trade Unions (Cosatu) in July 1985. One of these unions was Mawu which later morphed into Numsa. Kally Forrest writes that by the end of the 1970s, Mawu was on the "brink of collapse, as membership fell, and by 1977 all organised workplaces had folded."[39] This was partly due to the fact that some companies had refused the union space to organise the workers in its employ. Mawu's waning popularity and consequent subscription crisis during this period was worsened by the brutal police shut down of a strike at the Heinemann Electrical Company in the Johannesburg East Rand, one of its most important sites of worker organisation. But over the course of the next decade the union's fortunes steadily improved, buoyed by the rising tide of anti-apartheid activism.

Mawu also improved its organisational strength during the 1980s and adopted particular strategies to manoeuvre around the restrictive labour legislation of the apartheid government. To deal with the intransigence of individual factory managers to recognise the union, for instance, Mawu worked on entrenching the concessions to labour that had already been awarded in civil contracts.[40] The union's management also emphasised developing the shop floor strength of each factory to encourage an in-depth familiarity with its particular working conditions. As Forrest notes, budding trade unionists attended information sessions run by

[38] Dubow, *Apartheid, 1948-1994*, 198.
[39] Kally Forrest, *Metal That Will Not Bend: National Union of Metalworkers of South Africa 1980-1995* (Johannesburg: Wits University Press, 2011), 17.
[40] ibid.

academics at the University of the Witwatersrand. They faulted pre-apartheid black trade unions such as the Industrial and Commercial Workers Union (ICU) led by Clements Kadalie, for organising as "general trade unions". A sector-wide organising strategy also alleviated the fears of individual factory managers that labour concessions would give their competitors the upper hand, because Mawu could point to similar worker demands at the factories of their competitors.[41]

The NUM and the National Union of Metal workers of South Africa (Numsa) began organising workers in Ellisras in the late 1980s. They have remained the main trade unions in the district's coal mine and power station nexus. By organising workers at the Matimba power station, both unions strayed from the traditional industrial sectors. NUM had traditionally organised mineworkers while Numsa concentrated on the metals and engineering sector. Union organisation at Eskom's power stations followed the network connection of the mine and power station nexus.[42] According to Kekana, the involvement of both unions at Eskom's power stations is rooted in the Highveld industrial hub of the Vaal Triangle. Mawu had organised workers in VanderBijl Park, which was the site of one of Iscor's major steel factories. Two of Eskom's power stations, the Vaal and Lethabo power stations, were also situated in the vicinity of VanderBijl Park. Both Eskom's power stations and Iscor's steel factories drew their coal supply from the nearby coal mines where NUM organised mineworkers. According to Kekana, Mawu's strong regional presence was due to its mobilisation of workers at Iscor's Vanderbijlpark Steel. This encouraged the union to venture into the energy sector and organise workers at the nearby power station. In a similar manner, NUM began to organise workers at Eskom's power stations in the Eastern Transvaal because of their proximity to the coal mines. In this way both NUM and Numsa gained experience with organising power station workers, which eased their organisational access to the Matimba power station in Ellisras.

Numsa and the Matimba Power Station

The arrival of Mawu at the power station represented the first attempts at independent and concerted black worker organisation. Kekana played a formative role in introducing the union to the power station workers. Before the arrival of Mawu, he worked as a shop steward for the EWU and following a workshop for EWU shop stewards in Ellisras, took a car ride to the

[41] ibid, 18.
[42] Mitchell, *Carbon Democracy*, 2011. Mitchell describes this coal-mine, power station nexus as creating the conditions for political subversion.

nearby town of Nylstroom with one of the instructors there who was on his way back to Germiston, on the East Rand. The instructor was ordinarily based in Johannesburg and took the idea of recruiting workers at Matimba to Mawu's head office. The union deployed two of its members to the power station to help Kekana recruit members and gain recognition from the power station management. With the formation of Numsa in 1987 and its growing reputation across the country, the union built up its strength at the power station. This was also in the context of the ruthlessly repressive State of Emergency that began in 1985. In 1987 Kekana successfully defended a worker who faced disciplinary action after a coal-carrying conveyor had caught alight under his watch. Fires on coal conveyors are a common occupational hazard, caused when the friction between the rollers and the carrying surface of the conveyor generates enough heat to ignite the coal being carried on the conveyor belt. The worker had not paid enough attention to the process to prevent the occurrence. Kekana argued that his lack of concentration was due to an illness that the worker had reported to his supervisor beforehand. This victory encouraged other workers to place their faith in Numsa's organising structures, opening the door to further recruitment. According to Kekana, workers from different departments at the power station subsequently joined the union's fold in large numbers:

> I was working at the real estate or in township maintenance and it had 276 workers- they all joined Numsa at once. And then go to security, they all joined it was about 360 of them. Then we go to maintenance. We didn't get the whole maintenance but above 80% of them joined. And then operating as well we got 100% to join … Then HR and all those other office staff members we got them to join.[43]

Negotiations at Matimba

Once black trade unions achieved formal recognition at the power station, they were absorbed into a formal negotiation process that oversaw the power station's transition into the democratic era. This period coincided with Eskom's growing emphasis on market-related reforms. African workers, who were newly enjoying formal worker rights, also had to navigate their political and economic freedom. But the transition to the free market came with its own constraints, notably that of affordability. In addition, with the removal of formal colour bar restrictions the terms of occupational mobility had to be re-made through a process of continual negotiation.

[43] Interview with Stephen Kekana, Matimba power station, April 14, 2015

Once le Roux settled into the driving seat as the Matimba power station manager in 1992, he introduced regular meetings that allowed for consultation between power station management and representatives of the three main trade unions at the power station. One of the most pressing items on the agenda was the need for the different parties to reach consensus on the way that affirmative action would play out at the power station, especially as it related to recruitment and training policies. As I discuss in Chapter Four, Eskom's executive management advocated the development of transformation among staff at its various outposts. The minutes of the various negotiation forums in which the unions and management hammered out the details of transformation reflect a surprising degree of consensus from the trade unions that transcended racial divisions. This concurrence rested on their desire to protect the rights of their members already in the power station's employ and to resist the recruitment of staff members from outside of the power station.

The minutes of a meeting of the affirmative action task group held in August 1994 provide useful insight into the viewpoints of the various trade unions.[44] The union MWU-Solidarity, a union with a historically white membership, disputed the idea of "token" appointments from the outset. The notion of "token" appointments here refers to the practice of hiring employees on the basis of their skin colour to fill affirmative action quotas while neglecting their actual competency. While not explicitly rejecting the policy of affirmative action, MWU's representative argued that management should first consider "internal" candidates, or those candidates already in the employ of the power station. In this formulation, a suitably qualified white internal candidate should be preferentially appointed over an affirmative action candidate, drawn from outside the ranks of both the power station and Eskom. Numsa's representative concurred with MWU-solidarity on the need to avoid tokenism but disagreed on the order of preference for appointments. Numsa agreed that white internal candidates be considered before an affirmative action candidate from outside of Matimba and Eskom. However, the union argued that the needs of affirmative action candidates at Matimba and then Eskom were paramount, and were to be considered before internal white candidates. NUM attempted to refine the criteria for appointing internal affirmative action candidates, stating that "minimum qualifications" were to be applied in considering these candidates, while "maximum qualifications" were relevant for white employees.[45]

[44] Minutes of the Task Group, August 19, 1994. Personal collection of M Mothoni.
[45] ibid, p3.

On 29 August, the Affirmative Action task team was ready with its report and the meeting accepted the principals and procedures for recruitment that it laid out. For the next few months, the recruiting relationship ran smoothly, and in September 1994 the unions "expressed their appreciation of the way Engineering consults with them in terms of recruitment and transparency thereof"[46]. However, the trade unions continually propagated the importance of internal candidates in their views on subsequent appointments. This demand often came up against the shortage of suitably competent internal candidates. In June 1995, an employee in the electrical maintenance department proposed the appointment of a particular affirmative action candidate for work in the welding and boiler making section of the power station.[47] While the appointment was eventually approved at the meeting, NUM's representatives voiced their concern that the proposed candidate was not an internal one. Rather, "they felt that Matimbans irrelevant of race should get first preference." But management responded that no internal candidates had applied for the position and that those potential affirmative action candidates in the "accelerated development programme" at Matimba were not yet suitably equipped to perform the job satisfactorily.[48] Thus the imperatives of stabilisation[49] gave rise to concerted efforts for local residents to enjoy the opportunities for employment and skills development that the power station offered.

Certain senior managers at Matimba appreciated the value of employing internal candidates, though out of necessity rather than virtue. At a meeting held on 7 August 1995 the head of Matimba's engineering department spoke of his travels to the Eastern Cape town of East London to investigate the possibility of appointing affirmative action candidates from the region.[50] East London was a known hub of industrial skills because it was the concentrated sector of the country's motor vehicle manufacturing. But out the 25 candidates he interviewed, none met the requirements for employment at Matimba. This highlighted the limits to the recruitment of external candidates and he thought it more fruitful to focus on training employees within the power station. There were then three vacant positions which he proposed to fill with trainees from Matimba. NUM and Numsa supported the proposal and added that the danger was that appointments from outside of Matimba (and possibly Ellisras)

[46] Minutes of Engineering sub BU forum, September 7, 1994, Matimba power station. In the personal collection of M Mothoni.
[47] Minutes of a Special Maintenance sub BU forum, June 13, 1995, in the personal collection of M Mothoni.
[48] ibid.
[49] Cooper, *Africa since 1940*.
[50] Minutes of an Engineering sub BU forum, August 7, 1995. Personal collection of M Mothoni.

simply used the power station as a "stepping stone" before disappearing.[51] Thus Matimba and Eskom required custom-designed training programmes to fill their skilled labour requirements.

Training Positions

One of the problems with hiring internal candidates was that the training pipeline could not match the power station's demand on time. In 1994 le Roux complained of the dire state of the pool of engineers that Matimba could draw from at a national level so that even with the power station's engineers then in training there was likely to be a shortfall by the year 2001. The situation worsened if the pool was narrowed to include only engineers who qualified as affirmative action candidates because they were not graduating from universities in the vast quantities required. Matimba's head of engineering had previously highlighted the need to employ a number of "surplus engineers" who could be trained to become "system engineers".[52]A young engineer, he argued, required seven years of training before they could make autonomous technical decisions.[53]

The shortage of skilled engineers and artisans at the time constituted a national skills crisis. This was due to the historic exclusion of black students from the institutions of higher learning. Nonetheless some workers had acquired technical competency by learning on the job despite a lack of formal certification. As a result there emerged a process of assessment, motivated in large part by Numsa, known as the Recognition of Prior Learning (RPL).[54] Proponents of RPL argued that workers should be eligible for promotion on the basis of their experiential learning and in many instances employers accepted the argument with relief.[55] Institutional mechanisms for assessment were developed at a national level to determine an employee's actual efficacy and ascertain whether or not they fulfilled the necessary occupational requirements. Kekana related that certain employees at Matimba were successfully promoted on the basis of RPL. These included plant operators, for instance, who had learned how to handle certain equipment on the job.[56] Staff members performing

[51] Minutes of BU forum, May 4, 1995. In the personal collection of M Mothoni.
[52] Minutes of the Engineering sub BU Forum, August 3, 1994, Matimba power station. In the personal collection of M Mothoni.
[53] Minutes of the special generation sub BU Forum, 23 Sep 1994, at 8AM. In the personal collection of M Mothoni.
[54] Ballim, Y, Omar, R and Ralphs, A. 'Learning Assessments in South Africa' in Evans, N (ed) *Experiential Learning Around the World: Employability and the Global Economy*, London: Jessica Kingsley Publishers, 2000.
[55] ibid.
[56] Interview with Stephen Kekana, March 16, 2016, Matimba power station, Lephalale.

administrative tasks also achieved certification through RPL processes. Since it was usually the case engineers with university degrees came from outside of Elliras, RPL processes enabled the promotion of internal candidates, generally from the Ellisras district, who had not had access to tertiary education.

Le Roux argued that there were limits to the scope of promotion available through RPL. He argued that for certain high level occupations, experience on its own was not enough to justify the movement of an employee to a higher grade of employment. Here, knowledge, achieved through theoretical education, was more important than skill, hence the particular training that management had instituted. According to Kekana, later reminiscing on the question of the recognition of prior learning, le Roux did not oppose the principle of RPL but was responding to the demands of white employees who lacked formal engineering qualifications and sought promotion on the basis of RPL. But NUM asserted that by "watching someone do a job one should be able to do it" and that "'spanner boys' after 10 or 15 years could be artisans."[57] They also argued that theoretical training was tied to competency in the English language and this posed a language barrier for those workers who were unaccustomed to the technical terminology.[58] NUM continued to insist that transformation occurred too slowly at the power station, illustrated by what they considered to be the sluggish movement of workers through the employment hierarchy. Complaints persist to the present day of the partial and long-drawn out nature of the certification process for otherwise deserving employees.[59]

Strike

Discontent came to a head in March 1997, when the three trade unions declared a dispute and embarked on a week-long strike. The matter necessitated the intervention of the Executive Director of Generation at the time, Bruce Crookes, who visited the power station and drew up a report detailing recommendations. He intervened with the explicit aim of restoring the trust between management and labour. The persistence of racial segregation practices animated the protest. Numsa demanded the removal of racially segregated toilets, which was a legacy of Matimba's construction roots in the latter years of apartheid. According to Kekana, who was the chief Numsa representative at the time of the strike:

[57] Minutes of BU Forum, October 29, 1996. Personal collection of M Mothoni.
[58] Minutes of BU Forum, April 20, 1998. Personal collection of Stephen Kekana.
[59] Interview (anonymous), March 2016, Matimba Power Station, Lephalale.

