

# Knowledge and technological innovation transfer for economic development – the case of Eskom

Lumkile Mondli

## Abstract

*The article explores the transfer of knowledge and technological innovation by Eskom, the state owned vertically integrated South African power utility in South Africa and the rest of the continent in the period between 1997 and 2005 as forms of techno-nationalism, techno-globalisation and technopolitics, hybrids of technical systems and political practice that produce new forms of power and agency. Inherited from the technopolitics of the apartheid regime knowledge and technological innovation, the techno-nationalism of the young democracy and the techno-globalisation of financial and trade liberalisation were all useful in a new democratic regime finding its feet. It is argued that the retreat by Eskom to techno-nationalism explains some of its exnovation that is symbolised by power shortages and collapsing electricity infrastructure.*

Key Words: Knowledge, technology, techno-nationalism, techno-globalism, technopolitics, Eskom

## Introduction

Knowledge and technological innovation play a critical role in economic development. Archibugi and Michie (1997) argue that for us to understand technological change it is crucial to identify the economic, social, political and geographical context in which innovation is generated and disseminated by introducing another duality, national and global. The relative importance of national and global forces has been the subject of a vast literature. Some authors have claimed that the process of globalisation has eroded the significance of nations as meaningful subjects of technological change (Archibugi & Michie, 1997).

---

<sup>1</sup> Draft, not be quoted without permission. School of Economics and Finance, University of the Witwatersrand, Johannesburg, South Africa

Others, on the contrary, have argued that the significance of globalisation has been overemphasised since the bulk of firms' innovative activities are still carried out in their home countries (Archibugi & Michie, 1997). The thesis which might be dubbed 'techno-nationalism' is not necessarily contradicted by what might at first sight appear to be the alternative thesis, of 'techno-globalism'. Combining these two concepts of techno-nationalism techno-globalism exclusively without the context and period of analysis have a number of shortcomings. For example in the case of South Africa, apartheid was born, then, of the appropriation of globally current enthusiasms for a big interventionist state yoked into an ideologically distinctive vision of racial order and nationalist advance (Posel, 2011) which Edwards and Hecht (2010) interpret it as being Western and African. Edwards and Hecht (2010) argue that during the Cold War, the duality of East and West bloc and developed and underdeveloped had each a technological dimension. The developed/underdeveloped dualism posited a race in which poor countries rushed toward modernity by following 'the' infrastructural, technoscientific, and medical path charted by wealthy industrialised nations (Edwards & Hecht, 2010). The ideology of apartheid explicitly articulated South Africa's position with respect to these technopolitical dualisms according to Edwards and Hecht (2010). Even Afrikaner personal histories and collective imaginaries had articulated national identity as simultaneously Western and African (Edwards & Hecht, 2010).

This article explores how Eskom as a technological project figured in the practices, symbolisms, and political narratives marshalled by the new democratic government and the leadership of Eskom. It argues that in 1994 the new democratic South Africa government inherited infrastructure that was an outcome of political narratives marshalled by apartheid apologists and anti-apartheid activists during earlier periods. The infrastructure embedded technological prowess, symbolisms, and also harboured elements of duality (Edwards & Hecht, 2010) depicted by the South African-ness and the rest of African-ness in the diffusion of knowledge and technology by a state-owned vertically integrated electricity utility, Eskom. It is further argued that Eskom's extension of access to electricity to historically disadvantaged South Africans represented its roots of being South African or what Archibugi and Michie (1997) calls the carrying out of innovative activities in the home country and the diffusion of capability, whereas knowledge and technology in the form of investment is carried out in the rest of Africa.

The article makes a claim that the African Renaissance was located in this duality of being South Africa and at the same time being African in contrast to the apartheid regime that saw itself as

African and Western (Edwards & Hecht, 2010) simultaneously. We support the claim through an analysis of Eskom's investments in the domestic market and the rest of Africa in the period between 1997 and 2006. We contend that institutional complementarity depicted by Eskom's diffusion of knowledge and technology inherited from African and Western apartheid project carried favour with Mbeki's African Renaissance theme reinforcing path dependence. Finally, we conclude that Eskom's path dependence under the leadership of Reuel Khoza emphasised its African-ness and thus complemented the South African government's African Renaissance to assert its African-ness.

The essay is structured as follows. First, we present the changing attitude of Eskom management in the late 80s following major economic structural reforms announced by the PW Botha that suggested the privatisation of Eskom. We then discuss the institutional changes announced by the Department of Minerals and Energy that built the foundation for the 1988 White Paper on Energy. This is followed by the significance contribution by the chairman of Eskom, Reuel Khoza in the implementation of the duality of South African and African described by the deployment of capability, knowledge and technology diffusion to the rest of Africa. We conclude that there has been institution complementarity and path dependence in the functions of Eskom that has embedded duality in the form of being a South African based company and its diffusion of capability, knowledge and technology in the rest of Africa.

### **The political transition**

On 2 February 1990, President de Klerk announced the release of all political prisoners, including Nelson Mandela and the unbanning of the ANC, the South African Communist Party (SACP) and the PAC and the lifting of the state of emergency. In the annual financial statements of the same year, Eskom states its support for a new, democratic, outward-looking South Africa which was a huge leap by Eskom and its leadership since as late as 1978, the apartheid government's the Bywsburo (Bureau of Proof) had portrayed black fingerprinting as a way to safeguard the nation from 'foreign Black' invaders: 'the fingerprint record is absolutely essential, because it guarantees positive identification and precludes the possibility of foreign Blacks infiltrating into the Republic from other parts of Africa' (Edwards & Hecht, 2010). Keith Breckenridge has shown how technology in the form of automated data processing system of biometric identifiers (fingerprints), the baroque taxonomy of racial identity, and the elaborate

system of architectural zones and geographical and temporal borders was used by the apartheid government (Breckenridge, 2005).

For Eskom, the goals of bringing affordable electricity to all and joining a sub-Saharan interconnected grid were getting closer to becoming reality. Apartheid had buttered Eskom's slice on the one side and it believed that it could have it buttered on the other side if it got its act together to play the politics of transition. Eskom's leadership understood that the perceived Keynesian or dirigiste leaning<sup>1</sup> of the ANC would oppose any attempts to privatise Eskom as per the mandate given to the Eskom chairman, John Maree to implement the recommendations of the De Villiers Commission.

Eskom got political support. Eskom's business strategy to electrify black townships and rural areas enjoyed favour with the NP leadership. Veck (2000) argues that de Klerk's leaning on Eskom to electrify black households sealed the deal for the corporation and indicated that de Klerk's technopolitics of reaching out to potential voters would pay-off when in a political settlement is achieved. Through the extension of access to electricity to blacks by Eskom as symbolised by the electrification of Greater Soweto<sup>2</sup>, the NP was embedding itself in electricity technology and constructing a techno-nation referred to as the New South Africa of black and white people.

Despite being outsiders, the ANC Department of Economic Policy (DEP) under the leadership of Trevor Manuel who grew up in the Mass Democratic Movement (MDM), understood the effectiveness of mobilisation, strikes and boycott. It is this power and agency that the ANC DEP used to implement an implicit bargain of the electrification of black households. One of Trevor Manuel's interventions was at a national meeting on the electrification of black households, which the ANC had organised and was held at the University of Cape Town in February 1992 chaired by Ketso Gordhan, as cited by Veck (2000). However, the government was not

---

<sup>1</sup> See Harris (1989), A mixed economy for a democratic South Africa.

<sup>2</sup> Senior local state officials shared the Government's identification of the development of Soweto as a priority. Rive described Soweto as the mirror of South Africa's soul. The private sector also identified Soweto as the top priority for development. The electrification of Soweto had been identified by the Government as a priority since 1978 at least. In March 1979 Koornhof approved an electrification plan (which Rive was to oversee). Rive had put 'the lowest possible cost' of upgrading existing infrastructure at R 244m, but Koornhof only announced a R150m. Capital expenditure on the electrification and upgrading projects was slow to take off. By July 1984, there were almost R 380m in outstanding loans on these projects. The state's capital expenditure programme in Soweto fitted state objectives other than just the development of Soweto (Seekings, 1988).

represented at the meeting, prompting Trevor Manuel to say in his keynote address, as cited by Veck (2000, p. 198):

In a letter addressed to me, the Minister of Mineral and Energy Affairs, George Bartlett said: As indicated by the Director General, Dr P.J. Hugo, the Department of Mineral and Energy Affairs is currently undertaking an investigation into appropriate structures for electricity distribution in South Africa. These investigations initiated by the National Energy Council in 1991, are not yet complete. The Director General is therefore not in a position to attend.

