The Political Economy of the Renewable Electrical Energy Sector Within the Context of South Africa's Energy Transition

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Abstract

This research project explored the political economy of the renewable electrical energy sector within the context of South Africa's energy transition, focusing on the Integrated Resource Plan (IRP) and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The objective of this research project was to provide policy recommendations that would address the challenges within the renewable electrical energy sector and promote a *just* electrical energy transition.

Key findings in this research indicate that the political economy of the renewable electrical energy sector is shaped by the socio-political legacies of the Apartheid regime, namely, the Minerals-Energy Complex (MEC). With the MEC being underpinned by a set of relationships that prioritise coal-fired electricity- the renewable electrical energy sector is seemingly being suppressed to maintain the status quo thus limiting a just electrical energy transition. Moreover, the findings demonstrate the influential role of the MEC in the stalling of a *just* electrical energy transition. Additionally, the qualitative in-depth interviews revealed rich insights that shed light on the underlying mechanisms and contextual factors shaping the political economy of South Africa's renewable electrical energy sector.

The implications of these findings are twofold. Firstly, they contribute to the theoretical understanding of the political economy of South Africa's renewable electrical energy sector by confirming and expanding upon existing knowledge in the field. Secondly, they have practical implications for policymakers seeking to improve policy effectiveness and usher in a *just* electrical energy transition by addressing the identified factors.

Keywords: Political Economy, Mineral-Energy Complex, Renewable Electrical Energy, Socio-Technical Transition

SUPPLEMENTARY INFORMATION

Project format:	Research article
Nominated Journal:	New Political Economy
Supplementary files:	Semi-structured questionnaire
	Covering Letter
	Consistency matrix

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KEYWORDS

Climate Change

Electricity

Energy

Energy Access

Energy Intensive User Group

Energy Mix

Energy Politics

Energy Transition

Fossil Fuels

Green Economy

Mineral-Energy Complex

Political Economy

Renewable Electrical Energy

Socio-Technical Transition

South Africa

LIST OF ACRONYMS

DMRE	Department of Mineral Resources & Energy
DFFE	Department of Forestry, Fisheries, and the Environment
DPE	Department of Public Enterprises
DBSA	Development Bank of Southern Africa
IPP	Independent Power Producers
IRP	Integrated Resource Plan
MEC	Minerals-Energy Complex
MW	Megawatts
NERSA	National Energy Regulator of South Africa
NDP	National Development Plan
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
REFIT	Renewable Energy Feed-In Tariff

CHAPTER 1. INTRODUCTION

1.1 PURPOSE OF THE STUDY

This research project explored the political economy of the renewable electrical energy sector within the context of South Africa's energy transition, focusing on the Integrated Resource Plan (IRP) and the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). Moreover, the research project aimed to contribute towards the necessary conversations that underpin policy formulation for a *just* electrical energy transition. To achieve this, the research project has built an understanding of how the structure of the electrical energy sector and its political economy have impacted policy formulation in the renewable electrical energy sector. The intended audiences of the research project being academics, climate change and economic justice practitioners, and policy practitioners concerned with a political economy approach to policy formulation in relation to *just* socio-technical transitions.

1.2 CONTEXT OF THE STUDY

South Africa's electrical energy sector is characterised by a dominance of coal-based electricity generation, driven by the monopolistic State-owned energy provider, Eskom (Baker, Newell, & Phillips, 2014). As of 2018, coal accounted for 65% of total primary electrical energy supply, followed by renewables which accounted for only 11% of electrical energy supply (DMRE, 2021). Eskom is a vertically integrated electricity utility provider in South Africa which owns and operates diverse power stations. The power company produces approximately 91% of the country's electricity supply (DMRE, 2021). However, Eskom is no longer able to meet the country's electricity demand which has resulted in rolling blackouts since 2007. This has been attributed to the mismanagement of the utility provider, artificially low prices of electricity, low investment, and a maintenance backlog (Kessides, 2020).

The electrical energy sector was shaped by the socio-political and economic legacies of Apartheid which still impact the political economy of the electrical energy sector (Baker et al., 2014). Underpinning this, access to electricity in South Africa is inequitable based on race, with 43% of households being classified as energy poor in 2013 (DRME, 2013). Furthermore, the electrical energy sector can be described using a system of accumulation that emerged and was strengthened by policy in the times

of Apartheid known as the Minerals-Energy Complex (MEC), where key economic sectors shaped and continue to influence South Africa's industrialisation and economy (Rustomjee, 1993). The MEC was reinforced by and benefited from the artificially low prices of electricity. As such, South Africa's economy is dependent on energy intensive growth which translates into a dependence on abundant coal (DMRE, 2021). In 2018, 51% of the demand for energy (22% of this demand being electricity) was attributed to critical industrial sectors, such as: the chemical and petrochemical, iron and steel, and mining and quarrying industries (DMRE, 2021). The dependence on low-cost electricity is no longer viable following the implementation of electricity tariff hikes that have led to a 600%+ increase in electricity prices in the commercial and mining sectors between 2003 and 2021 (Eskom Holdings SOC Ltd, 2022).