> In 1997 one of the things that we were fighting for here in our own power station was that even after the 1994 general election you still had toilets being locked, you still had toilets for Europeans or whites. And then we had black ladies who were part of cleaning companies, they had to share toilets with the men.[60]

An official bulletin released by the power station management provides a useful summation of the main issues in dispute. The "implementation of affirmative action" was one of the chief concerns, and the neglect of "people from Matimba" was particularly at issue, in training and presumably also in promotion.[61]

In August 1997 the unions and management reached some certainty about the way the power station would handle the recommendations of the Crookes report. Following concerted pressure by the unions on management to find positions for the surplus staff, le Roux thought that more time was needed, because "work had to be fabricated for these individuals".[62] On the policy of recruitment, the eventual decision, reached in September 1997, was that Matimba would revert to Eskom's power station wide policy on affirmative action, rather than rely on its own Matimba-specific one. Numsa agreed with the policy on the grounds that it would "prevent an island,"[63] diverging from the normative policy framework established at Eskom's other power stations. The main implication of this transformed policy[64] was that all positions would only be advertised externally when all possible means of recruiting from within the power station were exhausted. These avenues included the thorough consideration of the staff that were in training and the "surplus staff". Trade unions were to "influence the compilation of the job description and the profile of the desired incumbent." But this rigorous consultation at the initial levels of recruitment allowed management some autonomy when deciding on the final candidate. A memorandum detailing the new recruitment and selection procedure stated that the "final selection of successful candidates is now left to the discretion of line management and needs not to be reported back at a sub BU forum." [65]

[60] Interview with Stephen Kekana, March 16, 2016, Matimba power station, Lephalale.
[61] "Bulletin: Industrial action issues and processes", attachment to the: Minutes of steering committee, August 8, 1997. Personal collection of M Mothoni.
[62] Minutes of a BU forum, August 25, 1997. Personal collection of M Mothoni.
[63] Minutes of a BU forum, September 4, 1997, item 4.4. Personal collection of M Mothoni,
[64] From Melinde Coetzee. "Recruitment and Selection Procedure", September 9, 1997. Personal collection of M Mothoni.
[65] ibid.

From Hostels to Single Quarters

In 1998 the power station began the slow phasing out of the hostel-based residential system. The housing transition was one from a residential system based on coercion and heavy company and state surveillance, to one in which residential life was subject to the wiles of the free market. The residential transition also marked the arrival of the neo-liberal reign of "choice", departing from the paternalist and coercive labour regime of preceding years. The impetus to home ownership and the creation of a local black middle class was also a means of creating a class of citizens who demanded better service delivery and the social amenities due to permanent residents of the district.

At Matimba the perils of the free market are best illustrated in the question of salary deductions. Over the course of the 1990s Matimba's management shed pretensions to paternalism and attempted to gradually halt the practice of salary deductions. The trade unions, mainly NUM, however considered payroll deductions to be a safeguard for workers who would sometimes neglect to make the more mundane but essential payments if left to their own devices. One of these was to a company called Istores, although the nature of the services it provided is not clear. In May 1998, NUM urged management to re-instate the system of stop orders from employees' payrolls and proposed that Istores impose limits on the amount that workers could purchase, noting that "some individuals did not manage their money."[66] A similar debate arose over the question of the salary deductions for payments to a company called IEMAS, which was a retirement fund company. NUM protested against the proposed cancellation of the payments and a member of Matimba management team stated his concern that workers were having difficulty managing their money and were "using Eskom as a tool to control finances."[67] Then in May 2000, unions urged management to continue deducting water and lights payments from workers' payrolls fearing that if the practice was stopped, workers would not make the payments themselves and their water and electricity would be disconnected.[68] The question of the visitors allowed to residents of the hostel is an example of the end of the paternalist system of labour organisation. While the hostel was in place, Matimba's management had to rule on the question of allowing female visitors to enter the hostel premises. Because there were multiple workers to a room, they opted to ban women from the hostels. Le Roux described it as follows:

[66] Minutes of a Joint Forum, May 4,1998. Personal collection of Stephen Kekana.
[67] Minutes of Joint Forum, August 3, 1998, Personal collection of Stephen Kekana.
[68] Minutes of a BU Forum, January 17, 2000. Personal collection of Stephen Kekana.

> You know the apartheid system created dependency. People were dependent. The system told you what you could and couldn't do, so you didn't have choice. And we were the system- we had to make those decisions: can you bring a woman into your room or not and you're 55 years old or 35 even, you know more independent. So those were the things we were dealing with- all of us, not just at Matimba, all the power stations, the whole of Eskom was dealing with those dynamics in the 1990s."[69]

The decision to close the hostel was a product of both ideology and necessity. The hostel was a massive structure, built to house 5 000 labourers during the time of construction.[70] By the mid-1990s only a tiny portion was occupied and the hostel fell into disrepair. Vandals had steadily stripped the near vacant hostel of those fixtures which still held some market value. Electric cables were popular items of theft, but removing them was a dangerous exercise and at times the bodies of those who tried were discovered on the hostel premises. One option put on the table was that Matimba turn the hostel loose onto the free market and offer the rooms to the public at a low rent but the prospect of uncontrolled access raised the serious threat of further vandalism.

One alternative to hostel accommodation was the "single quarters", which had historically housed Eskom's white and professionally skilled workforce. These tended to be single males in their twenties. The single quarters accommodated one person per room, which contained a bed, desk and closet. But workers paid more for lodging and meals than at the hostels. Le Roux recalled that while hostel dwellers paid R5 per month for accommodation and meals at hostels, residents at the single quarters paid R105.[71] As a result some workers dug in their heels and refused to leave the hostels. Workers who moved to the single quarters complained that the meals served there more vegetables and less starch and meat than the food traditionally served at the hostels and referred to as "westernised meals"[72]. But NUM and Numsa encouraged the closure of the hostel, in line with the unions' national campaign, because of its visceral connection to the brutality of the colonial and apartheid regimes. The number of residents in the hostel gradually declined so that in July 1998, Matimba's management reported that the hostel was inhabited by just 14 employees of Eskom.[73] According to Kekana, the intransigent workers who remained at the hostel were those

[69] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng
[70] ibid.
[71] ibid.
[72] Minutes of Joint Forum Meeting, July 6, 1998, Personal collection of Stephen Kekana.
[73] ibid.

migrant labourers from the Kwa-Zulu Natal and the Eastern Cape provinces. He suggested that with a permanent homestead in these regions, the migrant labourer was more willing to live a transient life at his place of work: "I don't know - because they prefer to go and work far from home. And then his home will always be his home. And then he'll go home when he is on leave and then come back. And he doesn't want to have any other place that is home."[74]

With so few inhabitants the hostel became economically unsustainable, setting the stage for its eventual closure. But the mass migration from the hostel caused some consternation among those employees already resident in the single quarters. Le Roux related that: "When hostel people started coming in and eating with their hands, the single quarter people who were eating with knives and forks, couldn't stand it anymore, so they all demanded to go into houses as communes. So we had a whole social movement taking place."[75] One particular complaint was of the pockets of prostitution that followed the hostel dwellers to the single quarters.[76] According to Le Roux:

> So we started moving people out of the hostel to the single quarters which is from the original black township into the traditional white township. We then had the white families come to me - they're tearing their hair out and being angry because they've now got shebeens and prostitutes and drunk women walking across the street.[77]

Thus the closure of the hostel, which symbolically signalled a shift away from the migrant labour system, was met with a degree of resistance from workers themselves and from some of the townsfolk.

Phasing in Market-Related Rentals

Across Eskom's fleet of power stations, managers had to introduce market related rentals to Eskom-owned houses. The Eskom Housing Policy of 1995 stated that, in line with the Reconstruction and Development Program (RDP) and national housing policy, Eskom committed to finding housing for its employees, and in particular to assist employees own their own homes.[78] Eskom thus had to provide housing in terms of the free market. Eskom's former sister parastatal, Sasol, faced a similar challenge. Sparks cites a memorandum from Sasol's managing director Peter Cox written in 1987, who argued that: "an employer should

[74] Interview with Stephen Kekana, March 16, 2016, Matimba power station, Lephalale.
[75] Interview with Clive le Roux, February 18, 2015, Megawatt Park, Gauteng.
[76] ibid.
[77] ibid.
[78] Eskom housing policy, 1995.

not become directly involved in the personal affairs of its employees. Housing could be classified as such a personal affair."[79] Apart from the financial incentive of improving cash flow by cutting the costs of employee housing, there was also an ideological basis for insisting that employees assume financial responsibility for housing.

One of the persistent problems of housing provision for Matimba's employees has been the shortage of affordable housing for workers, largely African workers, at the lower end of the pay pool, and on the other hand, a surplus of the houses at the higher end of the rental market. Demand for houses at the lower end of Eskom's rental grade exceeded supply so that black employees were entitled to more help from Eskom in shifting to houses that could accommodate their families. They thus were entitled to a settling in allowance for moving to married quarters, a first for many because the dictates of the Group Areas Act had outlawed their residence there in previous years.[80] According to Kekana, a government moratorium on the sale of state assets prevented Eskom selling many of its houses. As he related: "First the moratorium came from the government. Because there were farms, buildings in towns, whatever that belonged to the government and the government didn't know them all after 1994. Some of those buildings and farms, houses vanished because people would just register it under their name. Then they placed a moratorium on the selling of state assets."[81] This moratorium was only lifted in 2010. This meant that some levels of Eskom housing, particularly the lower cost housing, could not be sold onto the private market while the complete accounting of state owned land was in the process. A parliamentary monitoring group report of 2014 indicates that the task of auditing state assets had not been resolved by then.[82]

In August 1997, at a housing steering committee meeting, Matimba's management announced that the maintenance of Eskom houses had been outsourced to the property company Resprop. The anxiety of the transition to a system of private ownership is evident in discussions over the "maintenance of gardens". Numsa opposed the outsourcing of maintenance work in Eskom's housing, instead stating that "they support community development and RDP and feel that Eskom could play a bigger role in developing

[79] Sparks, "Apartheid Modern: South Africa's Oil from Coal Project and the History of a Company Town," 227.
[80] Minutes of a Special joint forum meeting held in conference room 2, Monday 24 Oct 1994. In the personal collection of M Mothoni.
[81] Interview with Stephen Kekana, March 16, 2016, Matimba power station, Lephalale.
[82] Parliamentary Monitoring Group, *Cooperation between departments and progress on the audit of land and property that belongs to government, with Deputy Minister of Public Works*, February 11, 2014. https://pmg.org.za/committee-meeting/16901/.

community."[83] Sparks has remarked on the importance of gardens as the prime marker of respectability in Sasolburg. The lease stated that individuals were responsible for maintaining their gardens, and it was proposed that Resprop issue warnings before sending in a horticultural specialist, and then billing the tenant for the service.[84] In contrast to the situation of labour control during the 1970s, the managers of the single quarters had limited scope for intrusion into the affairs of its inhabitants. Trade unions consistently urged that the rights to privacy of individual inhabitants be respected. In 1997 Eskom's employees occupied 105 rooms in the single quarters. A suggestion was made at one of the meetings, to upgrade or replace the fence around the single quarters to better control the "unwanted elements". But the Resprop regional manager stated that the matter required greater consultation with the residents of the single quarters because "there are residents who are against fences and other controls."[85]

In October 1997 Numsa pointed out that there had been police raids at the single quarters for married couples and urged the power station management to ensure that the police raids were lawful.[86] On further investigation, it emerged that the police had acted on information that certain "illegal residents" at the single quarters possessed illegal fire arms and stolen goods. Resprop admitted to having given permission to the police to protect Eskom's employees from the delinquency of the illegal residents.[87] They had mentioned that there were a number of illegal businesses operating at the single quarters with only three official businesses in operation.[88] NUM and Numsa were outraged by the police raids and Numsa suggested that the single quarter management take care of the eviction of illegal businesses, rather than the police.

Despite the difficulties inherent in room-like accommodation, houses proved too expensive for Eskom's employees. On 11 July 1997 one of the points of discussion at a meeting between management and trade unions was that Eskom-owned houses sold on the local housing market had proven unaffordable for Eskom's employees. But the proportion of

[83] Minutes of Regional Housing Steering Committee, August 22, 1997, item 5.4. Personal collection of Stephen Kekana.
[84] Minutes of Joint Forum, October 9, 1997, item 4.8. Personal collection of Stephen Kekana.
[85] Minutes of Regional Housing Steering Committee, August 22, 1997, item 4.9. Personal collection of Stephen Kekana.
[86] Minutes of Meeting held in the Esprop Conference Room, October 1, 1997. Personal collection of Stephen Kekana.
[87] Minutes of Meeting held in the Esprop Conference Room, October 15, 1997. Personal collection of Stephen Kekana.
[88] Minutes of Meeting held in the Esprop Conference Room, October 8, 1997. Personal collection of Stephen Kekana.

employees who could not afford the houses is not clear from the records.[89] On 24 November 1997, a representative of Resprop presented the findings of a study into the local housing market, which found costs for both purchasing and renting were "extremely high." He recommended that Eskom's employees purchase the empty plots owned by Eskom, which numbered 524 in Marapong and 123 in Onverwacht. The stands would also be "serviced" by Resprop and employees would have to finance the construction of their houses themselves.[90] Eskom also offered a housing loan to certain employees.

The implementation of market-related rentals at Matimba was a long drawn out and controversial process, as NUM and Numsa debated the extent of service provision to be provided at the single quarters. The unions were particularly concerned with the sparseness of recreational facilities, including the library, gymnasium, a football field serviced by the power station, and TV sets in rooms. They considered recreational amenities to be the "prerequisites for minimum single quarter standards."[91]As part of a compromise they reached at the end of the year 2000, they agreed to introduce a 50% rental for 2001, holding open the option to raise outstanding demands.[92] In November 2001, unions argued that their members would not be able to afford the new rentals for the following year. In 2002, the question of a pay-out was taken more seriously because unions argued that rentals were too high, and that empty stands in Marapong owned by Eskom could be bought by these employees. The unions stated that the majority of the residents were in favour of moving out of the single quarters, with just 15 out of 250 residents against it.[93] Another survey was conducted in 2003, by the power station's Services Manager, which found that 151 out of 199 people surveyed agreed to the buy-out while 12 were against it.[94] Eventually unions and management agreed that R30 000 would be paid to workers, a sum that was on par with the Majuba and Hendrina power stations.[95] Later that year 86% of the single quarter residents "applied to be bought out". In terms of Eskom's Conditions of Service, these workers could also apply for rental and housing subsidies.[96] This ended the period of transition to the free market but also encouraged the continuation of racial segregation through economic stratification.

[89] Minutes of Task Work group meeting, July 10 &11, 1997. Personal collection of Stephen Kekana.
[90] Minutes of a Joint Forum, November 24, 1997, Personal collection of Stephen Kekana.
[91] Minutes of the Joint Forum, February 2, 1998, Personal collection of Stephen Kekana.
[92] Minutes of the BU Forum, December 4, 2000, Personal collection of Stephen Kekana.
[93] Minutes of the BU Forum, August 5, 2002, Personal collection of Stephen Kekana.
[94] Minutes of the BU Forum, May 5, 2003, Personal collection of Stephen Kekana.
[95] Minutes of the BU Forum, September 1, 2003, Personal collection of Stephen Kekana.
[96] Minutes of the Bu Forum, August 8, 2003, Personal collection of Stephen Kekana.