Manuel was clearly worried that the government was restructuring the electricity supply industry without consultation with the ANC, who by now held a different position regarding the future of SOEs. He went on to say: “We will identify the weakness from our own perspective; we will serve them up on terms favourable to ourselves; then we will inform you; and if the ANC manages to get into power, then there will be nothing left to restructure” (Veck, 2000, p. 198).

The ANC believed that the restructuring of the electricity supply industry was a political ploy by the apartheid government during the transition to undermine a democratic government. Ketso Gordhan, who chaired the ANC national meeting, said in his summary of this topic that the resources were available to electrify black households and that the meeting had shown that the key “constraint to planning and implementing a national electrification initiative was the lack of political will” (Theron, 1992, p. 203; Veck 2000, p. 201). Gordhan’s advice to the meeting on how to overcome this shortcoming was ominous; he said that if regulation failed, then mass action should be used. The financing of electrification initiatives, would, according to Theron, cost about R800 million per annum (1992 Rands) (Theron, 1992, p. 17) or 1% of the government’s annual public works budget. Like other members of the ANC present at the meeting, Theron advocated the involvement of others beside the central government in financing the programme to electrify black households in South Africa. He cited Eskom’s positive net income from 1981 to 1990 and the capital resources accumulated by Eskom as a source of electrification funding (Theron, 1992, p. 205).

Unlike the white government of General Jan Smuts of the 1920s in which Hendrik van de Bijl was instrumental in legislating the Electricity Act, No 42 of 1922 that created the Electricity Supply Commission with statutory powers to establish generation and distribution undertakings

to supply electricity at the lowest possible cost, the ANC seemed content with the provision of electricity for all, particularly to black rural and urban areas.

### **Restructuring the ESI**

The National Electricity Forum (NELF) was charged with recommending ways to accelerate the electrification of black households in South Africa and was representative of all stakeholders in the South African Electricity Supply Industry (ESI), consisting of members from the ranks of government (national, provincial and local) political parties, businesses, electricity consumers, trades union, civic associations and, of course, Eskom. Despite the criticisms of Eskom voiced at the ANC's meeting on electrification, Ian McRae was appointed chairman of the NELF. This appointment rather demonstrated the importance of Eskom in the electrification process (Veck, 2000). The NELF recommended that the ESI should remain under public ownership and that the state should not be directly involved in the supply of electricity. This meant that the appropriate legal form of supply could be in the form of a parastatals (incorporated in terms of legislation) or local government electricity departments.

In 1991, Eskom was restructured to support the electrification programme and accelerate harmonisation with the country's changing sociopolitical climate", (Eskom Annual Report 1991, p. 8). The mood among Eskom's executive with regard to the electrification of black households at the time of the restructuring process was summed up in a statement made in Eskom in Perspective (1991, p. 16), which stated "every household has a need for energy (as cited by Veck, 2000). Electricity is the cheapest source of energy, outstripping coal, gas, paraffin and candles. Also, the customer has to invest time and money into bringing the latter forms of energy into his home. The question is no longer whether the poor can afford to have electricity. The question is: can the poor afford not to have electricity?"

### **Economic policy and techno-globalism after 1994**

Policy formulation and implementation to liberalise international trade and finance began well before the first democratic elections in 1994. Some reforms were driven by private institutions such as the Johannesburg Stock Exchange (JSE) and individual state agencies also pursued their own agendas. ANC policymakers were incorporated into most discussions, but before 1994,

they were not in a position to direct policy reforms. Macroeconomic policy reforms were also introduced before 1994, and these set the tone for subsequent policy. Inflation had cycled around 15% since 1973, but from 1989, the SARB used a fiercely contractionary interest rate policy to lower it into single digits by 1993. The SARB also used its still largely intact power with the support of President De Klerk to enshrine its own independence in the SA constitution, using the German Bundesbank as a model in its arguments for lower inflation (Padayachee & van Niekerk, 2019). This was accepted by ANC negotiators anxious to build credibility with international and domestic investors. As a result, Chris Stals, the SARB governor appointed in 1989, was retained in 1994. This cemented South Africa's position in relation to the rest of World which the article refers to as techno-globalism.

The African National Congress through the Freedom Charter envisioned the state playing a critical role in the economy when it was in control of the levers of the state in which people governed and wealth was shared. However, in 1994, following an overwhelming mandate by South Africans, Mandela governed and in 1996 adopted the Growth Employment and Redistribution (GEAR) macroeconomic framework which was seen as a victory for neo-liberalism (Marais, 1998; Terreblanche, 2002; Bond, 2000; McDonald, 2009; Habib, 2013) in South Africa. Its implementation was criticised by the ANC alliance partners and many academics as a Washington Consensus document with all the elements of Structural Adjustment Programs.

The inclusion and participation of black people in the formal economy and ownership were prioritised. This was done through black economic empowerment (BEE), employment equity (EE) and affirmative action (AA) in the period between 1994 and 2003. Black entrepreneurs who were benefiting through black economic empowerment faced a dual critique from blacks who perceived them to have no independent base of their own, but had risen on 'expedient structures' only to be the tools of 'old establishment' (Randall, 1996). Randall (1996) lists the following as factors of mistrust: Co-option in what was previously a white 'boys' club playing 'directly to the syndrome white faces, black masks'; A cosmetic attempt to dress up old white apartheid structures of power and privilege so as to maintain the status quo; black capitalists not genuine capitalists, having 'nothing more than a press release with no understanding of the company' surrounded themselves 'with white advisors and consultants who then run the company with remote control while they are left to indulge in the lifestyle of *nouveau riche*'. A white critique again quoted by Randall (1996) argued: senior black managers were 'hired for

their compliance and their smiling faces in our corporate brochures’ or to act as a ‘gopher, get the business in, smile, shake hands, and then leave it to us to get on with the job’; whites, it asserted have ensured at all costs that their black lackeys ‘don't ever get involved in our core white businesses’.

If that was how black capitalists were perceived by blacks and whites, it could not be generalised. There were a number of black capitalists with neither a Robben Island nor an exile badge who had successfully run businesses during apartheid, such as Sam Motsuenyane, the Makhetha brothers and many more. Standard Bank under the leadership of Conrad Strauss had recruited black capitalists to serve on its board. One of those capitalists was Reuel Khoza who became the chairman of Eskom on 1 March 1997.

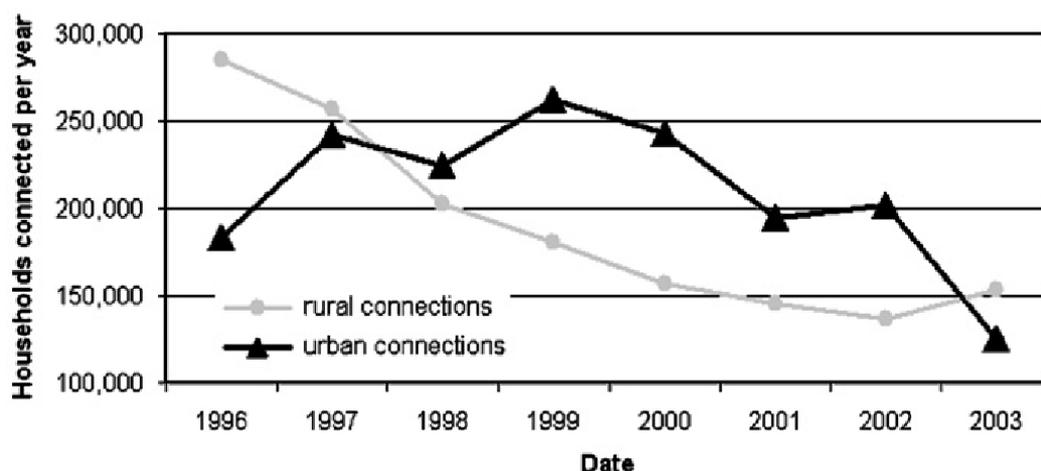
In 1994, after the democratic elections, the Electricity Act of 1987 was amended by the Government of National Unity (GNU) to allow for the institutionalisation of the National Electricity Regulator (NER). Eskom management who historically had autonomy and experience in determining its destiny by defining the end state by restructuring Eskom the way it saw fit as long as it met the electrification targets agreed upon in the RDP process before the democratic elections of 1994 of 1,750,000 homes. It did this by positioning Eskom as a global business with African ambitions but lacked a credible black leader who could assist it in making it happen.