Conclusion

This chapter has highlighted the shifts in the nature of labour relations in the district from being characterised as paternalist to one based on the nominal consent of the free market. While the paternalist system contained some understanding between the managers and employees, the relationship remained fundamentally unequal. The arrival of independent black trade unions in the late 1980s thus signified a fundamental shift in the nature of labour relations in the region. This coincided with Eskom's emphasis on the free market during the early 1990s, highlighting the perils of economic freedom and the constraints of affordability. But the incorporation of independent trade unions into the power station's formal negotiation channels meant that the network gradually adjusted to the demands of transformation and affirmative action. This necessitated the implementation of a system of redress to handle the effects of the historical exclusion of the country's black majority from institutions of higher education. The transition from a migrant labour system to one that recognised the permanency of an African urban population also gave rise to the pressures of stabilisation. While it created the incentive for people to remain in the Ellisras district, it also increased the demands of citizenship for the local populace. These pressures of localisation were to play a large role in the prospects for the Medupi power station's construction.

Chapter 6: Medupi

Introduction

The Medupi power station was intended to be the largest dry-cooled power station in the world, with a capacity to generate 4800 MW of electricity. Eskom's pressure to realise its ambitious scale was compounded by the high stakes for the power station's timeous completion. Medupi's completion date has been repeatedly postponed. While Eskom expected the first set to reach production by the end of 2011, its completion was delayed until 2015. Like the construction of Matimba, the Medupi power station was driven by desperation. The press and politicians painted Medupi as the panacea to the national electricity shortage crisis that manifested in periodic electricity outages for households and businesses. Electricity shortages had a devastating effect on the country's economy and on its growth prospects. Medupi was designed and commissioned alongside a sister power station, Kusile, which is situated among the coal fields of Mpumalanga. Many of the problems that plagued Medupi were similarly encountered during the construction of Kusile. But in the interests of brevity, this chapter will only focus on the construction of Medupi.

Medupi was hastily planned amid unpropitious global market conditions. A long time-lag between the commissioning of Medupi and Eskom's last power station development in the 1980s meant that Eskom's power station construction network had to be desperately revived following decades of lethargy. Amid the threat of splintering posed by democracy and neo-liberalism, Eskom faced severe challenges of long-term planning and stabilisation. The absence of long-term planning and seamless network continuity meant that Medupi was from its inception a patchwork of various incompatible elements. It was also a high-tech power station utilising elements that Eskom had little experience with. In this case the road to successful innovation involved numerous and costly instances of backtracking. Rather than a massive failure, Medupi was a case of the network adjusting to new circumstances and finding ways of absorbing unexpected challenges.

Medupi was also built during a time of global hostility to coal-fired power stations. Eskom was reluctant to embrace renewable energy sources, asserting that the technology was not reliable enough to meet the country's electricity demand. To reduce the power station's pollutants Eskom opted for the technologically sophisticated super-critical boiler design. But the manufacture and installation of the boiler required an intricate welding technique that few in the country were familiar with. Welding faults are one of the main reasons for the power

station's delay. The importation of skilled labour to perform the welding resulted in strike action from local residents of Lephalale, who argued that the contractors should have implemented training in the welding. This conflict was a manifestation of the challenge Eskom faced to encourage as much national and local-level development as possible alongside the speedy construction of the Medupi power station.

Persistent labour unrest at the construction site is another reason for the power station's delay. While Eskom kept a safe distance at first, not willing to interfere in the relationship between the contractors and their employees, its eventual intervention in 2013 alleviated the hostility of labour relations. Government also encouraged the resolution of labour strife because of Medupi's national importance. The heterogenous complexion of the workforce at the power station meant that the management of labour surpassed the bounds of normal corporate employer-employee relations, under which corporations sought to maximise profit. Rather the various managers at Medupi had to recognise the legacy of under-development wrought by the large-scale dispossession of land and capital of African residents.

Part of the rhetorical success of South Africa's hosting of the Fifa World Cup in 2010 was that it demonstrated that Africa's organisational and infrastructural prowess was worthy of a place on the infrastructural world stage. The construction of the World Cup stadiums and its transport infrastructure carried a message of defiance to Afro-pessimists. For the public then, Medupi's recurring delays were disappointing in what they implied about the state of modernity in South Africa. Blame too often rested on the oft-presumed symptoms of African political dysfunctionality, in particular on allegations of corruption that curtailed the efficient working of technical instruments. Like many other parastatals, by the 2010's Eskom had become a tool of enrichment for political enrichment, both at the party and individual level. However, there also exists a body of managers and engineers, long-standing employees of Eskom, who have resisted the undue interference of politicians. At the same time the story of Medupi shows that the state also played a facilitating role because it helped to resolve paralysing labour conflict. Thus the state acted as both a stabilising and de-stabilising force in the development of Medupi.

Load Shedding

By 2007 the country faced a desperate shortage of electricity. To ease the pressure of consumer demand, Eskom initiated a controversial programme of forced electricity outages at regular and pre-announced intervals, termed "load shedding". In November 2007, the *Mail*

and Guardian expressed its despair over the future of electricity provision in the country: "Despite previous assurances by Eskom that there will be enough electricity to go round come 2010, this week many South Africans again sat in their dark, silent homes as another round of load shedding kicked in."[1] Load shedding had a devastating impact on the country's economic growth. In January 2015, the deputy director-general of the Department of Planning, Monitoring and Evaluation (DPME) estimated that load shedding cost the country between R8 billion and R11 billion a day in lost economic activity.[2] In 2008, Cosatu expressed its concern over the impact of electricity on unemployment: "The Congress of South African Trade Unions shares people's anger at the enormous disruption to their lives and the economic prospects for the country caused by Eskom's 'load shedding'. It has become a serious national embarrassment and could have a major impact on economic growth and job creation."[3] By 2011, Medupi and Kusile were expected to come online in 2017 and there was no respite in sight for the electricity crisis. Eskom expected an "energy gap" for 2012, where demand overshot supply. In an interview with the Financial Mail, Brian Dames said: "Even if we use all the mechanisms we currently have, there will still be an energy gap for 2012."[4] Eskom then began to intervene in the sphere of electricity demand by negotiating with its large industrial consumers to reduce their electricity usage. In subsequent years, largely due to the slowdown in electricity demand caused by the economic recession, load shedding reduced in intensity and public pressure on Eskom receded.

The period of Medupi's construction was also one of great optimism over the power of large-scale infrastructure projects to deliver what was considered sorely needed connectivity infrastructure across the African continent. In July 2010, a pan-African infrastructural development initiative, called the Programme for Infrastructure Development in Africa (PIDA), was formed with support of the African Development Bank. South African president Jacob Zuma stood at its helm, the success of his candidacy boosted by the country's successful hosting of the 2010 World Cup. In his inaugural speech, Zuma described PIDA as grappling with an important gap in communications infrastructure on the continent, stating that "we cannot trade on the continent because of our lack of infrastructure".[5] As such the

[1] "Dark Times Ahead," *Mail and Guardian*, November 15, 2007.
[2] "Load Shedding Costs SA Dearly," *The Star*, July 30, 2015.
[3] "Eskom's 'Load Shedding' Crisis," *Cosatu Press Statements*, January 16, 2008. http://www.cosatu.org.za/show.php?ID=309#sthash.VERr8T6s.dpuf
[4] "Power in Process," *Financial Mail*, January 14, 2011.
[5] "Africa Launches an Ambitious Programme for Infrastructure Development | NEPAD," July 26, 2010. http://www.nepad.org/content/africa-launches-ambitious-programme-infrastructure-development.

growth in connectivity was, at least in rhetoric, intended to stimulate trade between and within African countries.

There also existed a substantial global antipathy to coal fired power stations at the time that Eskom commissioned Medupi. Its large institutional funders, the World Bank and the African Development Bank (AFDB), confronted the wrath of environmental organisations once they agreed to fund the power station.[6] Eskom initially estimated that Medupi would cost R 125.63-billion, 47% of which it hoped to borrow from institutional funders. Other sources of funding for the construction of Medupi were increases in electricity tariffs and Eskom bonds.[7]The World Bank agreed to provide a $3.75-billion loan in 2010[8] and the African Development Bank agreed to lend Eskom 1.86-billion euros (an estimated R21-billion at the time) at the end of 2009.[9] As a testament to the haste with which Medupi was planned, Eskom raised these funds after the main contracts were awarded. In April 2010, the environmental conservation organisations Earthlife Africa and groundWork laid complaints with both the AFDB and the World Bank, urging them to investigate various aspects of Medupi's construction they argued constituted instances of improper environmental management. Eskom viewed the environmental organisations with suspicion and in 2013 was forced to apologise to Greenpeace for spying on their activities.

South Africa's electricity supply crisis and the consequent pressure on the country's economic growth were enough to quell the Banks' fears about the power stations' environmental destruction. Both the World Bank and the AFDB argued that the construction of a coal-fuelled power station was the only way in which South Africa's electricity demand forecast could be met, which would in turn assure the country's 4% projected GDP growth. The sense of urgency and crisis surrounding Medupi thus affected their decision to provide the funding. Responding to accusations that Medupi's environmental impact contradicted the Banks' own conservation policies, both the African Development Bank and the World Bank stated that their funding was retroactive. At the time that the AFDB approved its loan to Medupi, Eskom had already awarded the boiler and turbine contracts and the contractors had already spent twenty months on the design of the boilers and turbines.[10] The Bank was unable

[6] "World Bank Approves Eskom Loan," *Mail and Guardian*, April 9, 2010.
[7] African Development Bank, *Management response to the request for verification of compliance to bank policies regarding the Medupi power project, South Africa*.
[8] "World Bank Approves Eskom Loan," *Mail and Guardian*, April 9, 2010.
[9] "Eskom Will Get R21 bn Loan to Build Power Station," *The Star*, November 27, 2009.
[10] African Development Bank, *Management response to the request for verification of compliance to bank policies regarding the Medupi power project, South Africa*.

to align its own specifications for environmental conservation with those of Eskom's. Similarly, the World Bank argued that Eskom conducted the Environmental Impact Assessment (EIA) for Medupi before it agreed to the loan and that it could not provide input into the EIA. Construction work had already started for the power station when the loans were granted. Thus the country's electricity crisis and its effects on economic growth encouraged the power station's funders to bypass normal environmental impact evaluation procedures.

The Banks' investigative reports into Medupi's environmental impact are also useful explanatory sources for Eskom's reluctance to place its entire faith in renewable sources of energy. Scholars have attributed the continued dominance of coal-powered electricity generation to the peculiar institutional configuration and lasting hold of the Minerals-Energy Complex. This idea suggests that Eskom has used its monopolistic position, and historical relationship with the country's coal mines, to continue building fossil-fuelled power plants.[11] Joel Krupa and Sarah Burch argue that historic long-term coal contracts drawn up between Eskom and the country's coal mines have rendered the power station coal comparatively cheap. But this supposition ignores the fact that the long-term coal contracts were not always to Eskom's advantage. The fickle nature of the coal export market meant that during downturns, Eskom's coal contracts provided a lifeline to coal suppliers. In addition Eskom was more experienced in constructing coal-fired electricity power stations, emphasising the importance of the long-standing role of the large technical systems network.

In its report, the AFDB, drawing on Eskom's own analysis, stated that renewable energy sources of solar and wind power were not viable alternatives because they were "not possible to develop in a scalable and timely manner"[12] to meet the country's supply deficit. One possibility involved generating electricity from "heavy fuel oil", but this was considered too expensive because it would rely on imported oil and "would not provide the same level of energy security and self-sufficiency."[13] In addition Eskom could not place its faith in the efficacy of South Africa's electricity generating neighbours, which together formed the Southern African Power Pool (SAPP). Ideally, South Africa could import electricity from the Democratic Republic of Congo's Inga 3 hydropower project. This involved the construction

[11] Joel Krupa and Sarah Burch, "A New Energy Future for South Africa: The Political Ecology of South African Renewable Energy," *Energy Policy*, Sustainability of biofuels, 39, no. 10 (October 2011): 6259.
[12] African Development Bank, *Management response to the request for verification of compliance to bank policies regarding the Medupi power project, South Africa*, p5.
[13] ibid.

of a dam and a 4800 MW hydroelectric plant at the Inga Falls on the Congo River.[14] But the eventual completion of the project lay beyond Eskom's control. The dam was only in its planning stages at the time and its commissioning date had yet to be confirmed.[15] In addition, South Africa's importation of electricity from the DRC would place pressure on an already straitened power supply in the SAPP. Thus Eskom considered the possible alternatives to a coal-fired power station to be unfeasible considering the large volume of electricity it had to generate.

Medupi: Contractors and Technical Difficulties

As decades before, with the design and construction of the Matimba power station, many observers doubted Medupi's feasibility. Critics argued that the scale of the project was too ambitious – in terms of its generating capacity and its technological sophistication. In 2013, when its delay had become apparent amid the strains of load shedding, the *Mail and Guardian* reported the opinions of Eskom watchers from various sectors. They proclaimed that Medupi was cursed from inception. A member of the South Africa-based Free Market Foundation's Energy Policy Unit argued that Eskom failed to prioritise speed by opting for a complex, high-tech "mega station". Eskom's boast that Medupi was the first of its kind, and a global pioneer in power station construction, was not necessarily desirable considering that "off-the-shelf" standard models, commonly used in India and China, of power station development would have satisfied the same function. According to the AFDB report, a smaller power station with a lower capacity would not have satisfied Eskom's electricity supply requirements.[16] But a coal analyst interviewed by the *Mail and Guardian* defended the economies of scale, arguing that the nature of the Waterberg coal made it suitable for a large power station in the area. Coal mining was only economically efficient when mined in large quantities, and a power station with a large generating capacity was needed to receive the coal supply.[17]

Brian Dames, Eskom's CEO at the time of Medupi's construction, denied the idea that the large-scale nature of Medupi necessarily meant that the power station planning was misguided from the start. However he conceded that its construction might have run smoother if Eskom had started planning earlier and if construction had started on three units at first,

[14] http://www.internationalrivers.org/campaigns/the-inga-3-hydropower-project.
[15] See the Introduction to this thesis for more on the troubled history of the Inga hydropower project.
[16] African Development Bank, *Management response to the request for verification of compliance to bank policies regarding the Medupi power project, South Africa*, p6
[17] "Medupi Mission Impossible," *Mail and Guardian*, July 18, 2013.

with the other units incrementally added.[18] He argued that Eskom found itself in a weak bargaining position in 2007 when it first approached the handful of engineering global corporations to supply the power station's specialised components. Buoyed by the rising industrial powers of India and China, global demand for power stations was high and these corporations were swamped with orders. In September 2013, Dames further described the dire effects of the electricity supply crisis on Medupi's design. Because of the cessation of capital investment during the 1990s, Eskom's decision to construct Medupi and Kusile came too late to allay the electricity supply crisis. Dames stated that: "building Medupi and Kusile too late meant we also had little opportunity to complete all the upfront planning. We went ahead based on virtual designs, and using the best footprint available in Eskom at the time - the designs for the Majuba power station, which had been designed in the 1980s and completed in 2001."[19] Majuba and Kendal were also dry-cooled power stations and the immediate predecessors of Medupi and Kusile. Nonetheless, he attributed the delay of the power stations' completion, from the first estimate of 2011 to the then current target of 2014, not to an inherently flawed plan but to "underperformance by key contractors."[20] Thus, he argued, the contingent factors in the process of construction played as important a role in the power station delay as any faults in the initial design.

The Expansion of the Grootgeluk Coal Mine

To prepare for the coming of Medupi, the Grootgeluk coal mine underwent a process of expansion. According to Joe Mayer, the General Manager the Medupi Expansion Project at the Grootgeluk coal mine during this period: "Medupi expansion on our side involved the expansion on the side of the mine: we doubled up the mine to meet Medupi's demand and that meant more housing, accommodating a lot of contractors. At our peak when we did the mine expansion, we accommodated about 5 000 contract workers which had to be accommodated in all kinds of accommodation."[21] The expansion process involved the greater use of capital intensive, automated mining operations. In 2009, Mayer told *Mining Weekly*: "we will actually just be mining faster."[22] The mine had opted for an in-pit crushing and conveying system (IPCC), which meant that coal was crushed inside the pit and then transmitted via a conveyer belt to a spreader for further dispersal. The IPCC is generally

[18] ibid.
[19] Brian Dames, "The Lessons That Eskom Have Learnt the Hard Way," *Infrastructure News*, September 17, 2013, http://www.infrastructurene.ws/2013/09/17/the-lessons-eskom-learnt-the-hard-way/.
[20] ibid.
[21] Interview with Joe Meyer, 17 March 2015, Onverwacht.
[22] "Exxaro's R9bn Medupi Coal Expansion Project at Grootegeluk," *Mining Weekly*, December 11, 2009.

intended to reduce reliance on what was the previous "haul and dump" practice at the coal mine. In this model, massive trucks drove into the pit where it was loaded with tonnes of coal and then driven out the pit. The IPCC was more automated than the truck-driven system and was most attractive under conditions of high fuel and labour costs.[23]

Exxaro confidently completed the expansion of the Grootgeluk coal mine to schedule. The company was at the time engaged in a broader process of expansion, seeking to exploit previously untouched coal reserves. The rise of the industrial powers in East Asia had opened the market for coal exports and in 2014, it was reported that 70% of Exxaro's coal exports were geared for India and China. Asia had overtaken Europe as Exxaro's chief continental client for coal. [24] In 2012, its CEO Sipho Nkosi described the possibilities Exxaro's management had considered opening a new coal mine, building on the increased skills and capabilities the company had accrued from the Grootgeluk coal mine. Prospects on the horizon included the exploitation of other areas of the Waterberg, at an incipient mine called Thabametsi, as well as a potential coal mine in Mozambique. At the time, Exxaro had established itself as a global coal mining player, and was in the process of developing a coal mine called Moranbah South in Australia, with a production capacity of 12-million tonnes of coking coal a year.[25]

Coal Contract

However, Exxaro's readiness to supply Medupi with coal came up against the power station's inability to receive it. This was ultimately to Eskom's disadvantage, and necessitated a review of the coal contract. On 30 March 2007, Eskom signed a forty year, long-term coal contract with Exxaro. This initial contract covered the coal supply for only the first three units of Medupi, and for an estimated 7.3 million tonnes.[26] In 2009, following a review of the coal contract, Eskom temporarily suspended the agreement. At the time, Eskom was also reviewing its coal contracts at other power stations in a bid to lower its input costs. Brian Dames told the *Business Day* that "the world has totally changed since the conclusion of the agreement."[27] Changes in the coal industry emanated from the historic concern of the unwieldy private sector and the attractive opportunities for coal export thrown up by the growth in demand from India and China for South Africa's lower quality coal. Eskom also

[23] "Spreading the Load," *Inside Mining*, September 2014.
[24] ibid.
[25] "Exxaro's Grootegeluk Medupi expansion project to start production in latter half of 2012," *Mining Weekly*, August 26, 2011.
[26] "South Africa: Exxaro Seals Coal Contract with Eskom," *Business Day*, March 30, 2007.
[27] "Eskom to Review Exxaro Coal Contract," *Business Day*, December 9, 2009.

opted to draw up short-term coal contracts with the collieries because of inadequate supply from the "tied-mines" that Eskom had signed long-term coal contracts with.[28]

For Eskom this was due to years of pressure to cast off any "wasteful expenditure". This can be seen in Eskom's expression of a newfound desire to do away with long-term contracts.[29] In many cases these had been "cost-plus" arrangements where Eskom owned part of the coal mine as a measure to allay the risks of starting up or expanding production for the mine owners. In early 2016, *Engineering News* reported that: 'Using the analogy of a bakery, acting CEO [of Eskom] Brian Molefe said the idea would be to source "healthy bread", or "healthy coal", without actually "owning the bakery".[30] "I don't see the coal industry objecting to us getting the correct quality of coal for our power stations and getting out of the cost-plus arrangements. We are not interested in owning mines; we are not interested in contributing capital expenditure to the mines. We would like to buy coal from the suppliers that can give us coal at the best price," he said.'[31] Part of Eskom's managers' discontent was that the tied coal mines were not performing as they would have liked and inefficiencies were shifted onto the price of coal.

This broader background of concern for the price of coal did not have the same effect on the relationship between Grootgeluk and Medupi as it did at Eskom's other power stations. However, the timing of the coal delivery became an issue of recurring concern. The agreement was eventually confirmed in April 2010 and Exxaro resumed its funding of the project. The revised agreement postponed the delivery of the coal from the mine to Medupi by a year, from the end of 2010 to 2011. This was important because if Medupi's boilers were not ready to receive the coal by the time specified in the coal contract, Eskom would still have to pay for what was in effect unused coal. This situation of wasted expenditure materialised in 2013 when Eskom paid penalties of R1.6-billion to Exxaro in 2013 and R352-million in 2012 for its inability to receive the coal. Exxaro also expected Eskom to pay R1.6-billion in penalties for 2014 because Eskom could not receive the six million tonnes of coal that were ready for delivery.

[28] "Eskom's Coal Moans Find a Sympathetic Ear," *Business Day*, November 23, 2010.
[29] "Exxaro Opts to Stoke up Its Coal Business," *Business Day Live*, August 21, 2015.
[30] "Eskom Unveils New Coal-Sourcing Strategy as It Pursues R2bn Optimum Claim," *Engineering News*, August 11, 2015.
[31] ibid.

Contractors

Medupi's delay was due to a series of cascading problems, not least interminable trouble with the contractors. In July 2013, Eskom's chief financial officer Paul O'Flaherty said in an interview with the radio station SAFM, that Eskom had faced adverse conditions since Medupi's inception. "We have continued to be on [the] back foot for most of this project," he said.[32] As reported, Eskom had a less than ideal relationship with its contractors due to the high global demand for power station equipment. When the main contracts were awarded Medupi had a budget of R78.6-billion, of which the boiler and turbine contracts made up an estimated R33-billion.[33] Similar contracts were simultaneously awarded to the same companies for the Kusile power station. This large capital expenditure meant that Eskom was more likely to proceed tenaciously against the odds when faced with technical failure rather than abandon the power stations entirely.

While these contracts were awarded to global engineering corporations, Eskom set down strict requirements for the involvement of local industry because of its high levels of capital expenditure. While accepting that some of the equipment would be imported, Eskom expected that at least half of the installations at Medupi would be supplied locally.[34] To fulfil the requirements for localisation, these companies merged with South African companies. The president of Alstom in South Africa Didier Farez said that the country had sufficient capacity and expertise to render the local targets realisable.[35] To enlarge its capacity, Alstom was then in the process of establishing a subsidiary called Alstom Africa holdings, which would oversee the delivery of Eskom's equipment. Alstom Africa had compiled a list of the equipment and material that could possibly be sourced from local suppliers. These included: "air coolers, pumps, auxiliary equipment for the turbine island, and structural steel and piping fabrication related to the turbine hall".[36]As with the construction of the Matimba power station, this equipment was mainly intended for auxiliary use; to assist in the installation and housing of the main power station equipment. This meant there was an extensive process of vertical integration.

[32] "Eskom on Medupi Delay: We take full Responsibility," *Mail and Guardian*, July 9, 2013.
[33] "Eskom Awards Biggest Contracts in SA's History to Hitachi and Alstom," *Engineering News*, November 13, 2007.
[34] "The Spending Begins," *Financial Mail*, August 15, 2008.
[35] ibid.
[36] "Alstom Looks to Place Upwards of €1,4bn of SA Power Work with Local Industry," *Engineering News*, February 28, 2008.

Boilers

The continued appeal of a fossil fuel power station was that technological advances had significantly reduced the scale of the air pollutant emissions. One of the distinctive features of Medupi is its use of super-critical boilers. Super-critical technology made more efficient use of steam pressure within the boiler and reduced the sole dependence on the power of the heat generated by the coal combustion. Super-critical boiler technology rose to prominence in the 1980s when technologists became concerned to reduce the harmful environmental impacts of coal combustion. In countries like South Africa and Germany, coal was the cheaper and the more competitive option for electricity generation, but was denounced by environmental activists who progressively achieved a growing clout.[37] A super-critical boiler favoured high capital investment over operating costs. It was thus the preferred option where coal was expensive because the boilers required less of it. But at Medupi, there is no indication that coal costs were higher than the ideal. Rather the Grootgeluk coal mine continued to be one of Eskom's lowest cost collieries. Thus the main incentive for the installation of a super-critical boiler was its ability to reduce environmental pollution.[38]

Awarding the Contract

Amid widespread suspicions of corruption from ANC officials in the awarding of contracts, it appears that those seeking to profit off the large infrastructure expenditure have manipulated rather than completely eroded Eskom's internal, legal processes.[39] Eskom awarded the contract to manufacture and install the super-critical boilers at Medupi to the company Hitachi Africa. This decision was controversial because the ANC owned 25% of the company's shares through its investment arm, Chancellor House. The stark coincidence gave rise to suspicions that the contract was improperly awarded. In 2009, following a request from Helen Zille, South Africa's main opposition leader, the Public Protector launched an investigation into Eskom's tender decision-making process. During the investigation the role of Eskom's chairperson Valli Moosa, who was also a member of the ANC's fundraising committee at the time that the contract was awarded, came under particular scrutiny. In the report of his findings the Public Protector cited an article published by the *Mail and Guardian* which detailed the fact that in the same month Eskom decided to construct Medupi,

[37] "Can Coal Be Clean?" *The Economist*, November 30, 2006.
[38] African Development Bank, *Management response to the request for verification of compliance to bank policies regarding the Medupi power project, South Africa*, p2
[39] Neopatrimonial politics, as Cristopher Clapham has noted, is characterized by a peculiar combination of formal institutional design and the predatory pursuit of individual wealth accumulation. Mkandawire, "Neopatrimonialism and the Political Economy of Economic Performance in Africa."

Chancellor House acquired a 25% stake in the shares of Hitachi Africa.[40] Moosa had been the chairperson of Eskom for four months at the time. In his evidence to the Public Protector's Commission of Inquiry, however, Moosa argued that Eskom's tender process was sound and that there was no room for an "arbitrary" ruling on his part. His statement was backed by the findings of an independent review conducted by the auditing firm Deloitte, which concluded that the tender process had been fair. While the Public Protector concluded that the tender had not been improperly awarded, he faulted Moosa for his failure to manage his conflict of interests in accordance with Eskom's policy. This potential conflict of interest arose because of Moosa's capacity as a member of the ANC's National Executive Committee and as Eskom's chairperson.[41]

The controversy died down following the Public Protector's investigation and the matter remained a surprising coincidence until October 2015, when an investigation by the United States' Securities and Exchange Commission (SEC) revealed that Hitachi had "inaccurately recorded improper payments" to the ANC. The payments consisted of a $1-million "success fee" and $5-million in dividends from the ANC's shares in the company and were related to the award of the Medupi boiler contract.[42] In response to these allegations, Hitachi opted to remain mute, agreeing instead to pay a $19-million fine to settle the charges. The evidence unearthed by the SEC's investigation, which included internal company emails, together with Hitachi's unwillingness to launch a defence provides compelling reasons to suspect a relationship of impropriety between the ANC and Hitachi. However, this does not mean that Eskom's tender process had been compromised and there is little evidence in the public domain to support this claim.

The SEC's investigation revealed that the relationship between Chancellor House and Hitachi began in late 2005. The following year Hitachi submitted its tender application for the boilers and turbines at Medupi, and in 2007 similar tenders for the Kusile power station. In May 2007, an executive member of Hitachi Africa emailed his or her colleagues in the company, stating that while the company ""had not been successful in receiving any update [from Eskom]," Chancellor House and "HPA's 5% shareholder" were doing "their very best" to

[40] "Report on an Investigation into an Allegation of Improper Conduct by the Former Chairperson of the Board of Directors of Eskom Holdings Limited, Mr V Moosa, Relating to the Awarding of a Contract," *Report of the Public Protector of South Africa, ML Mushwana*, February 18, 2009, 8.
[41] ibid, 35.
[42] "Hitachi Fined in US for Paying ANC 'front,'" *Business Day*, September 29, 2015.

bring Hitachi's offer for the Eskom contracts "in first place.""[43] Their efforts were clearly unsuccessful because in August 2007 Eskom awarded the boiler contract to the French multinational, Alstom. Alstom had been Hitachi's only rival in the tender race. If Hitachi and Chancellor House indeed worked hand in hand, their initial failure was proof of the fact that the latter did not have a direct influence on the tendering process. Eskom's tender evaluation board retained remained accountable to its internal procedures.