The Eskom leadership had expected that the South African electricity supply industry would be restructured in line with what was happening in the rest of the world. They were ahead of their time when on 1 January 1996 they implemented what was called an “experimental wholesale power pool”, modelled on the United Kingdom’s wholesale market. Eskom wanted to be ready for this move by experimenting with the system in a less abrasive environment than real competition. The internal Eskom power pool was implemented on 1 January 1996, with trading rules based on the United Kingdom market. The demand side was represented by an hourly load forecast. The wholesale model market could have been a suitable starting point when introducing non-Eskom generation into the mix, but events subsequently overtook the exercise (Eberhard, 2007).

## Techno-nationalism and extension of electricity

Over 3 million new domestic customers (households) in South Africa were connected during the past decade (Gaunt, 2003). This significant electrification programme raised the proportion of households with access to electricity from 36% in 1991 to 69% in 2001. Due to the fact that rural areas were part of its licensed area of supply and had the largest backlog of electrification, Eskom took on the majority of the RDP targets (66% or 300,000 new connections per year), and the local authorities assumed the rest (Gaunt, 2003). As a result, it may be argued that a higher proportion of rural connections were made during the initial stages of the programme than might have been the case in a 'unitary' programme, as evident from Figure 1.

**Figure1: Households connected per year**



Source: Bekker, Eberhard, Gaunt, & Marquand (2008)

This was achievable because of the knowledge and technological innovation at Eskom and other institutions such as the Council for Scientific and Industrial Research which form part of South Africa's national systems of innovation. Technological development and innovation in extending access and inclusivity in the techno-nationalism was mainly driven and facilitated by efficiency gains focussing on reducing costs. The efficiency gains are illustrated by the declining real cost per connection until the early 2000s (Figure: 2). Given the political difficulties of lowering connection targets or altering tariff structures, the cost per connection was one of the few areas in which the financial performance of the electrification programme could be improved.

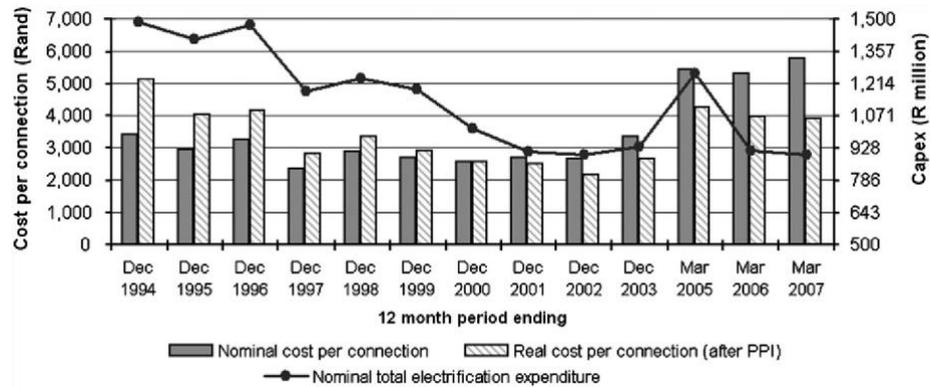


Figure 2. Average annual cost per connection and total electrification capital expenditure (Bekker et al., 2008).

Bekker, Eberhard, Gaunt, and Marquand (2008) identify four broad technology developments as shown in Figure 3, and offer a structure to analyse the development of technology preceding and during the electrification programme. The four phases are:

- Supply quality-driven optimisation
- Cost-driven optimisation and standardisation
- No-high impact innovation

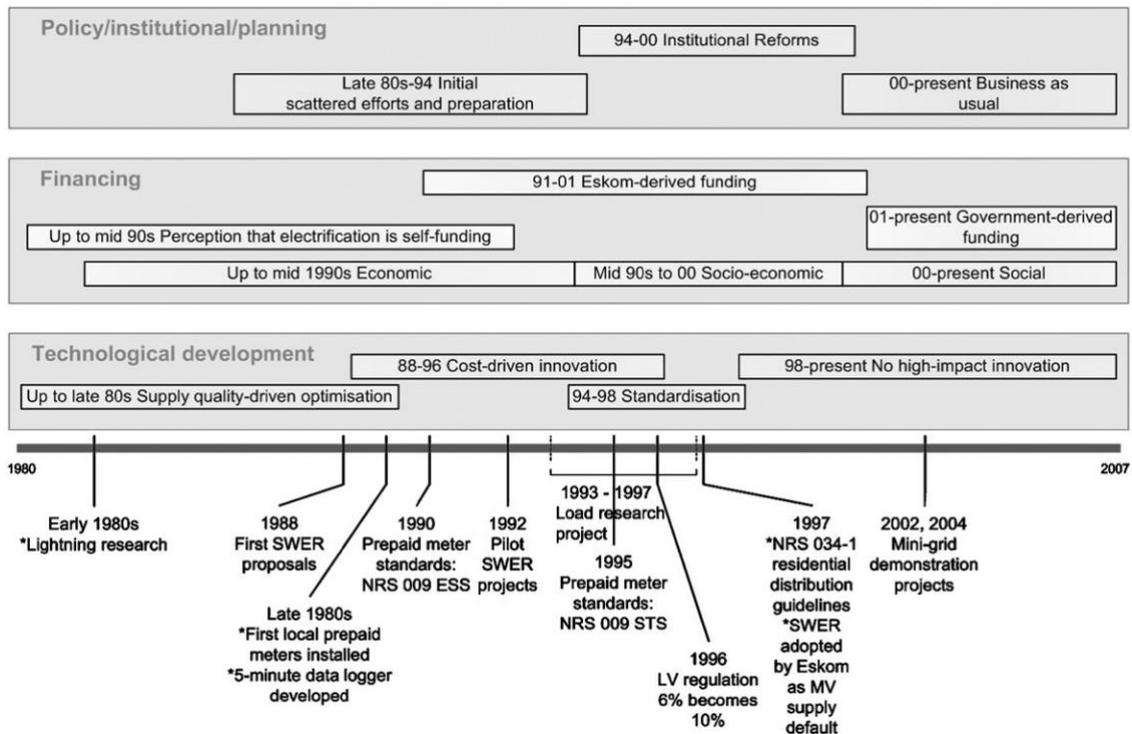


Fig. 3. Technology development phases shown with policy/institutional and financing phases and significant technology development events (Bekker et.al., (2008)).

### Phase 1: supply quality-driven optimisation

During the pre-electrification programme of the 1980s, primarily customers that could afford to pay in full were connected to the electricity supply network. The emphasis was on providing high quality and reliable supply, with connection cost only a secondary criterion in most utilities. This led to supply-quality-driven optimisation of technology, through, for example, substantial research into the impact of lightning on distribution lines by Eskom and the Council for Scientific and Industrial Research (CSIR), and through constantly improved medium-voltage (MV) line designs (Bekker, Eberhard, Gaunt, & Marquand, 2008).

### Phases 2 and 3: cost-driven optimisation and standardisation

According to Bekker et.al., (2008) cost-savings were only realised by changing conservative design specifications to those more suited to the requirements of typical customers. This realisation led to changes in both quality of supply and domestic load model specifications.

Second, innovative technologies like prepayment electricity meters and the broader adoption of single-phase lines significantly reduced both capital and ongoing costs per connection. Finally, electrification programme implementation processes were optimised. These three different changes are explored in more detail below.

## **Design specification changes**

### ***Domestic load research.***

In the late 1980s, Herman and Gaunt (1991) developed data loggers that could make continuous time-synchronised measurements of individual customer loads averaged over short periods (of typically 5 min). Data could be downloaded every several weeks. These data loggers were used to collect electricity consumption data from communities in a Load Research Project from 1993, which informed the development of new design parameters. More conservative parameters, in use during the 1980s, had been mostly based on the work of American and European researchers in the 1940s and 1950s, and UK guidelines (Bekker, Eberhard, Gaunt, & Marquand, 2008). The new parameters were standardised in the national design guideline for the design of residential distribution systems in 1997.