Nonetheless, Hitachi eventually acquired the contract following the breakdown of negotiations between Alstom and Eskom. The SEC argued that Hitachi had gotten wind of the fact that Eskom was having difficulties negotiating its terms with Alstom. Hitachi consequently "directed Chancellor House to help Hitachi win reconsideration of the boiler component of the Medupi power station contract."[44] By July 2008, Chancellor House had received its "success" fee together with the dividend payments from its shares. In addition, the SEC alleged that when Hitachi bought back its shares from Chancellor House to dampen the surrounding controversy, the latter received a 5000 % return on its shares. There is thus evidence of an improper relationship between Chancellor House and Hitachi, but the degree to which Chancellor House could influence Eskom's tender process is unclear. It is however probable that the appearance of success was enough for Chancellor House to claim payment of its "success fee".

Difficulties with Installation

Hitachi was not a new entrant to the South African electricity generation market. It had in fact a long and deep rooted relationship with Eskom through its control of the boiler manufacturing company Steinmuller. As discussed in Chapter Three, Steinmuller was previously responsible for manufacturing and installing the boilers at the Matimba power station, as part of a consortium of contracting companies. In 1999 Babcock Borsig bought Steinmuller and then in 2003, Hitachi bought the energy division of Babcock Borsig.[45] Despite the continuity in installing the equipment at a local level, they were also faced with a changed set of operating conditions in the development of the power station.

But the installation of the boiler was not as smooth as hoped. In March 2013, the *Business Day* reported on Eskom's suspicion that the reports it received from Hitachi detailing

[43] Securities and Exchange Commission vs Hitachi ltd, 10 (United States District Court for the District of Columbia 2015), 13.
[44] "From Hitachi Deal with Arm of ANC to Power Cuts," *Bloomberg*, October 5, 2015.
[45] Hitachi and Steinmuller at odds over SA boiler reference sites, *Engineering News*, December 5, 2007.

progress on the boiler work may have concealed the true threat of the welding faults. Investigations had revealed that some of the welding performed on the boiler at Hitachi's factory in the Johannesburg East Rand town of Nigel, did not meet the required specifications and that "9 000 pressure welds had not been post-weld heat-treated…"[46] Paul O'Flaherty, Eskom's financial director at the time, claimed that Eskom had repeatedly warned Hitachi about potential problems with the welding procedures. He was quoted as saying: "We have been telling Hitachi we don't believe you are conforming to your specifications and they have said, 'Don't worry, we'll take the risk, we'll take the risk.'"[47]

The welding was a very delicate process, consisting of thousands of intricate welds to connect pipes and equipment. Since Eskom and the subcontractors had no experience in installing super-critical boilers, they encountered a desperate shortage of skilled labour. According to interviewees who were employed at Hitachi during this time, the boiler at Medupi was fundamentally different to any boiler installed at any of Eskom's power stations, including its Waterberg predecessor Matimba. The super-critical technology utilised by the boiler meant it could withstand far higher temperatures and pressure.[48] In September 2013, the Hitachi Power Africa representative responsible for both Medupi and Kusile, Mark Marais, discussed at a Department of Science and Technology seminar the catastrophic consequence of the lack of competent welders in the country. The power stations required a particular type of welding called "mirror welding" which meant that the welder would have to perform the weld on the basis of a reflected image in a mirror before him. Commenting on the complexity of the operation, Marais quipped: "I can't even tie my shoelaces while looking in the mirror."[49]

This discontent manifested in a violent strike in 2011 that resulted in an estimated R104-million in damages and 221 677 lost "working days". A key source of dissension was that contractors had employed "foreign" workers to perform specialised tasks- in this case Thai welders- and striking workers argued that members of the local community should be trained to perform the same function.[50] Murray and Roberts' spokesperson described in response the company's efforts to train 1 000 workers, which were not entirely successful because the training had taken longer than the time available. At the time when their skills were most

[46] "Eskom Says Medupi Welding Faults Were 'concealed,'" *Business Day*, March 19, 2013.
[47] ibid.
[48] Interview (anonymous), Johannesburg Country Club, 25 June 2015.
[49] "Skills Shortage Inhibiting Success of Local Infrastructure Projects – Hitachi," *Engineering News*, September 12, 2013.
[50] "Strikers Riot at Power Project," *Times Live*, May 11, 2011,

needed, not enough of the trainees had qualified and the skills shortfall was made up by importing foreign workers. He estimated that 200 foreign artisans were employed at Medupi, a number matched by the number of local workers in employ. [51]

The factory in question was situated in the Johannesburg East Rand town of Nigel and was nominally run by a subcontractor of Hitachi, DB Thermal. DB Thermal also had a long-standing presence in South Africa, dating back to the 1970s when it supplied cooling equipment to the mines. In partnership with Hitachi, it invested in the development of a brand new boiler manufacturing facility in 2009. Its stated motivation in expanding the factory in Nigel in 2009 was to fulfil Eskom's 60% local manufacturing requirement by establishing a local manufacturing presence and to invest in training a skilled welding workforce. This development was an extension of the company's already existing manufacturing facilities in Nigel, which were initially established during the 1970s to supply the boilers for Sasol's own electricity generating units. The company was also involved in manufacturing parts for Eskom's new power stations in the 1980s. In 2002, the company became the subject of interest of global capital when the US based global manufacturing company of SPX became its majority shareholder.[52]

On July 25, one of the subcontractors responsible for welding on the boiler was charged with fraud. Forensic investigations instituted by Hitachi discovered that the subcontractor had submitted fraudulent documents, in covering up the extent of irregularity in the boiler work.[53] After ongoing investigations, Eskom reported in September 2013 that the nature of the fraud was so sophisticated that it had gone undetected by the professional bodies responsible for quality assurance. Eskom asserted that the subcontractor had used the incorrect welding procedures in the boiler equipment it intended supplying to Medupi. The welding procedures did not fit Eskom's quality control assessments and thus could not confidently withstand the high heat and air pressures that would be created within the boiler by the super-critical technology. In addition, the post-weld heat treatment was incorrectly performed.[54] Post-weld treatment is generally required for the material surrounding the weld which is ordinarily damaged during the intense heat treatment of the welding process.[55] This corresponded with the insights of a Hitachi employee who requested anonymity. He described the problem as

[51] "Medupi Dispute 'Hinges on Lack of Special Skills,'" *The Star*, May 13, 2011.
[52] http://www.spx.com/en/db-thermal/about-us/
[53] "Medupi Contractor Charged with Fraud," *Business Day*, July 25, 2013.
[54] "Police Investigating Fraud over Welding Work at Medupi," *Business Day*, September 11, 2013.
[55] http://pmg-assets.s3-website-eu-west-1.amazonaws.com/130911medupi_0.pdf, p17

due to the fact that "it was a new type of boiler tube material (which required higher welding skill) coupled with inexperience and aggravated by poor management and QA processes."[56] The technical failure was thus due to a combination of inexperienced welders employed at the Nigel factory, who were not suitably trained to handle the required welding, and the failure of quality assurance management to notice that welding did not fulfil the proper requirements.

The programme subsequently put in place to repair the fault repaired the boiler to fit the technical specifications. The repair work involved a team of about 50 workers, carrying out repairs on the welds so that the workmanship fitted with the Weld Procedure Qualification Record protocols.[57] In addition, a subcontractor had to replace four "separators", a device used to separate water from steam within the boiler system.[58] Eventually in November 2013, Hitachi reported that its boiler work at Medupi was mainly complete. This followed Eskom's postponement of Medupi's commission date from the end of 2013 to the second half of 2014.[59] This also came after the budget was revised from R91.2-billion to R105-billion, excluding interest. Thus, the pressures for localisation in terms of tailoring the power station to fit South Africa's unique environmental and social conditions meant the utilisation of particularly innovative materials. But the "networks'" lack of experience with this innovative technology fell on the lack of a readily skilled workforce to install the boilers.

Alstom and the Control and Instrumentation system

As mentioned above, in November 2009 Eskom announced that the contract for the control and instrumentation system would be awarded to French multinational Alstom. At an update to the Parliamentary Monitoring Group in September 2013, Eskom Group Executive Dan Marokane described the role of the Control and Instrumentation system, stating that "the whole of Medupi would be controlled by a Distributed Control System, which was a complex computer and instrumentation system that allowed operators to safely monitor and control what happened to the plant, internally and externally."[60] Alstom already held the contracts to install the power station turbines at Medupi and Kusile. The control and instrumentations system contract was worth Rl.1-billion but Eskom had made the award only for Medupi, and held back on its decision to award the contract for Kusile. The piece-meal awarding of

[56] Email correspondence, follow-up to: Interview (anonymous), Johannesburg Country Club, 25 June 2015.
[57] "Hitachi Confirms Medupi Progress, Insists It Can Meet Revised Schedule," *Engineering News*, November 14, 2013.
[58] ibid.
[59] ibid.
[60] Eskom, "Medupi Power Station Issues: Updates by Eskom and the Department of Public Enterprises," September 11, 2013, https://pmg.org.za/committee-meeting/16367/.

contracts was because Eskom was wary of committing itself entirely in a context where demand from South African industry was generally low.[61]

Further technical crisis ensued in July 2013 when Alstom reported that tests on its boiler protection system, which included a component of its overall control and instrumentation system, had failed. Its explanation for the failure was that the configuration required was too complex for its design capacity, considering that "no other coal plant has been built on this scale."[62] Eventually in January 2014 the contract to install the Boiler Protection System (BPS), was awarded to the German electrical engineering company Siemens. Nonetheless, the boiler protection system was a small component of the overall C&I system, which Alstom had successfully developed.[63]The overhauling of the contract came at a heavy cost to Eskom, but Siemens managed to successfully develop the software.

By mid-2013, it became clear that Medupi's delay had significant consequences on Eskom's financial well-being. *Bloomberg* reported that Eskom's bonds had taken a blow following its announcement that Medupi would be postponed. Investor perception that Eskom was a risky venture had skyrocketed.[64] Analysts quoted in the article suggested that the only reason Eskom remained investment-grade was because it was backed by government guarantees.[65] During the same week, O'Flaherty promised that Eskom would take stricter action in recovering penalties from contractors for non-delivery. In September 2013, Eskom's commercial director Dan Marokane confirmed this sentiment in a statement to the Parliamentary portfolio committee that "we will be going after contractors"[66]. This led to legal battles which went all the way to the Supreme Court of Appeal (SCA). Eskom sought to utilise its right to call in its performance bonds against Hitachi as penalties for non-delivery. Performance bonds are a commonly used mechanism in capital intensive projects, intended to function as a guarantee for the client if the contractor failed to deliver. The funds are set aside by the contractor as part of its contractual obligation. The SCA eventually ruled in Eskom's favour in September 2013, by upholding Eskom's right to call in its performance bonds from

[61] "Eskom Awards New R1,1bn Medupi Contract, Holds Back on Kusile," *Engineering News*, November 23, 2009.
[62] "Alstom admits Boiler Protection System tests were not 'fully satisfactory,'" *Mining Weekly*, July 9, 2013.
[63] "Cancelling Alstom's Boiler Protection Software contract 'proactive' step," *Business Day*, January 31, 2014.
[64] "Investors Punish Eskom for Delays," *The Star*, July 10, 2013.
[65] ibid.
[66] "Eskom Tries to Keep Hitachi in Line," *Engineering News*, September 11, 2013.

the Mizhuo Corporate Bank of Japan, which had acted as guarantor for Hitachi's work for Eskom.[67] The guarantees amounted to about R600-million.

Small Contractors

Further problems with localisation can be seen in Eskom's struggle to incorporate Ellisras-based contractors. One of the prerogatives of Medupi was to assist local entrepreneurs in Lephalale. In a letter written to the community based newspaper of *Mogol Pos*, Lephalale resident Wayne Derksen, who represented the Lephalale Builders Forum complained that Medupi did not pay contractors in time. Small, Lephalale-based contractors were unable to cope with payment delays from Medupi in the same way that large-scale "corporate companies" could. These large corporations were generally based outside of Lephalale. "Most businesses in Lephalale," he argued "have never received a written order in the excess of R100 000 let alone R1 000 000."[68] Failure to receive payment after 30 days meant that the company struggled to cover its running costs for the month, paving the way for liquidation. In addition, the small contractors complained about the fact that when construction stopped due to labour unrest, so did the payment processes.

This stemmed from Murray and Roberts' overt policy of empowering small contractors and local entrepreneurs. Rather than sourcing goods and services directly, sub-contracting increased the number of corporations in the supply chain. But these contractors struggled against the reins of what they considered Eskom's mistakes, which curtailed their ability to work efficiently. In one case the small construction firm Baraata Construction and Projects, a subcontractor of the construction firm Basil Reed, applied for the latter's liquidation because of alleged non-payment.[69] Baraata had been tasked with the installation of ceilings and partitions in some of the buildings at Medupi. As such, while it was Eskom's policy to encourage local industry and economic development, small contractors struggled to produce at the same level of efficiency as large corporations which contained some bulwark against risk in the form of economies of scale and expertise outside of Lephalale.[70]

[67] *Eskom Holdings Soc Limited v Hitachi Power Africa (Pty) Ltd & another*, Supreme Court of Appeal, September 12, 2013.
[68] "Corporate Contractors Bad Payers," *Mogol Pos*, September 2, 2011.
[69] "Subcontractor applies for Basil Read liquidation," *Moneyweb*, September 4, 2015. http://www.moneyweb.co.za/news/companies-and-deals/subcontractor-applies-for-basil-read-liquidation.
[70] "Medupi contractors blast Eskom," *Fin24*, April 29, 2012. http://www.fin24.com/Companies/Industrial/Medupi-contractors-blast-Eskom-20120429.