The impact of load research is seen through the change in design load specifications over time. Urban design loads dropped from up to 7 kilovolt-ampere (kVA) per household during the 1980s, to around 3 kVA in the early 1990s, and down to around 1.5 kVA in 2003. Rural design standards dropped from around 2.5 kVA per household initially, to 0.4 kVA in 2003, with significant associated savings in distribution infrastructure (Bekker, Eberhard, Gaunt, & Marquand, 2008).

### ***Prepayment metering***

The first locally developed prepayment meters were introduced during the late 1980s (Bekker et.al., 2008). The objectives were to remove the need for postal delivery addresses for billing, reduce the costs of reading meters, and reduce non-payment by helping customers not to incur unaffordable consumption costs, which was already a problem in many township areas (Tewaria and Shahb, 2003). Eskom and most municipalities adopted prepaid metering on a large scale

after 1990, with the meters usually installed in households with ‘ready boards’, a distribution board placed in a central location in a house or shack, which contained one or two plug sockets and a light, facilitating electricity use without further house wiring.

By the mid-1990s, a number of prepayment meter standards were adopted that solved initial problems like the incompatibility of proprietary meter and vending station systems.

### ***Implementation processes***

Innovative technologies and design specification changes alone are, however, insufficient to explain the changes that occurred during the electrification programme. New and improved implementation processes played a crucial role, including greater use of decision-aiding techniques and tools, adoption of new financial evaluation methods (e.g. the modified Internal Rate of Return method used by Eskom), computer-based asset management, and software for feeder design (Bekker, Eberhard, Gaunt, & Marquand, 2008).

### **Phase 4: no high-impact innovation**

Although much progress was made up until the late 1990s, thereafter no technology innovations had a significant impact on the electrification programme in terms of cost per connection or increased annual connections. A potentially innovative off-grid network arrangement, the mini-grid, was tested through two demonstration projects in the Eastern Cape, commissioned between 2002 and 2004. Instead of individual off-grid household installations, a mini-grid distributes energy from a local generation source, e.g. photo-voltaics and/or wind, to several households located close to each other and the source. The demonstration mini-grid systems were, however, both non-functional by the end of 2006, due mainly to social and institutional problems.

Von Schnitzler (2013) shows that residents in Soweto and other urban areas have bypassed their meters, rendering the meters useless and giving residents de facto free water or electricity. As a result, there is an ongoing low-intensity battle between residents tinkering with the technology and utility officials trying to secure it. Von Schnitzler (2003) tracks this technical micro-politics involving residents, engineers, and utility officials in a seemingly perennial struggle over the enforcement and evasion of payment and argues that this politics does not take conventional political forms of public demonstration, disagreement, or deliberation, but takes shape at the level and in the language of technology itself. Here, questions that were central to the liberation

struggle—about the limits, entitlements, and obligations of citizenship—are transduced to novel forms, media, and idioms argues Von Schnitzler. In this context, technologies and infrastructures are not merely symbols or tools for political expression; rather, technology itself becomes a political terrain for the negotiation of moral-political questions that were at the heart of the anti-apartheid struggle and that continue to animate the forms of life left in apartheid's wake.

### **Techno-globalism and technopolitics**

In 1997, John Maree retired as a chairman of the Electricity Council and was replaced by Ruel Khoza. Ruel Khoza joined the Eskom board with a mandate to prepare Eskom for restructuring. Eskom was already in discussions on its future with a variety of stakeholders through the Electricity Restructuring Interdepartmental Committee (ERIC). The key recommendations of ERIC were that the entire electricity industry should move to cost-reflective tariffs, with separate transparent taxes to fund electrification and other local government services, and that the distribution industry should be consolidated into a limited number of independent, financially viable regional distributors. ERIC also recommended the formation of a transformation task team to manage the transformation process (Eskom, annual report, 1970-2015). Ruel Khoza harboured African ambitions that complemented Thabo Mbeki's African Renaissance vision. In the 1997 Eskom AFS, Ruel Khoza said:

Africa is delicately poised, from where it can descend into chaos or push forward into what has been referred to as the African renaissance. This reawakening will not happen on rhetoric alone. We have to plan, create initiatives, set things in motion and change more than mere structures and formalities. We must address the changes that need to be made from within. All of this must be reinforced by business and large technical organisations such as Eskom, which must lead by example, instil a rewarding work ethic and demonstrate that the achievement of excellence is possible.

Khoza's (2011, 2005, 2005a, 2004, 2004a) writings about African-ness and his promotion of ethical leadership based on ubuntu and Mbeki's African Renaissance converged into a partnership of vision and implementation. Khoza was to use the knowledge and technology in Eskom by speedily extending access to electricity in the domestic market, techno-nationalism and at the same time underpin Mbeki's political ambitions. These two South Africans had a

vision to develop South Africa and Africa and play a role in the world political economy. The three systems, techno-nation, techno-globalism and technopolitics all converged with Mbeki's agency and power to make it real. The two, Mbeki and Khoza, presented ideas that were outside the embedded Washington Consensus policies that were driven by the treasury (Padayachee, 2018). The African Renaissance and the Africa Rising narratives positioned African commodity exporting countries successfully on the back of rapid Chinese growth between 2001 and 2007. The growth acceleration was a consequence of stronger policy frameworks in many African countries, including their embrace of more open trade.

### **The African renaissance**

The New Partnership for Africa's Development (NEPAD), a pan-African strategic framework in which President Thabo Mbeki, President Olusegun Obasanjo of Nigeria, and President Abdelaziz Bouteflika of Algeria collaborated for the socio-economic development of the continent, was officially adopted by the AU in 2002 as the primary mechanism to coordinate the pace and impact of Africa's development in the 21st century. Its primary objective included the provision of a new mechanism, spearheaded by African leaders, to:

- eradicate poverty,
- place African countries, both individually and collectively, on a path of sustainable growth and development,
- halt the marginalisation of Africa in the globalisation process,
- accelerate the empowerment of women, and
- fully integrate Africa into the global economy.

South Africa was seen to be punching above its weight. For example, in 2005 at the Gleneagles G8 Summit, in alliance with the British Labour Party led by Tony Blair, President Mbeki and his African colleagues were able to get an agreement that resulted in the writing-off of multilateral debt for the world's poorest countries. This was preceded by the formation of the Commission for Africa by Tony Blair in 2004, which prepared a document titled "Our Common Interest" that served as an input to the Gleneagles Summit. The Commission for Africa had 17 members, nine of whom came from Africa. Trevor Manuel, who was South Africa's minister of finance, was one of the commissioners. African leaders were encouraged by the democratisation wave taking place on the continent, which was backed by the commodity super-

cycle, which resulted in higher levels of consumption and improvements in the quality of African lives. Africa was a darling of the world. Reuel Khoza was determined to see Eskom playing the African and global game.

Were Smuts and Van Der Bijl reawakening in the form of Mbeki and Khoza? In an interview conducted as part of the research for on the 26 February 2019, Khoza emphasised that his chairmanship and role at Eskom was aligned with that of the government. Mbeki's vision and Eskom's had to be aligned (Khoza, 2019). Mbeki also gave Khoza and Eskom autonomy to implement Eskom's diversification agenda by contributing to the African Renaissance vision. Khoza was a man on a mission. He was not a Hendrik van de Bijl, but he was determined to change the fortunes of Eskom and the African continent in a global economy.

### **Knowledge and technology transfer – Khoza and Eskom**

Eskom has grown a significant R&D effort over the years. Research emerged from its engineering division and still focused mainly on “sweating assets”, i.e. incremental improvements that solve problems, lower costs and increase efficiencies in its main generation, transmission and distribution businesses. However, Eskom has also devoted R&D resources to environmental issues, end-use technologies and alternative and future energy technologies, including the development of a new generation “pebble-bed” nuclear reactor. R&D expenditure increased rapidly in the 1990s and amounted to about US\$ 30 million in 1999, 0.8% of total revenue. The R&D capability had been transferred to Eskom Enterprises which contracts its services to Eskom Holdings and other industry participants (Eberhard, 2003).