Labour

Medupi has been beset by labour strife at the construction site for the years 2011 to 2015, resulting in work stoppages and remarkably low levels of productivity. The twin imperatives of transformation and speedy construction have bedevilled the state of the current infrastructure projects. The challenge of democratisation to the development of the infrastructure project was thus its ability to cater to the many demands for transformation and uplift attached to the idea of the grand project. Resolving the labour disputes involved wide ranging interventions from government officials and from Eskom. A key challenge has been to contain all the disparate desires. One of the persistent sources of discontent at the Medupi site has been the implementation of the Project Labour Agreement (PLA), an agreement signed between the contractors and trade unions at the beginning of the build project. Intended to govern labour relations for the duration of the construction, the PLA was designed to enforce construction stability by reducing labour disruption. But the labour agreement has a controversial history, with critics describing it as generally authoritarian.

In the case of Medupi, the wide range of activities involved in its construction meant that its workforce was heterogeneous, containing different skills, aspirations and income levels. In considering the particular nature of union activity in South Africa, the lead representative of one of the main trade unions at the Medupi construction site, the National Union for Metal Workers of South Africa (Numsa), described trade unions in South Africa as having to face the particular challenge of organising workers in an unequal society. Managing aspirations was particularly challenging because a trade union victory on one set of worker demands tended to widen the parameters of the realisable. Workers that were otherwise excluded from the concessions would agitate for similar benefits in a bid to level the playing field. In describing the heterogeneity, he said: "Within the class there are classes. Within this working class there is the middle class, and they've got different interests than the poor. And the poor of the poor have got different interests than the unemployed. And that creates all the tension within them." [71] This shaped notions of justice and the basis for the "moral economy" that Dunbar Moodie has described in his study of the 1946 Black Miners' Strike of 1946.[72]

Early in the twentieth century, colonial officials had recognised the importance of tempering worker aspirations by limiting the realm of the possible. At issue was the age-old debate of

[71] Interview with Numsa's Medupi representative, Numsa HQ, Johannesburg, October 2015.
[72] E. P. Thompson, "The Moral Economy of the English Crowd in the Eighteenth Century," *Past & Present*, no. 50 (February 1, 1971): 76–136.

determining a living wage, which began during the decolonising period in Africa, and during which British and French colonial powers began to seriously consider the idea of improving the living conditions of Africans. The policy of "stabilisation" meant that the living wage came under debate, because underlying its calibration was a whole range of assumptions of the type and quality of life due to African workers. In this conception, trade unions were a desirable, rather than an antagonistic, force of modernisation that would rationally consider wage demands and in the long-term, endow Africans with the necessary capabilities for eventually realising political autonomy. But interestingly, Fred Cooper writes of a senior colonial labour official who argued that it was necessary to divide the wage calculation on a racial basis to prevent inter-African dispute and aspirational fights. In other words, stark class stratification among Africans was considered more likely to lead to discontent than class stratification between whites and Africans.[73]

In South Africa, various ministries and government officials proclaimed that the large build projects would absorb members of the vast unemployed. The Expanded Public Works Programme (EPWP), which began in 2004, promised massive amounts of job creation in the construction industry. Despite the capital-intensive nature of the country's economic development, employment rates in the construction sector rose consistently since the end of apartheid. Statistics cited in a Bargaining Indicators report in 2014 show that construction in employment increased by 174% from 438 665 in 1994 to 1 204 000 in 2013.[74] However, these were jobs of a short-term duration, intended to last as long as the construction itself. Unskilled and semi-skilled workers constituted an estimated 76% of this workforce.[75] In 2012, some of the erstwhile defenders of the EPWP professed their disillusionment after observing its actual implementation. Rob McCutcheon, professor of Civil Engineering at University of the Witwatersrand, complained that contractors had failed to modify their construction design to accommodate labour-intensive methods, instead continuing to incorporate high levels of mechanisation. He detailed the lip service contractors paid in practice to the employment creation imperative: "Not only were contracts implemented using conventional capital-intensive methods; in some cases extra people were hired to sit under a tree alongside the site where the equipment was working in order to raise the numbers.

[73] Frederick Cooper, *Decolonization and African Society: The Labor Question in French and British Africa* (Cambridge University Press, 1996), 343.
[74] Eddie Cottle, "Twenty Years of Transformation of the Construction Sector in South Africa since the End of Apartheid," in *Bargaining Indicators 2014: Twenty Years- A Labour Perspective*, vol. 14 (Labour Research Services, 2014), 142.
[75] ibid.

Mostly, even this tokenism was not considered necessary."[76] Despite these reservations over its efficacy, government remained committed to job creation through infrastructure development and various ministers restated their commitment to job creation in the press, although they scaled down the number of jobs initially promised.

The construction of the football stadiums for the 2010 FIFA World Cup was one of the major infrastructure projects of South Africa's post-apartheid era. The mass retrenchment of 110 000 construction workers preceded the World Cup opening ceremony in June 2010. A year earlier, in July 2009, thousands of construction workers had downed tools, cognisant of the impending dismissals. Murray and Roberts, one of the largest construction companies in the country, had promised some security for its demobilised workforce in the form of redeployment. In August 2009 its spokesman, Eduard Jardim, said the company planned to transfer some of its workers from the World Cup stadiums to its new construction projects, including the Medupi and Kusile power stations. At the time, Murray and Roberts had already redeployed construction workers from Gautrain and the Green Point stadium in Cape Town to work at the power stations. It is not clear how many workers were part of the redeployment plan, but it is probable that these comprised only the more skilled and permanent component of the workforce. In 2012 the Minister of Economic Development Ebrahim Patel described the government's determination to make the Presidential Infrastucture Coordination Commission (PICC) work, by streamlining what were in effect the state's own blockages to the infrastructure roll-out, for instance in environmental legislation and in speedily gaining servitudes for land through which railway lines would pass. He argued that the PICC would make it possible to gather all the key players in government needed to clear bottle necks in one room. But state bodies were more easily streamlined than workers.[77]

Labour Unrest

The constant strike action at the Medupi power station led notable voices in the press to label Medupi's workforce as possibly "the most pampered ever".[78] The narrative of labour indulgence included that workers travelled on Eskom-provided buses free of charge and were

[76] Robert McCutcheon, "The Expanded Public Works Programme : Policy, Rhetoric, Reality and Opportunities Foregone during the Expenditure of over R40 Billion on Infrastructure : Construction and Project Management," *Civil Engineering*, 20 (6), (July, 2012) 43.
[77] "Patel Cracks the Whip," *Mail and Guardian*, February 22, 2012.
[78] "Medupi Workforce: The Most Pampered Ever?" *Financial Mail*, August 8, 2013.

compensated in the form of hourly wages for each hour spent travelling to the construction site. Other "abnormal benefits" included free lunches, with an average of 14 000 lunches being handed out at the site each day. One press analyst blamed Numsa for encouraging the government to lean on Eskom, which in turn convinced contractors to accede to the workers' outrageous demands.[79] But these suppositions of manipulation at a national level do not rest on concrete evidence and detract from the local, context-specific nature of labour demands. Taking the nature of the demands more seriously is an important step towards understanding the complexity of labour relations at the construction site.

The challenge of managing aspirations in a postcolonial context of stark inequality is best illustrated in the first major strike to occur at the power station's construction site. In June 2010, workers went on strike over the quality of food provided to workers on site. According to an Eskom circular describing the strike, the striking workers numbered 1 200 out of a total of 3 762 workers employed by the main contractor, the Medupi Power Station- Joint Venture (MPS-JV).[80] The MPS-JV was a consortium composed of the chief construction companies on site: Murray and Roberts, Grinaker Ltd and Concor. As part of the strike action workers refused to eat the food provided by the contractor and had reportedly dumped their lunch packages.[81] *Die Beeld*, South Africa's major Afrikaans- language newspaper, termed the incident a "scandal", echoing the sentiment of its more vocal readers. The indignation went along the lines that workers at Medupi were wilfully wasting their food, while there were starving citizens who would "give their arms" for it. The food packages in question typically consisted of a sandwich, an apple, fruit juice and a bottle of water.[82] Protesting workers demanded they be served hot meals for lunch, and Eskom eventually conceded. In a subsequent press release, Eskom announced that an agreement had been reached between the contracting companies and the trade unions, under which workers would be fed hot meals from 21 June 2010. Dining halls, which had been under construction at the time of the strike, had their completion expedited so as to become operational in August 2010.[83]

Despite the middle class's outrage at the notion of the poor dumping food, the matter had more complicated roots in the heterogeneous quality of labour activity at the power station. Numsa became more actively involved at Medupi only in 2010, three years after construction

[79] "Medupi Mess Is Result of Numsa Strategy," *Business Day*, August 16, 2013.
[80] "Food wastage situation at Medupi Power Station," *Eskom Press Release*, June/July 2010.
[81] ibid.
[82] "'n Gemors Met Die Kos," *Beeld*, June 11, 2010.
[83] "Food wastage situation at Medupi Power Station."

first began in 2007. The union's greater involvement during this time signifies the shifting nature of the construction project from one of civil works construction which generally required low-skilled labour towards the more intricate installation that required more skilled, artisanal labour. It was from these artisanal ranks that Numsa's membership was drawn. Construction workers were generally low-skilled and less affluent. They were also drawn from Lephalale and its immediately surrounding districts as part of the contractors' compliance with Eskom's directive to increase local employment. According to Numsa's representative at Medupi, while these workers were willing to tolerate cold food, artisan labourers expected a higher quality of meals at the construction site. [84] Many of these artisanal workers, who also constituted a large portion of Numsa's membership at Medupi, had worked through a continuous channel on some of the country's major industrial projects, including the aluminium plant Alusaf, Coega and Sasol. Thus Numsa played an important role, not only in its fight for reasonable working conditions, but also as a place of belonging for these travelling artisanal workers.[85]

Migrant or Foreign Labourers

Friction in the main township of Lephalale stemmed also from a class cleavage between local workers and those considered outsiders or recently settled inhabitants of Marapong. But this was not a strict claim to autochthony on the part of Marapong residents or a persistently hostile relationship. In 2013, the *Financial Mail* reported that a large proportion of the house owners in Marapong had rented their backyard rooms to migrant workers.[86] Class cleavages mapped on to the divide. According to Numsa's representative at Medupi, "foreigners" were conspicuously present in the township as the drivers of "fancy cars" [87] and locals complained that they were being short-changed because of their higher standard of living. The latter were also entitled to company-provided housing and living out allowances, which to some appeared to be extra compensation.[88] Low-skilled migrant labourers who settled in the township were also a source of some consternation. A new informal settlement has formed on the outskirts of Marapong, generally populated by the low-skilled migrant labourers from the Eastern Cape and other impoverished rural districts in the country. According to one interviewee and long-time resident of Marapong, these migrant labourers, whose employment

[84] Interview with Numsa's Medupi representative, Numsa HQ, Johannesburg, October 2015.
[85] ibid. This also relates to Amcu's (a competing union) difficulty in penetrating the ranks at Medupi.
[86] "No Meat on These Bones," *Financial Mail*, February 22, 2013.
[87] ibid.
[88] "No Meat on These Bones," *Financial Mail*, February 22, 2013.

prospects were often precarious, were considered a force of trouble and unrest. [89] During protests against the employment of welders from Thailand, Numsa's chief concern was with the lack of development opportunities for local workers. Its spokesperson, Alex Mashilo, stated that the union did not oppose the employment of foreign skilled workers in principle. Instead workers were upset that contractors appeared to exploit migrant workers. He argued this had a knock-on effect on the restrictive employment opportunities for locals and caused site managers to neglect health and safety measures.[90] This related to Eskom's inability to source skilled labour locally and of the artisanal training facilities to suitably develop a skilled labour force timeously.

The term "local" was open to interpretation. Eskom defined "local" as not only restricted to Lephalale, but also those resident in the surrounding districts that were close enough to allow workers to commute daily to the construction site rather than being housed onsite. But the commute took an average of three hours in one direction by bus, complicating their ability to be characterised as "local".[91] Numsa counted as its success a concession on travel allowances, according to which management agreed to pay workers for the time they spent travelling to the construction site in the form of hourly wages. Management had agreed to include the time workers spent travelling in their hourly wages. But this did not include the first hour of travel so that the workers nearest the construction site, such as residents of the Marapong township, felt disadvantaged if for instance they spent less than an hour to travel to the construction site. This resulted in strike action by workers from Marapong, who were not compensated for their travel.[92] Thus the differential between locals and "outsiders" was based on a perceived class differential and on variations in access to the benefits of employment.

Project Labour Agreement (PLA)

Construction at Medupi began under the auspices of a controversial agreement negotiated between the contracting companies and labour. The MPS-JV undertook the initial negotiations with labour representatives and the PLA was signed on 13 December 2008 at the Mogol Club in Lephalale. While the Agreement boasted the signature of labour representatives, Numsa's representative at Medupi claims that the Agreement was not signed at the national bargaining forum. Rather the signatories were local shop stewards, eager for

[89] Interview with Kgantshi Makubela, March 2015, Marapong (Lephalale).
[90] "Medupi Dispute 'Hinges on Lack of Special Skills.'"
[91] Interview with Numsa's Medupi representative, Numsa HQ, Johannesburg, October 2015.
[92] "Travel Fight Causes New Delay at Medupi," *Business Day*, August 5, 2013.

job opportunities once the construction commenced. They signed without being fully cognisant of the implications of the curtailment of labour rights contained within the PLA.[93]

Subsequent years saw attempts to revise the PLA. One of the NUM shop stewards present at negotiations that took place in 2009 described the main MPS-JV representative at the negotiations as appearing to carry a mandate to get the unions to sign the agreement. This is an entirely plausible supposition considering the immense pressure Eskom and the contractors were under to complete Medupi as timeously as possible. In addition, negotiations were held outside of Lephalale and the company provided the shop stewards with transport, accommodation and meals for the duration of the stay. Having resented the implications of co-option, he arranged with NUM's headquarters to provide food for the shop stewards at the negotiations and ensure a reasonable distance between them and the contractors. The shop steward spoke of his perplexity when first confronted with the idea of the PLA, having first tried to locate the term in his own Lexus-Nexus copy of the Labour Relations Act and then in the Oxford Dictionary, both to no avail.[94]

The PLA is a unique form of labour agreement. Medupi was not the first site of its implementation – it had in fact a precedent in construction projects in other parts of the world – with the fundamental purpose of "stabilising" construction projects in the interests of timeous construction. Its roots lay in the dam construction projects in the United States during the 1930s before it became a more commonly used tool for construction projects during the Second World War. Skilled labour was in demand during this time and the PLA aimed at preventing, or at least limiting, work stoppages due to worker demands. Critics of the PLA have deemed it oppressive in general. For trade unions, the chief marker of its oppressive qualities was that it outlawed strikes, instead mandating that disputes be resolved by other, internal mechanisms. It also tried to standardise wage rates and working conditions were implemented to be used across the construction site, bypassing the particular preferences of individual contractors.[95] Some governments viewed its implications as problematic: in 2001 President George Bush banned the use of PLAs in federal state-funded construction projects.