In the 1998 Eskom financial statements, Khoza called on Eskom's leadership to continue to operate at world-class levels, to be well positioned to respond rapidly in a constantly changing environment, and to act as a catalyst for economic growth in South Africa in a globalising world. He was fierce in pushing Eskom to give direction in Deputy President Thabo Mbeki's vision of the African Renaissance. Eskom vision was changed to reflect its African roots and its global competitiveness. For Khoza, the Eskom vision for Africa was linked to the new century. In his words, “...when it began, we say, as marking the dawn of a new African personality, in line with the president's declaration of this new era as the African century. Eskom continues to embrace the President's notion of the African Renaissance. We align ourselves with the view that Africa has the potential to become an economic success story because of the natural wealth

and intellectual capital she possesses. All that is required is for us to harness and galvanise our collective energies for growth and development” (Eskom, 2000).

Khoza’s African-ness was expressed in his belief in African possibilities. Khoza believed that Africa had to begin to play its role and work in partnership with its counterparts to improve economic conditions for all of Africa’s citizens (Eskom, 2001, p. 18). Moreover, Eskom believed that “it is now possible for Africa to determine its future and become:

- An Africa more excited by its future than by its past.
- An Africa whose scope for growth is limited only by its imagination.
- An Africa that has successfully translated its concepts of humanity and communal relations into vibrant co-operative models of governmental, institutional and individual relations.
- An Africa whose intellectuals are nurtured by indigenous founding principles and insatiable enquiry.
- An Africa that redefines the term “emergent” from one of condescension and derision to one of economic, political and cultural vibrancy. and technological prowess.

If the apartheid project (Posel, 2011) was South African and Western (Edwards & Hecht, 2010), Eskom in 1998 wanted to be South African and African by aligning Eskom with Thabo Mbeki’s African Renaissance (Mbeki, 1998) project. Thabo Mbeki was deputy president of the country during that period. In 1999, he became South Africa’s second state president. In Thabo Mbeki’s words:

The conviction therefore that our past tells us that the time for Africa's Renaissance has come, is fundamental to the very conceptualisation of this Renaissance and the answer to the question: Whence this confidence? Unless we are able to answer the question - Who were we? we will not be able to answer the question - What shall we be? This complex exercise, which can be stated in simple terms, links the past to the future and speaks to the interconnection between an empowering process of restoration and the consequences or the response to the acquisition of that newly restored power to create something new (Mbeki, 1998).

Khoza understood that Africa’s success was intertwined with the quality and values of its leadership. According to Khoza, Africa requires leadership (Eskom, Annual Report, 2001, p.

18):

- “whose defining features are probity, humility, integrity, compassion and humanity;
- that demonstrates competence, tenacity and a sense of efficacy;
- that practises introspection and self-renewal;
- that strongly believes that the locus of control for Africa’s future, is within Africa herself:
- that does not consume seed capital, but invests for the generations to come; and above all else
- that is visionary.”

### **Knowledge, technology transfer in the rest of Africa**

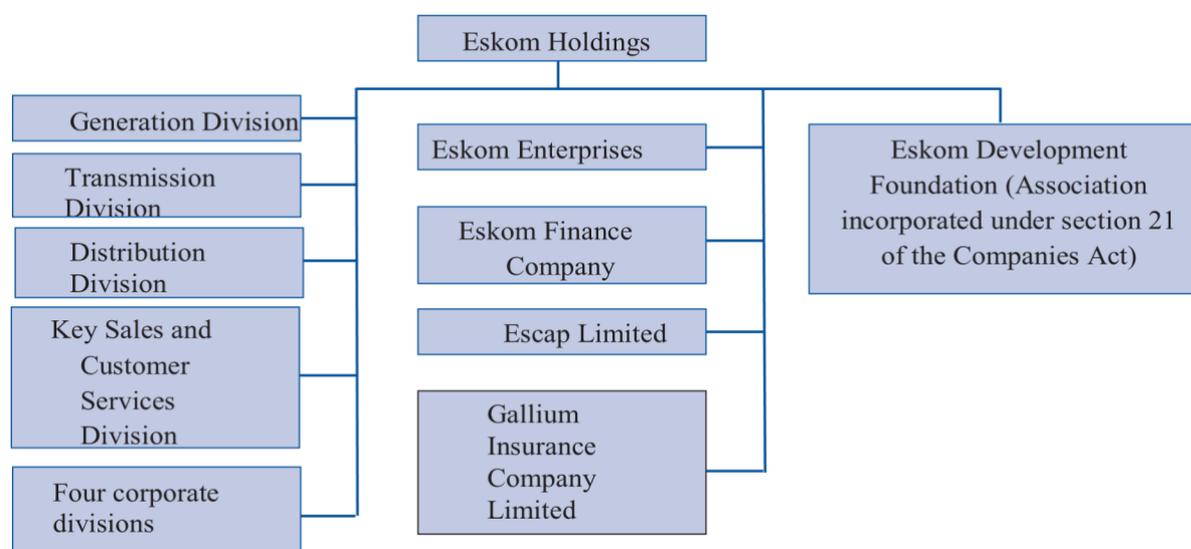
Khoza had left the day to day running of Eskom to Thulani Gcabashe who was the chief executive. Gcabashe became the chairman of Eskom Enterprise in 1999 and, in an interview with him on 28 February 2019, said it was a training and testing ground for him to prove why he should succeed Allen Morgan, who was facing retirement in 2001. Following the corporatisation of Eskom in 2002, a new board of directors was appointed by the government. It was chaired by Khoza. Both the Electricity Council and the management board ceased to exist. The Gcabashe and Khoza team had all the makings of a development coalition last seen under the apartheid developmental state of the 1940s, when Smuts, Van Der Bijl and Van Eck played a pivotal role in South Africa’s industrialisation (Freund, 2013). In the new millennium, South Africa had Mbeki, Khoza and Gcabashe. Khoza and Gcabashe believed that Eskom could act as a catalyst for the regeneration of Africa through its initiatives.

Eskom developed a new strategy that would allow it to search for economic opportunities in South Africa, Africa and the world. The South African infrastructural base was a vital link in the developmental chain for those African countries with which Eskom would do business, which were regarded as the foundation for greater global involvement. The investment strategy was designed to achieve Eskom’s strategic intent, including selective investments in diversified markets, products and services. Given the trends in the global energy sector during the period, Eskom decided to re-evaluate its investment targets for diversification of markets, products and services in order to be in line with international best practice. Subsequently, Eskom developed an investment strategy with associated targets and exposure limits for business areas, industries and geographical locations. This was Eskom’s strategy for transitioning into a different entity

than that of Smuts and Van Der Bijl and towards a low-carbon African economy. While managing the coal powered generation fleet in preparation for privatisation, Eskom was planning on diversifying into hydro, wind, solar, and nuclear in the form of the pebble bed modular reactors. At the same time, its transmission network and internal capability allowed Eskom to diversify into information technology and telecommunication. Eskom was transitioning.

Scholars in science and technology studies and geography have analysed how infrastructures mediate exchange over distance, bringing different people, objects, and spaces into interaction and forming the base on which to operate modern economic and social systems (Graham 1996, 2001; Lefebvre 1991) as cited by Larkin (2013). Graham (1996) has also written a series of influential works examining how new systems of telecommunications are reconfiguring urban space and recently on how infrastructures bundle together water, energy, people, and streets into a series of networked infrastructures that define modern life (Graham, 2001). Eskom's sociotechnical system led to a revised business model, reflecting the strategic thrust and the changing environment in which it operated and capturing a set of principles that Eskom needed to embrace to focus on its activities and resources. The revised business model required refocused objectives, measures and targets. In line with the revised business model, the investment strategy focused Eskom's investments on its core competencies in advance of large generation projects in South Africa and southern Africa and network capacity expansion projects in Africa. Khoza had encountered speed bumps in the rest of Africa, as a result of a concern and fear that doing business with an SOE (Eskom) could be perceived as re-colonisation by South Africa. As a result, Eskom was restructured between regulated and unregulated business, as depicted in Figure 1.1 below. Eskom Enterprises was established to pursue Eskom's diversification strategy and to transition, under the chairmanship of Gcabashe, into becoming the trading arm on the African continent and around the globe.

Figure 1.1 Corporate structure of Eskom in 2001



Source: Eskom 2001

Figure 1.1 above shows Eskom’s corporate structure in 2001. By 2001, Eskom had already unbundled its business into about eight divisions related to its core electricity deployment business, in line with the 1998 white paper on energy.

### **From electricity to telecommunication**

Khoza, flanked by two Eskom staff, Andrew Monyane and Jan de Beer, visited a number of African countries with a view to promoting sustainable, long-term commercial initiatives in line with Eskom’s vision. By meeting with top utility and government officials, Eskom’s management team wanted to establish stronger links and build the foundation for future commercial ventures. Eskom’s technology, technical expertise and financial strength, combined with its unique African knowledge and experience, made it a logical choice for joint business ventures and partnerships in many countries on the continent. Notably, the success of the African Renaissance depended on the development of the region and its people, which, in turn, depended on Eskom’s performance as an efficient and effective organisation that could provide the basis for South African economic growth.

Eskom's first diversification success came in the form of the acquisition of a 70% stake in Telecom Lesotho as part of consortium called Mountain Communications (MC).

The MC consortium was comprised of Econet Wireless International, owned by the Zimbabwean entrepreneur, Strive Masiyiwa, Eskom Enterprises, and Mauritius Telecom. Its bid resulted in a five-year exclusivity to provide telecommunications services throughout Lesotho. The consortium operated the fixed-line, satellite and Internet services, as well as the second competitive national GSM cellular network. According to Vusi Ngubeni, executive director for Eskom Enterprises: telecommunications:

The advanced technologies and skills sets that MC brings will ensure that the requisite infrastructure is in place to bolster business on a global scale. We are proud of this partnership; it is indeed a milestone in line with the tenets of the African Renaissance (New24.com, 2000).

### **The Manantali Hydropower Project**

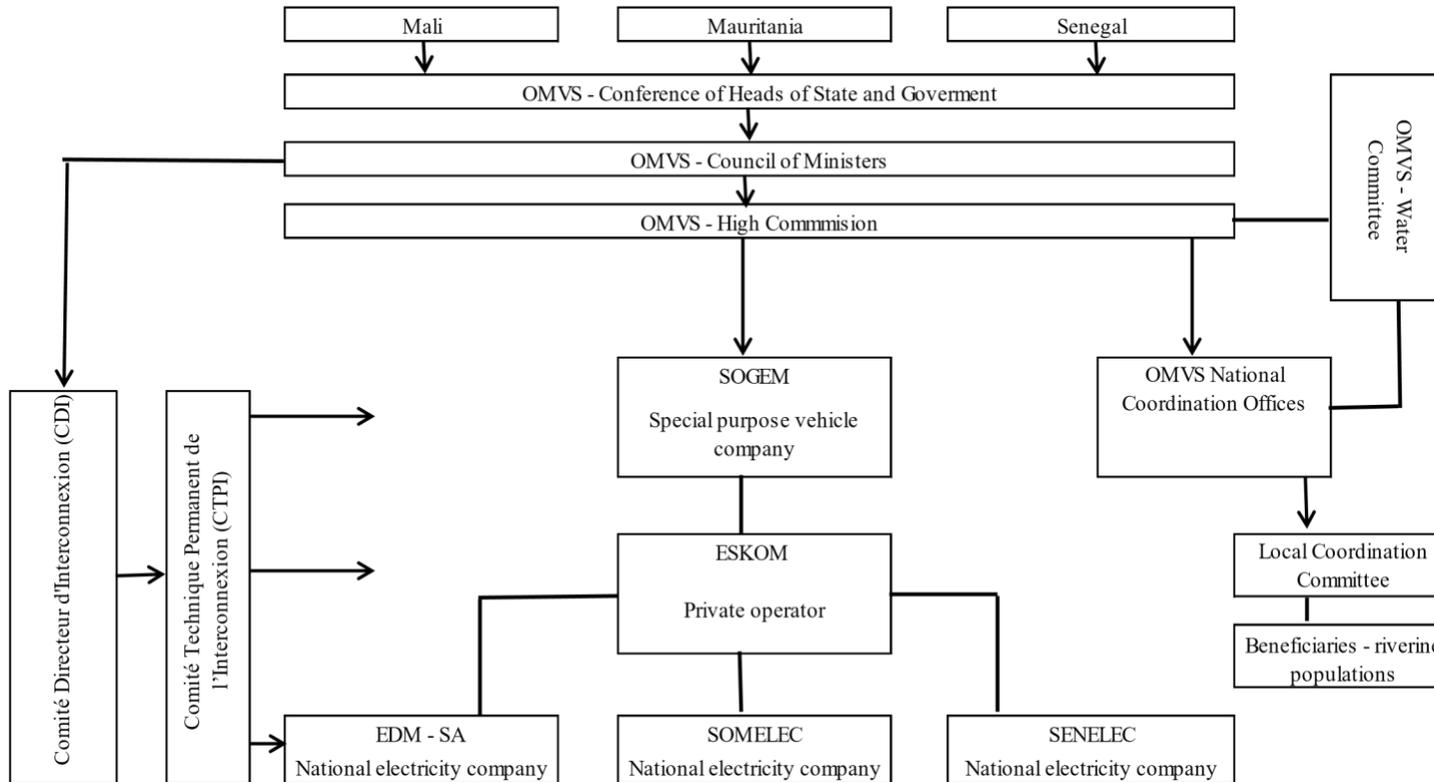
Eskom's next venture was in hydro-electricity in West Africa, in the Manantali hydropower project. The Senegal River Basin was estimated to have a hydropower potential of 1,200 MW, of which only 200 MW had been developed. The Senegal River Basin is managed by L'Organisation pour la Mise en Valeur du Fleuve Sénégal (OMVS), an organisational grouping composed of Guinea, Mali, Mauritania and Senegal. Guinea had an estimated potential of 6,000 MW in the basin, which could generate around 26 TWh per year of electricity at relatively low cost (AfDB, Energy and Power Infrastructure to Facilitate Regional Integration in the ECOWAS Region, 2011) as cited in AfDB (2013).

The Manantali hydropower project involved cross-border cooperation among the three governments of Senegal, Mali and Mauritania under the aegis of the OMVS. It established a unique sub-regional power system including a 200 MW hydroelectric plant at the foot of the Manantali dam and a 1,000 kilometre-long system of 225 kV transmission lines and substations to distribute the electricity produced to the main load centres in Mali, Mauritania, and Senegal, both operated in real-time by a central load dispatching system located at Manantali (AfDB, 2013).

The original project was initiated in 1970, although construction works started in 1981 and were completed in 1987, with significant contribution from the AfDB. In parallel, a second dam was built at Diama, close to the Atlantic Ocean, to prevent the intrusion of saltwater into the lower delta and to create favourable conditions for irrigated agriculture. The original project was planned to include a hydroelectric plant, but its construction was not pursued at that time because of insufficient financing, disagreement on the route of the transmission lines, the outbreak of a conflict between Mauritania and Senegal between 1988 and 1989, and the low quotation of petroleum (AfDB, 2013).

Finally, in 1996, an agreement was reached and several donors offered loans to finance the construction of the hydropower plant and transmission facilities. Total project cost was estimated at 209,9 billion FCFA at appraisal. The project was a major multi-donor initiative that included ten major donors: the French Development Agency (Afd), the World Bank, Kreditanstalt für Wiederaufbau (KfW, Germany), the Canadian International Development Agency (CIDA), the European Union, the European Investment Bank (EIB), the Islamic Development Bank (IDB), the African Development Bank (AfDB), the Arab Fund for Economic and Social Development (FADES), the West African Development Bank (BOAD) and other small financiers (AfDB, 2013). AfDB's contribution to the project, which was directed to finance the construction of the western transmission lines, amounted to nearly 9% of the project (AfDB, 2013). Figure 1.2 shows the organogram of all the parties that made the project possible.