[93] Interview with Numsa's Medupi representative, Numsa HQ, October 2015.
[94] Interview with Kgantshi Makubela, March 2015, Marapong (Lephalale).

[95] http://www.nrtw.org/neutrality/na_6.htm

The PLA signed at Medupi contained similar controversial clauses in the interests of "minimising risks" and promoting "labour stability". One of its main sticking points was that it banned all strike action. Its dispute resolution procedure stated that grievances had to be reported to the Project Industrial Relations Manager and escalated if necessary to the Project CDR (Dispute Resolution Committee) for further arbitration. Neither party could refer the matter to the CCMA or resort to any form of external arbitration. The internal channels fell under employer control, creating the perception of a compromised impartiality. The PLA did not provide any indications of how legal impartiality would be ensured.[96] It is not clear whether or not each employee had to be unionised, but the PLA specified that contractors could automatically deduct union fees from the wages of union members and later deliver the collected funds to the union headquarters.[97] It also made it the responsibility of the contractor to provide furnished offices for shop stewards. At first this took the form of interim facilities in the main town with the view to eventually relocating to an area closer to the construction site once land was available.[98] But the achievement of a modicum of consensus for the signatories of the PLA was not enough to head off labour unrest. Instead, discontent over the PLA led to the work stoppages that drafters of the PLA had sought to curtail.

Numsa, along with other trade unions, initially called for the disbandment of the PLA in 2010, but the contractors resisted until the matter's final resolution in the Labour Court of Cape Town. In 2012, the contractors initiated court action at the Labour Court in Cape Town in a bid to protest the trade unions' withdrawal from the PLA. The respondents were a consortium of trade unions led by Numsa. Numsa argued for the PLA's disbandment on the grounds that "the parties to it laboured under a mutual error that they were permitted to compromise the fundamental rights of workers in permitting the curtailment of the dispute resolution process under the PLA."[99] In addition, Numsa argued that under the Labour Relations Act, any agreement entered into for an indefinite period, which was the case with the PLA, could be terminated if the dissenting party provided reasonable notice. The court accepted this argument in the end.

[96] "Medupi Project PLA," December 2008, 92.
[97] ibid, 25.
[98] ibid.
[99] *South African Federation of Civil Engineering Contractors v The National Union of Metalworkers South Africa*, J2847/12, Judgement delivered on December 19, 2012, Labour Court, Cape Town.

Chronology of Strike Action

The year 2013 saw recurring and increasingly violent strike action that paralysed construction at the power station site. The first strike was reportedly initiated by 1 100 Alstom employees, working to implement its controls and instrumentation system. They were soon joined by workers employed by the boiler manufacturing company Hitachi[100] and this critical mass compounded the threat of violence, vandalism and the intimidation of non-striking workers. On 16 January, work at the construction site was shut down and the workers locked out. Numsa's branch deputy secretary at the time, Seanego Ngakamone, told the *Star* that "We are not going to return to work unless the employer terminates the project labour agreement. They are not applying it in fairness, they are applying the part that favours them most."[101] He accused the employers of refusing to act in "good faith". The strike continued with various instances of off-site vandalism. In mid-February, 46 workers were arrested at the Medupi site after a clinic and two vehicles were set alight and following strike-related violence in the Marapong township.[102]

Workers had also complained about too-easy dismissals, unfair working hours, and inexplicable salary deductions. One worker, a grinder operator employed by the largest single employer at the site, Murray and Roberts, told the *Financial Mail* that his grievance stemmed from an inexplicable wage deduction on his payslip in December 2012; from R18 891 to just R5 000. He found that the pay office, where he sought to query the amount, was filled with workers with similar complaints.[103] This administrative error on the part of the employer quickly escalated under the conditions set out by the PLA. Since strike action was outlawed by the PLA, those that did occur were considered to be in breach of the negotiated agreement, setting the battle lines by creating an intransigent attitude among employers. In mid-February of that year, the contractors Hitachi Africa, Alstom and Murray & Roberts served workers with an ultimatum, demanding that they either sign a peace agreement and return to work or face dismissal. The employers also insisted that returning workers be subject to disciplinary hearings.[104] Negotiations had deadlocked the previous week after the two parties failed to reach a resolution on the only outstanding issue of the disciplinary processes.[105]

[100] "Medupi Still on Hold after Eskom Vehicle Is Torched," *The Star*, February 18, 2013.
[101] "Strike Brings Eskom's Medupi Power Plant to a Grinding Halt," *The Star*, January 17, 2013.
[102] "Grievances Slow Medupi Progress," *Sunday Times*, February 17, 2013.
[103] "Medupi Impasse," *Financial Mail*, February 15, 2013.
[104] "Medupi Workers Get Ultimatum from Firms," *Business Day*, February 19, 2013.
[105] "Medupi Still on Hold after Eskom Vehicle Is Torched."

In early March, as the dispute appeared to be heading to a close, NUM and Numsa parted ways. Driven by pressure from their members NUM, along with three other smaller unions, was willing to allow workers to return to work. As part of the agreement for returning to work, workers would receive a month's salary, an interest-free loan of two month's salary as well as a final written warning. But Numsa held out on signing the agreement that would signal the end of the strike.[106] Numsa opposed the fact that returning workers would have to face disciplinary action and argued that the question of bonuses had not been adequately resolved. NUM's regional co-ordinator complained that Numsa's intractable stance was adversely affecting their members' ability to return to work and NUM reportedly raised its frustration with the inter-union dispute at a Cosatu forum.[107] Union rivalry was further compounded by the threat of the Association of Mineworkers and Construction Union (Amcu), a relatively new union that rose to prominence in the weeks leading up to the Marikana massacre of 2012.

Eskom was constantly present in the shadows, encouraging contractors and workers to resume work as quickly as possible. It openly disagreed with its contractors' employment practices. In July 2013, Paul O'Flaherty, Eskom's Chief Financial Officer, stated that: "The ability of our contractors to supervise labour has been poor across the board. They have to adequately train the person to do the job and supervise them."[108] On 22 February 2013 the Minister of Public Enterprises, Malusi Gigaba intervened in the dispute.[109] A few weeks later Gigaba announced that the strike had ended after his intervention and that harsher penalties needed to be imposed on the contractors for lost production time as an incentive for improved productivity.[110]

While Gigaba's role in bringing the parties together is not entirely clear, in the immediate aftermath of his intervention, the trade unions, contractors and Eskom reached a new labour settlement. In June 2013 the new agreement, known simply as the Partnership Agreement (PA), came into force. Among other things the PA committed the signatories to greater wage standardisation across the different contracting companies. The drafters of the PLA had considered the question of wage standardisation but argued that it was impossible to completely standardise wages and working conditions across the site because of "individual

[106] "Strikers Stoke up a Turbine of Troubles at Medupi," *Business Day*, March 4, 2013.
[107] "Unions in Dispute over Strike at Medupi," *Business Day*, February 28, 2013.
[108] "Medupi Delayed: What Went Wrong?" *Mail and Guardian*, July 8, 2013.
[109] "Work Stoppages at Medupi Worry Eskom," *Business Day*, February 22, 2013.
[110] "Minister Refuses Delays to Medupi," *The Star*, March 18, 2013.

contractor employment agreements". It had however prescribed a minimum wage for each job category. Importantly, Eskom was a signatory to the new agreement, which meant that it assumed some of the responsibility for labour relations. Managers at Eskom recognised that this was not the ideal position for the corporation to assume. Speaking to the *Mail and Guardian* in July 2013, O'Flaherty said that while Eskom was then "driving the management, development and supervision of labour," this was not its main responsibility.[111] The PA allowed Eskom to intervene in the relationship between the contractors and their employees, thereby diluting the corporate model of profit making. However, it also brought into view the state and government's responsibility of social upliftment and equality. In an interview with the *Sowetan* in November 2013, Medupi's General Manager, Roman Crookes, said that the new labour agreement played a fundamental role in smoothing labour relations. According to the *Sowetan*:

> "We facilitated a new agreement and we also became the signatories, and this, for the first time, made Eskom the ultimate employer and no longer a silent party. Hence, we are now actively involved in the labour management on site." Crookes said labour issues that took time to resolve were now speedily dealt with. "The rapid resolution of labour disputes has brought relative calm to the construction site," he said.[112]

Following the new agreement, strikes continued, although on a much more limited scale. On 25 July 2013, a strike occurred following a visit to the construction by a parliamentary oversight committee. Workers of 500 to 1 000 in number protested over the subject of allowances. Vandalism during the strike that saw five vehicles set alight and several graders (a type of construction equipment) being pelted with stones - led to the arrest of 45 workers.[113] The workers were charged with "malicious damage to property, public violence and unlawful gathering", and ordered to appear in a court in the Limpopo province. Then in August 2013 another strike occurred which saw instances of vandalism of vehicles and construction equipment, injured security staff and the shutdown of the construction site.[114] Contractors labelled this strike the "last straw,"[115] threatening mass dismissals with the view to begin a massive re-hiring process. The *City Press* reported that in response to the strike

[111] "Medupi Mission Impossible."
[112] "Medupi Progressing Well," *Sowetan*, November 1 2013.
[113] "Workers Set Five Cars Alight as Medupi Protest Turns Violent," *The Citizen*, July 25, 2013.
[114] "Travel Fight Causes New Delay at Medupi."
[115] "Latest Strike Is the Last Medupi Straw," *City Press*, August 11, 2013.

Eskom raised the minimum wage across the construction site to R25 per hour, which was higher than the sector's minimum wage of R20.50 per hour. Complaints abounded that Eskom had allowed the unions too much power, and was interfering in the sacred relationship between contractors and workers by standardising labour conditions across the construction site.[116] In this way, Eskom exercised its power set out in the PA to facilitate the resolution of labour disputes.

In the ensuing years labour unrest assumed an increasingly subversive character, occurring outside the sphere of formal trade union negotiations. During strike action in 2015, the erosion of worker faith in formal channels of negotiation is evident in the increasingly anarchic character of the protests. Instances of anonymous vandalism and arson attacks, committed by masked protestors, abounded and Numsa had begun to lose control over the strike action that sporadically occurred. Following labour unrest in August 2015, a Numsa official explained that "it was almost impossible to identify Numsa members in a crowd. If we are sure they are Numsa members, our jobs would be a bit easier," he said."[117] Eskom believed that the source of the trouble were the "demobilised" workers who were still resident in the hostels.[118]

Eskom and the contractors faced the challenge of demobilising the majority of the construction workers. Demobilisation was a slow spiral rather than a definitive tranche of "retrenchments" and the trade unions played a role in negotiating the packages workers received at the end of their contracts. In 2013 contractors expressed their fears about the discontent likely to arise from the mass retrenchments. Murray and Roberts had by May 2013 reduced its workforce from 5 000 to 2 700.[119] The continued irresolution of the PLA was one of the contributing factors to the long strike of 2013. But the subsequent PA served the purpose of rebuilding trust among the unions and contractors. Unions allayed strike action enough for work to resume to sufficient levels. It also allowed demobilisations to continue in an incremental fashion.

Numsa argued that the companies Murray and Roberts Projects and Medupi Fabrication had retrenched workers in September 2013 under the guise of the PLA-mandated

[116] ibid.
[117] "Inside Medupi's Labour Pains," *Fin24*, August 23, 2015, http://www.fin24.com/Economy/Eskom/Inside-Medupis-labour-pains-20150822.
[118] "Medupi Strike Madness," *City Press*, May 10, 2015.
[119] "Medupi Firms Fear Labour Unrest as Contracts End," *SA Construction News*, July 29, 2013.

"demobilisation" clause. According to Numsa's representative at Medupi certain pertinent aspects such as the dispute resolution mechanism, had not been fully resolved in the Project Agreement and dispute resolution continued to utilise the mechanism set out in the PLA by default. In 2014 Numsa brought court action against Murray and Roberts due to what they argued was the continued application of the PLA in the demobilisation process. Numsa's quarrel at the time was not with the principle of demobilisation but with a particular tranche of worker dismissals that occurred in September 2013, which they argued had been carried out incorrectly. At the time of the court hearing, Murray and Roberts' industrial relations manager said: "About 2 000 workers at Medupi have already been demobilised in consultation with Numsa and other unions."[120]

The last major strike at Medupi occurred in March 2015. Workers at Unit 6, which was expected to start generating electricity in July of that year, went on strike over the non-payment of exit bonuses they claimed had been promised by contractors. As a result of the strike action, sub-contractors at Medupi fired 1 700 workers by SMS, promising disciplinary action would follow. Workers were "locked out" of the construction site and barred from entry. [121] Numsa's representative at Medupi explained the issue of bonuses as follows:

> Now the project bonus, the PLA said that you work until the project is finished and when it's finished you get your bonus. Now there were conditions that you can't go on strike, you can't be absent etc. …Now in terms of the PLA, the old one, they were supposed to get their bonuses when the project was finished. Now if it took us nine years to complete one unit, to complete the last five units, it might take us 20 or 30 years, now who's going to wait for that money…[122]

On 14 April Eskom reported that it had offered to reinstate the workers unconditionally, although in reality the conditions of return had to be hammered out between Numsa and Eskom at the negotiation table.

Nonetheless, Medupi had a decidedly diminished workforce at that stage because contractors had gradually retrenched workers over the course of the previous two years. By the beginning of 2016, it was clear that a proportion of the remaining workers had lost faith in the organising structures of Numsa and NUM. A new union called the Liberated Metalworkers of

[120] "Numsa Applies for Order against Murray & Roberts," *Moneyweb*, May 28, 2014, http://www.moneyweb.co.za/archive/numsa-applies-for-order-against-murray-roberts/.
[121] "Eskom Offers to Reinstate 1700 Workers at Medupi Power Plant," *Mail and Guardian*, April 4, 2015.
[122] Interview with Numsa's Medupi representative, Numsa HQ, October 2015.

South Africa (Limusa) made its presence felt at the power station. Limusa was formed in July 2014 at the national level by the former secretary general of Numsa, Cedric Gina. Since Numsa had opted to leave the fold of Cosatu, Limusa was intended to fill the empty space in Cosatu wrought by Numsa's decision to leave Cosatu. Limusa thus organised workers in the same sector as Numsa. In March 2015 a former NUM shop steward had signed up some of the remaining workers to Limusa's fold. The proliferation of representative unions however has appeared to dilute the effect of the labour demands.

Conclusion

The eventual completion of one of the units of Medupi was largely due to the tenacity of Eskom's engineers. This tenacity was conditioned by the power station's massive cost expenditure which meant that it was more expensive in the long term to retreat than to persist. Thus Eskom and the South African government had no choice but to marshal all their resources to ensure that the power station became operational. This tenacity enabled a new balance of forces in the absence of the strong-arm rule of the apartheid regime. While the political and economic liberalisation of the early 1990s threatened the completion prospects for the power station, Medupi has demonstrated the possibility for these otherwise disparate forces to come together. Cohesion was however wrought at considerable, and often unexpected, time and expense. The longevity of this new balance of forces, and the extent to which it can be re-created, remains to be seen.

Conclusion

Across the world disillusionment with democracy has set in with some leaders openly disdainful of its inherent political value. These leaders have achieved some measure of political success with contra-democratic methods. In Africa in particular, certain governments have boasted of superficial economic growth and glossy infrastructure development while condoning ignominious crackdowns on human rights. The "illiberal state builders", which include countries such as Rwanda, Ethiopia, Angola and Sudan, have marshalled the strong arm of government, combining intolerance for dissent with infrastructure development for the elite. Ethiopia, for instance, has embarked on a state-led infrastructure development programme with backing from the Chinese government. In early October 2016, the Ethiopian government announced the completion of a $3.4-billion train-line that connected the capital of Addis Ababa to the Red Sea port city of Djibouti. But the ribbon-cutting celebration was marred by mass anti-government uprisings across the country. A few weeks later the Ethiopian government announced the commencement of what would become a six-month long state of emergency. The Emergency suspended the due process of law and by 20 October, an estimated 1 600 people had been detained under its auspices.[1] This raises the question of the value of sophisticated and expensive infrastructure projects in a context of repression and anti-democratic politics. The challenge faced by the post-colonial state is to expand the fruits of infrastructure development outside the narrow bounds of the elite enclave to include and serve the interests of the majority of the country's population.

In considering the changing context of infrastructure projects from the apartheid era to the democracy, it is important to recognise the continuities between the two periods. These continuities were not conditioned by changing political factors but by the institutional autonomy of the state corporations, which absorbed the various political prerogatives into their operations. I use the term "large technical systems" coined by Thomas Hughes to describe the inter-connected nature of infrastructure projects and the corporations that maintain them. Because the management of large technical systems combines both social and technical elements, authoritarian control can more effectively unite and coordinate the otherwise disparate elements required for infrastructure development.

Large technological systems are also subject to failure if not properly maintained. Their unwieldiness has allowed engineers to become autonomous figures in their own right. This

[1] "Ethiopia cracks down on protest," *The Economist*, October 15, 2016.

autonomy is embedded in the organisational nature of the state corporations or parastatals. Iscor and Eskom, the parastatals discussed in this thesis, were formed during the 1920s to steer the country's industrialisation. The parastatals geared their technological expertise to serve the growth of industry in the national interest. In the aftermath of the Sharpeville massacre of 1960 the apartheid government defined the national interest in terms of the need to protect white rule on the southernmost tip of the African continent. This meant attaining domestic economic self-sufficiency amid an intensifying threat of international sanctions. It also meant securing the country's borders against the threat of invasion from the newly decolonised Southern African countries that neighboured South Africa. The parastatal network of large technical systems did not die along with the apartheid regime. Instead it adapted, as best it could, to the changing prerogatives of democratic rule. This involved expanding the fruits of development outside of the mineral rich enclave; a project that was begun by the apartheid government during the late 1970s in response to growing unrest in the black townships. But the political liberalisation in the early 1990s formalised and legitimised the demands for the material upliftment of the black majority.

The neo-liberal era saw the gradual withdrawal of paternalist systems of labour management in favour of the free market. But rather than levelling the playing field, this shift laid bare the severe under-development that apartheid had wrought. Years later, this affected the construction of the Medupi power station in the form of the shortage of suitably skilled labour and in a stark socio-economic inequality that complicated the management of labour. In addition, the pressure on state entities to undertake commercial reform and improve their cost efficiency led to Eskom's curtailment of its capital investment. But this was not the only reason for Eskom's lack of capital investment in the early 1990s. Following its power station construction spree during the 1980s, the country confronted a situation of electricity over-supply. This was because the country's actual economic growth rate fell short of Eskom's earlier forecasts. As the 1990s wore on, debates over the possible privatisation of Eskom hampered the corporation's ability to plan for the expansion of its generation capacity.

When South Africa's looming electricity supply crisis became apparent in the 2000s, two new giant power stations had to be hastily planned. The design and commissioning of the Medupi and Kusile power stations coincided with the seismic rise of China as a global powerhouse. India was then also expanding its industrial base. Thus Eskom had to expand the country's electricity-generation capacity in the context of a growth in global demand for power station equipment. In the context of intense global hostility to fossil-fuelled power

stations, Eskom attempted to alleviate the concerns of environmental lobbyists by opting for a super-critical boiler design. The novelty of this technological choice is one of the main reasons for the construction delay of the Medupi power station. But it is important to note that Eskom always had to deal with novel technology it had little experience in handling. This is illustrated in the case of the Matimba power station, built twenty years before Medupi, among the Waterberg coal fields. Like Medupi, Matimba had to contend with the arid environmental conditions of the Waterberg. Matimba was designed to function as a dry-cooled power station. During the 1980s this was a novel technological choice for Eskom. But the risk associated with adopting the technology was cushioned by the inbuilt ability of large technical systems for revision and auto-correction. This is akin to Thomas Hughes's description of the "reverse salient". Technological risk is not only an accepted component of the large technical system, but it is also valued for the fact that it encourages innovation. Thus unexpected obstacles call on the problem-solving techniques that professional engineers are trained to perform.

The novelty of the technology was not an inherently problematic component of the Matimba and Medupi power stations. Rather, the main problem lay with the imperative of managing the changing dynamics of the social and political elements that comprised the large technical system. But the system also contains a tendency towards resolution due to the "locked-in" nature of the investors and engineers responsible for the large technical system. Thus it tends toward correction and problem-solving rather than retreat in the face of unexpected obstacles. The success of the development of the infrastructure projects depended on the network's successful incorporation of social and political elements into its ambit.

For most of the twentieth century, infrastructure development was tied to the nation-building project. But amid abundant indications of its autonomy from the wiles of politicians, its relationship to the state and to the political project has not been properly interrogated. As this thesis has demonstrated, Iscor and Eskom combined a project of nation-building with one that emphasised regional development. From the 1960s the government imagined that the various geographical regions would develop in an autonomous fashion, utilising the labour and natural resources peculiar to each region to spur economic growth. In this conception of development the private sector and the public sector, mainly through the parastatals, would provide the capital investment to encourage autonomous regional growth. In this ideal conception the black homelands would serve as a perpetual source of low wage black labour while simultaneously restricting the movement of the African population to the white urban

areas. In Lephalale, the parastatals operated in a similar, though inadvertent, manner to encourage autonomous regional development.

The apartheid government did not attempt to directly control the processes of regional development. Instead it delegated this function to local officials, businesses and the parastatal engineers. But the parastatals were not merely channels of the government's instruction and instead retained a distinctive autonomy from the government. As I demonstrated in Chapter One, Iscor was driven primarily by its search for the materials necessary to sustain its steel manufacturing operations. Its decision to enter the Waterberg was based on its own internal operating requirements rather than any government directive. But once its engineers arrived in the Waterberg they acted as regional and political players in their own right.

The parastatals and their engineers under apartheid enjoyed a high risk threshold and free rein in much of their decision- making. This was conditioned by the government's concern to defend its borders and ensure economic self-sufficiency in the face of an internationally unpopular apartheid regime. This high risk threshold allowed Iscor and later Eskom to leap over the obstacles that would otherwise have rendered the Waterberg coalfields impossible to exploit. But the disadvantage was that this high risk translated into a large amount of capital investment. The critique of the parastatals from the government and members of the public in the late 1980s was based in large part on a perceived excessive expenditure. The late 1980s also saw the rising illiquidity of the apartheid regime. In an effort to rejuvenate its flailing rule the government considered serious commercial reform and the question of the privatisation of the parastatals fell under review. I have argued that government was not ideologically committed to privatisation during this period but was concerned to curb parastatal expenditure. Iscor was however privatised and unbundled. Its mining and steel manufacturing components were separated and sold to private investors as individual companies. The Grootgeluk coal mine fell under new corporate management. The company changed hands over the years so that it was owned by Exxaro Resources at the time of the construction of the Medupi power station. After long years of deliberation among government officials, both in the late apartheid and early democratic era, Eskom escaped privatisation. To meet the imperative of commercial reform, its management demonstrated a commitment to restructuring the organisation on commercial lines. In a firm break with tradition, the newly appointed chairman of Eskom held a university degree in finance rather than in engineering.

This emphasis on commercial reform, anchored in Eskom's commitment to cost saving, signalled the informal arrival of neo-liberal management principles of governance. During the early 1990s the paternalist system that governed labour relations for much of the twentieth century gradually gave way to one which saw workers as agents of the free market. In concrete terms this meant the introduction of market related rentals at Eskom-owned housing and it meant in some cases the removal of automatic salary deductions. But this caused anxiety among workers and trade union officials over the issue of affordability. Importantly, this neo-liberal reform was enacted during the 1990s alongside the formal recognition of independent black trade unions at the Matimba power station. The gradual dissolution of the paternalist system laid bare the fundamental capitalist dispossession of the majority of the local African residents and the stark economic inequality between and within race groups. But the transition was also managed by the independent black trade unions, which agitated for the greater spread of benefits from the infrastructure project to the residents of the region. In this way trade unions assisted with managing expectations in a context of stark inequality and mitigated the splintering effects of neo-liberalism. But this was an only partial resolution of the labour management dilemma. Unforeseen obstacles arose during the time of Medupi's construction that called on Eskom's capacity for tenacity and problem-solving for resolution. During the construction of Medupi the relationship between the contractors and labour broke down. Eskom and the government had to intervene in a manner that took into account factors beyond the pure employer-employee relationship between the contractors and workers.

This thesis has demonstrated the continued coherence of the network of large technical systems despite the potentially splintering effects of the political and economic liberalisation of the 1990s. The uncertainty over the privatisation of Eskom during the late 1990s inhibited the parastatal's ability to plan for the expansion of its electricity generating capacity. This reluctance to commit to substantial capital expenditure led to the electricity supply crisis that precipitated the hasty commissioning and planning of the Medupi and Kusile power stations. Medupi was built during an era of global hostility to coal-fuelled power stations. Eskom faced heavy pressure to focus on renewable energy sources for electricity generation, which by their nature, allowed independent power producers a greater share of the electricity generation market. Renewable energy electricity does not require the large economies of scale of coal-fired power stations thus allowing many, smaller-scale electricity producers to enter the market. But Eskom persisted with the construction of the two new power stations. Its dominant justification was that the electricity supply crisis was too serious and renewable

energy technology too unreliable to ensure a consistent supply of base-load electricity. Eskom's large institutional funders, the World Bank and the African Developmental Bank, asserted that without the construction of Medupi and Kusile, South Africa's economic growth would be severely curtailed. Thus the electricity supply crisis provided the justification for the hasty commissioning of the Medupi power station.

The seemingly endless problems plaguing the Medupi construction site gave rise to a fatalistic attitude among public commentators about its prospects for completion. Complications arose through unforeseen difficulties with the technical equipment, particularly in the installation of the boilers. A super-critical boiler of the size that Medupi required had never been manufactured anywhere in the world. It was a novel technology for the specialised engineering corporations who could potentially take charge of its completion. The gradual dissolution of the South African boiler manufacturing industry in the roughly twenty years since Eskom had last constructed a power station compounded the difficulties with the boiler manufacture.

Labour unrest also impeded productivity at the construction site. But the frequency and intensity of strike action was alleviated by Eskom's active intervention in the management of labour relations. This was embodied by a new labour agreement termed the Project Agreement (PA) that was signed by Eskom, the contractors and trade union representatives in 2013. The PA differed from its controversial predecessor, the Project Labour Agreement (PLA), the legality of which trade union representatives challenged in the Labour Court. The employers who drew up the PLA had tried to guarantee the speedy completion of the construction project by curtailing workers' rights to strike. But this restricted the legitimate channels for workers to voice their dissatisfaction and inadvertently intensified worker grievances. The recurrent strike action at Medupi was in part targeted at the disbanding of the PLA.

In Chapter Three, I discussed the report of one of Eskom's engineers on a gathering of electricity system planners. One of the delegates to the conference had argued that electricity utilities had to be wary of the growing influence of trade unions and environmental activists. These two pressure groups threatened the feasibility of long-term planning. They surfaced during the construction of Medupi, and contributed to the power station's seemingly incessant delays. But this did not destroy the power station's chances of success. Rather Eskom adapted the power station design to allay criticism about environmental degradation

and intervened in the relationship between contractors and labourers when conflict appeared intractable. Thus to deal with the pressures of democracy, Eskom's engineers acted to remedy unforeseen problems as they arose during the construction. But the longevity of the new balance of forces, and its ability to be re-created, has yet to be tested.

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Interviews (some interviews are not listed to ensure the anonymity of interviewees)

All interviews were conducted by the author.

Interview with Ponk Ellis, August 2013, Lephalale

Interview with Michael Deats, September 2, 2013, Woodmead, Gauteng.

Interview with Sam Sekati, August 4, 2014, Lephalale (interview conducted with Ntombi Mpofu).

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Interview with Joe Meyer, 17 March 2015, Onverwacht.

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Interview with Stephen Kekana, Matimba power station, 14 April 2015; follow-up interview, March 16, 2016, Matimba power station, Lephalale.

Interview with Dries de Ridder, April 2015, Lephalale.

Interview with Melton Mothoni, April 2015, Matimba Power Station, Lephalale.

Group interview with Johannes Mfisa, Hellen Kekae, Hendrik Ndebele, April Selema and Kgantshi Makubela (translator), August 25, 2015, Marapong (Lephalale).

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