Figure 1.2 The organogram of the Manantali Hydropower Project



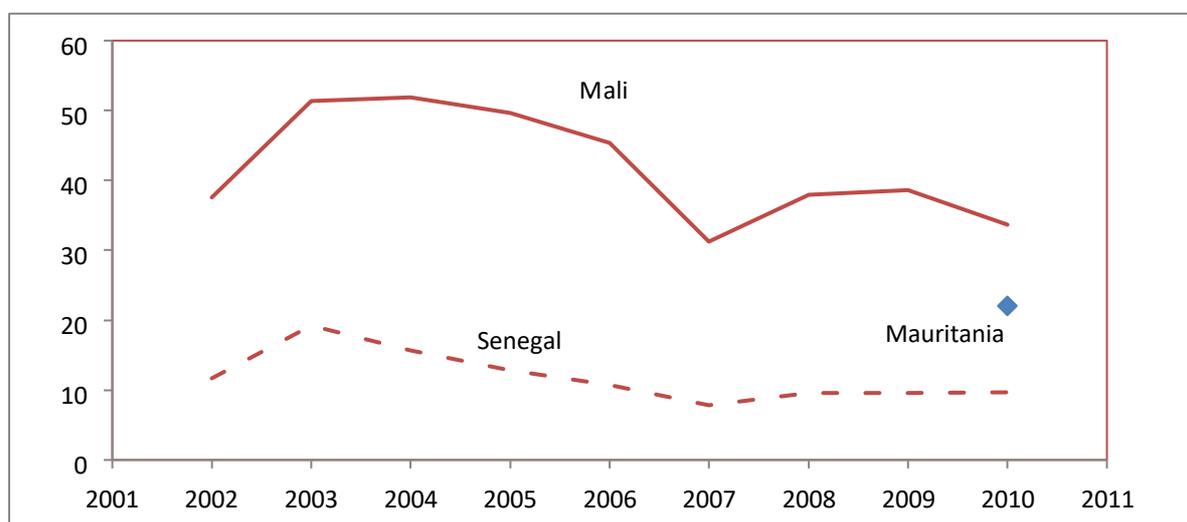
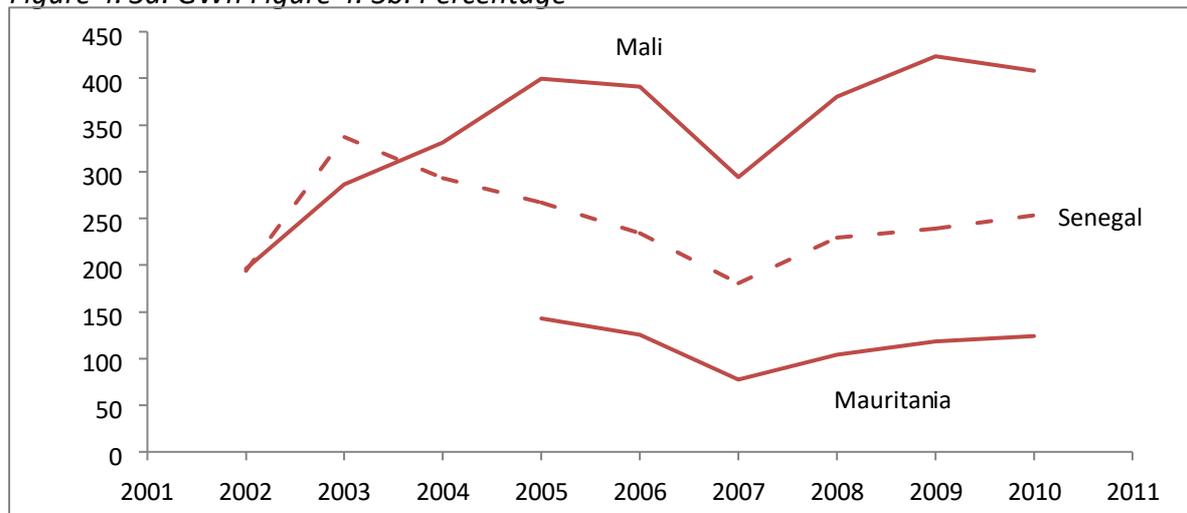
Source: (AfDB, 2013, p. 5).

Upon donor request, the Société de Gestion du Barrage de Manantali (SOGEM) was created by the OMVS to be the asset owner and operator of Manantali. The Société de Gestion du Barrage de Diama (SOGED), a sister organisation to SOGEM, was also established to manage the Diama Dam and collect irrigation fees. In turn, SOGEM contracted Eskom Energie Manantali (EEM), a subsidiary of Eskom, to manage the hydropower station and the associated infrastructure. The Comité Technique Permanent de l'Interconnexion (CTPI), made up of representatives from SOGEM; EEM and the three national electricity companies, was responsible for defining rules and procedures for power generation. Its activities were guided by the Comité Directeur de l'Interconnexion (CDI), composed of senior staff from the three abovementioned bodies.

Capacity building was an important criterion for the selection of Eskom. All the parties noted the high degree of competence and dedication of the technical staff Eskom posted at Manantali. Most staff benefited from training programmes and technological transfer from Eskom's expatriate personnel. Figure 1.3a shows the contribution of the project to the electricity output in gigawatts in each of the member countries. Figure 1.3b shows the electricity in each of the member countries as a percentage of the total project output,

### Contribution of Manantali to the three countries' energy production

Figure 4. 3a. GWh Figure 4. 3b. Percentage



Source: AfDB (2013, p. 10). Calculation from data provided by the national electricity companies.

Khoza and Thulani Gcabashe, agree that the Manantali project was one of the most successful projects in the diversification strategy of Eskom. Eskom was also able to install fibre-optic lines along the transmission line, which connected the OMVS countries to the Atlantic fibre network, enabling these countries to digitalise.

### Other successful projects

Eskom went to East Africa, to Uganda, in partnership with a local company, Umeme. This partnership owns a 20-year concession to operate and maintain government assets in generation

and distribution that was awarded in 2003. Eskom manages generation at Nalubaale and Kiira, while Umeme is in charge of distribution. The transmission part is owned by the state.

An IDC-driven aluminium investment project in Maputo, Mozambique, in partnership with BHP (formerly BHP Billiton), was powered by Eskom in a tripartite agreement. MOTRACO, a joint venture company comprising Electricidade de Mozambique (EDM), the Swaziland Electricity Board (SEB) and Eskom, was formed for the construction, ownership and operation of a 400 kV line that supplied electricity to MOZAL.

Eskom also entered into a buy-and-bank agreement with the Zambian Electricity Supply Corporation (ZESCO) and SNEL, an electricity utility in the Democratic Republic of Congo (DRC) to trade electricity at different times of the day. Funds flowing from this venture were used for the refurbishment of the badly damaged electrical infrastructure in the DRC.

Providing consulting and engineering services in Africa either directly or through its subsidiary companies, Eskom secured contract work in the electricity sectors in Congo, Zanzibar, Namibia, Kenya, Botswana, the DRC, Mozambique, Uganda and Zambia, as well as in Indonesia and Thailand.

The groundwork done by Eskom in Africa, the Middle East, the Far East and South America promised the possibility of a transition to low carbon energy by Eskom through the delivery of a substantial number of development projects in future. The Zimbabwe Electricity Supply Authority (ZESA) had been Eskom's good trading partner since 1996.

With Eskom having pursued a diversification strategy and aligned itself with NEPAD and the African Renaissance, there was discord in the boardroom which might have emanated from the politicians, who could have their own differences, particularly between the DPE and the DME. This view is explained by the speed and efficiency with which the DME had attempted to introduce the power sector reforms presented in the 1998 white paper on energy. Moreover, the country had committed itself to various climate change commitments to reduce its carbon footprint by pursuing a low-carbon growth pathway by signing various national and international declarations. The major actions include the ratification of the United Nations Framework Convention on Climate Change (UNFCCC) in August 1997, and accession to the Kyoto Protocol in July 2002. Arguably, the DME was committed to power sector reforms that

included the privatisation of parts of the vertical integrated state-owned company, Eskom, and a just energy transition.

### **The emergence of techno-nationalism**

Khoza (2019) and Gcabashe (2019) argue that the new board wanted management to focus on the regulated business of Eskom instead of its privatisation. That meant that Eskom's transition towards a diversified, low-carbon, regional and global entity was to be deferred. However, Eskom could not just unplug itself, given the resources that had already been invested. The last straw came in the form of a Cabinet decision aligning itself with the views of the board, instructing Eskom to completely withdraw from its diversification efforts, which was delivered in 2003 (Ritchken, 2013).

In the interviews with both Khoza (Khoza, 2019) and Gcabashe (Gcabashe, 2019) on 26 and 28 February 2019 respectively, asked if Thabo Mbeki was at the Cabinet meeting and therefore had changed his agenda on Africa. They could not confirm. However, a source suggested that the Cabinet meeting was chaired by Jacob Zuma, who was the deputy president at the time, because Mbeki was travelling. It appeared as though many black business groups were positioning themselves for the privatised assets of Eskom and the voice that empowerment and transformation was only benefiting a few was getting louder.

This decision marked the beginning of the destruction of the capability, efficiency and effectiveness of Eskom. Eskom started prioritising transformation and empowerment to satisfy a variety of interest groups, particularly those linked to the ANC, the state and black business. We may never know how the Mbeki, Khoza and Gcabashe vision would have changed Africa had it had the support of the ANC and its allies.

### **Conclusion**

In this we have explored how Eskom as a technological project figured in the practices, symbolisms, and political narratives marshalled by the new democratic government and the leadership of Eskom. We have shown that since 1994 the new democratic South Africa government inherited infrastructure that was an outcome of political narratives marshalled by apartheid apologists and later by the ANC led government in the form of techno-nationalism

and technopolitics. We showed how Eskom technology, innovation and capability was extended to black rural and urban areas by the white government and how the ANC led government used the infrastructure embedded technological prowess, symbolisms, in its South African-ness and the rest of African-ness in the diffusion of knowledge. Our claim that African Renaissance was located in this duality of being South Africa and at the same time being African shown in in the deployment of capability, technology and knowledge outside South Africa in contrast to the apartheid regime that saw itself as African and Western (Edwards & Hecht, 2010) simultaneously.

## Bibliography

- AfDB. (2013). Fostering Regional Integration in Africa: Lessons from Manantali Energy Project (Mauritania, Mali & Senegal). *African Economic Conference 2013* (p. 38). Cote D'Ivoire: African Development Bank.
- Archibugi, D., & Michie, J. (1997). Futures. *Technological Globalisation or National Systems of Innovation?*, 121-137.
- Bekker, B., Eberhard, A., Gaunt, T., & Marquand, A. (2008). South Africa's rapid electrification programme: Policy, institutional, planning, financing and technical innovations. *Energy Policy* (36), 3125-3137.
- Bond, P. (2000). *Elite Transition: From Apartheid to Neoliberalism in South Africa*. Pietermaritzburg: University of Natal Press .
- Breckenridge, K. (2005). Verwoed's Bureau of Proof: Total Information in the Making of Apartheid. *History Workshop Journal*, 83-108.
- Chabane, N., Goldstein, A., & Roberts, S. (2006, May). The changing face and strategies of big business in South Africa: more than a decade of political democracy. *Industrial and Corporate Change*, 15(3), 549-577.
- Eberhard, A. (2003). *The Political Economic, Institutional and Legal Dimensions of Electricity Supply Industry Reform in South Africa*. Cape Town, Western Cape, South Africa.
- Edwards, P. N., & Hecht, G. (2010). History and the Technopolitics of Identity: The Case of Apartheid South Africa. *Journal of South African Studies*, Volume 36 Number 3, September, 619-639.
- Eskom. (1970-2015). *annual report*. Johannesburg: Eskom Centre.
- Gaunt, T. (2003). Researching a basic electricity support tariff in South Africa. In Domestic Use of Energy Conference. *Cape Technikon Vol 31*. Cape Town: Cape Technikon.
- Gcabashe, T. (2019, 2 28). Former Eskom CEO 2001-2007. (L. P. Mondi, Interviewer)
- Gelb, S. (2006). Macroeconomic in post-apartheid South Africa: Real growth versus financial stability. In R. French-Davis, *Seeking Growth under Financial Volatility* (pp. 184-218). Palgrave Macmillan.
- Graham, M. S. (1996). *Telecommunications and the City: Electronic Spaces, Urban Places*. London: Routledge.
- Graham, M. S. (2001). *Splitting Urbanism: Networked Infrastructures. Technological Mobilities and the Urban Condition*. London: Routledge.
- Habib, A. (2013). *South Africa's Suspended Revolution*. Johannesburg: Witwatersrand University Press.
- Harris, L. (1989). *The Mixed Economy of a Democratic South Africa*. Laussane, Switzerland: Paper Delivered at Colloquium of the Institute of Development Studies at the University of the Western Cape.
- Khoza, R. (2004a). *Vumunhu Vhuthu African Humanism*. Johannesburg: African Morning Star Publishers.
- Khoza, R. (2005). *Let Africa Lead: African Transformational Leadership in the 21st Century*. Johannesburg: Vezubuntu Publishing .
- Khoza, R. (2010). *Chairman's Statement*. Johannesburg: Nedbank Annual Report.
- Khoza, R. (2011). *Attuned Leadership: African Humanism as Compass*. Johannesburg: Penguin Books.
- Khoza, R. (2018, July 7). Retrieved from Ruel Khoza: <http://www.reuelkhoza.co.za/the-new-era-the-new-dawn-and-the-new-dispensation/>

- Khoza, R. (2019, February 26). Former Chairman of Eskom 1997- 2005. (L. P. Mondli, Interviewer)
- Khoza, R. J., & Adam, M. (2005). *The Power of Governance: Enhancing the Performance of State-Owned Enterprises*. Johannesburg, Gauteng, South Africa: Pan Macmillan.
- Larkin , B. (2013). The Politics and Poetics of Infrastructure. *Annual Review of Anthropology* 42, 327-43.
- Lefebvre, H. (1991). *The Production of Space*. Oxford: Blackwell.
- Marais, H. (1998). *South Africa: Limits to Change; The Political Economy of Transformation*. Cape Town: University of Cape Town Press .
- Marquard , A. (2006). *The Origins and Development of African Energy Policy*. Cape Town : Unpublished PhD Dissertation in Faculty of Engineering and Built Environment, University of Cape Town.
- Mbeki, T. (1998, April 9). The African Renaissance. Tokyo, Japan: United Nations University.
- McDonald, D. A. (2009). *Electric Capitalism: Recolonising Africa on the Power Grid*. Cape Town : HSRC Press.
- New24.com. (2000, 11 09). Retrieved from <https://www.news24.com/xArchive/Archive/Eskom-consortium-wins-stake-in-Telecom-Lesotho-20001109>
- Padayachee, V., & Van Niekerk, R. (2019). *Shadow of Liberation*. Johannesburg: Wits University Press.
- Posel, D. (2011).
- Posel, D. (2011). The apartheid project, 1948–1970. . In *The Cambridge History of South Africa, 2, 1885-1994*. (pp. 319-368). The apartheid project, 1948–1970. The Cambridge History of South Africa, 2, 1885-1994.
- Randall, D. J. (1996). Prospects for the Development of a Black Business Class in South Africa. *Journal of Modern African Studies* Vol 34 No.4, 661-686.
- Roberts, S. (1996). Monetary policy within macroeconomic policy: An appraisal in the context of Reconstruction and Development. *Transformation* 32, 64-78.
- Seekings , J. (1988, May). *Why was Soweto Different? Urban Development, Township Politics, and the Political Economy of Soweto, 1977-1984*. Retrieved from Wiredspace: <http://wiredspace.wits.ac.za/bitstream/handle/10539/9881/ISS-387.pdf?sequence=1&isAllowed=y>
- Terreblanche, S. (2002). *A History of Inequality in South Africa 1652-2002*. Pietermaritzburg: KwaZulu-Natal Press.
- Tewaria, D., & Shahb, T. (2003). An assessment of South African prepaid electricity experiment, lessons learned and their policy implications for developing countries. *Energy Policy* 31, 911-927.
- Veck, A. G. (2000). *The Politics of Power in an Economy in Transition: Eskom and the Electrification of South Africa. 1980-1995*. Johannesburg: Unpublished PhD Thesis, University of the Witwatersrand.
- Von Schnitzler, A. (2013). Traveling Technologies: Infrastructure, ethical regimes and the Materiality of Politics in South Africa. *Cultural Anthropology* 28(4), 670-693.