Consequently, South Africa's National Development Plan 2030 (NDP 2030) was premised on an energy sector which can promote economic growth and development dividends, as such, this indicates a need for a policy shift towards significant investments into renewables (DMRE, 2022). According to the NDP 2030, the key infrastructure investments that would be prioritised include the procurement of at least 20 000 megawatts (MW) of renewable electricity by 2030, the decommissioning of ageing coal-fired power stations, and increased investments towards energy efficiency, which were stipulated in the IRP (National Planning Commission, 2011). The factors discussed above converged to redefine South Africa's energy path towards a low-carbon and diversified energy mix where renewables would be critical (Baker, 2017). To address these challenges, the government needs to increasingly build a green economy that will meet the electricity demand to produce economic development outcomes such as increased employment (National Planning Commission, 2011).

South Africa's renewable energy sector is dominated by wind power which accounts for 52% of the production within the sector, with photovoltaic power at 36% and concentrated solar power at 9% (DMRE, 2022). Over the past years, policy interest in low-carbon energy transitions gained traction globally. Within South Africa's renewable electricity sector, there were policy developments that aimed to develop the sector and industrialize the local green economy - most notably, the IRP and REIPPPP

(DMRE, 2022). The IRP was conceptualised as a living document that would deliver against the NDP 2030's objectives for the energy sector (DMRE, 2019). The IRP is an electricity infrastructure roadmap that was shaped by least cost supply and demand principles that also took sustainability of electricity supply and the environment into account (DMRE, 2022). The objective of this roadmap was to also facilitate a socially *just* energy transition as the country pursued a diversified energy mix (DMRE, 2022). As such, an important element of the IRP was the pursuit of a diversified energy mix to reduce the reliance on fossil fuels where renewable energy was seen as an opportunity to stimulate the green economy, while driving the diversification of the electricity mix (DMRE, 2019).

According to the Department of Mineral Resources and Energy (DRME), the REIPPPP is a competitive bidding process that was designed to add power to the electricity system through private sector investment in grid-connected renewable electrical energy (Eberhard & Naude, 2017). The key objective of the REIPPPP was to increase the supply of electricity while decreasing reliance on fossil fuels, develop the South African renewable electrical energy industry and drive economic development (DMRE, 2015). The REIPPPP process invites Independent Power Producers (IPPs) to submit bids for projects, where these bids must first meet minimum compliance requirements before they are evaluated on the economic developmental criteria and price (Eberhard & Naude, 2017). That considered, there were concerns that despite the success of the REIPPPP in delivering the generation of electricity, the programme may not have been able to deliver the socio-economic developmental dividends (Baker, 2017). Underpinning this, ownership patterns in the renewable electrical energy sector is characterised by large multinational corporations (Baker et al., 2014).

1.3 RESEARCH PROBLEM

South Africa's electrical energy sector, which is largely coal-based, is no longer economically or environmentally practical (Baker et al., 2014). As such, the South African Government has to embark on a *just* electrical energy transition to meet the electrical energy demand and reduce greenhouse gas emissions by increasing renewables in its electrical energy mix (National Planning Commission, 2011). This research project investigated how the structure of the electricity energy sector

contributed to the seeming failure to deliver its objectives on the back of its political economy.

1.4 RESEARCH OBJECTIVES

Having outlined the contextual problem, the objectives of the research study are defined below:

- Broaden the understanding of the political economy of South Africa's electrical energy sector and renewable electrical energy sector, by examining this topic within the scope of the IRP and REIPPPP.
- Understanding the impact of the renewable electrical energy sector vis-à-vis the goals outlined in the IRP and REIPPPP from the perspective of key stakeholders.
- Formulating electrical energy policy recommendations that will facilitate a *just* electrical energy transition, focusing on the IRP and REIPPPP.

1.5 RESEARCH QUESTION

The study will explore the following primary research question:

How has the political economy of the renewable electrical energy sector impacted the electrical energy transition in South Africa?

1.5.1 RESEARCH SUB-QUESTIONS

The secondary research sub-questions will be as follows:

- How do the developments in South Africa's electrical energy sector constitute a socio-technical transition?
- What are the positions and interests of the State and non-State actors in the electrical energy sector (including renewable electrical energy)?
- How was the emergence of a renewable electrical energy sector negotiated and operationalised, and who were the drivers or detractors of this emergence?

1.6 SIGNIFICANCE OF THE STUDY

This research project contributed to the broader understanding of the political economy of South Africa's renewable electrical energy sector and formulate policy recommendations intended to meet the NDP 2030 goals of energy security, a *just*

electrical energy transition, and equitable access to electricity. Furthermore, this research project contributed towards a theoretical framework to develop policy recommendations in the renewable electrical energy sector. This research project also contributed to the research gap in the political economy perspective in South Africa's current energy debate (Büscher, 2009). Moreover, this research project explored the MEC, which is widely cited in South African energy policy literature, in the context of an emergent renewable electrical energy sector where there is a dearth of MEC-renewable electrical energy analysis due to the renewables sector being in its nascent stages (Baker, 2012).

1.7 SCOPE AND DELIMITATIONS OF THE STUDY

The research project focused on the political economy of the renewable electrical energy sector. It covered the IRP, particularly the sections relating to electrical energy transitions, such as the policy guidance on energy mix. This study also focused on the requirements, bidding processes and operationalisation of the REIPPPP. A number of broad assumptions have been made in this research paper, concerning the conceptual standpoint towards the MEC. While no theory of the State and Industrialisation is explicitly adopted, it is generally viewed as being explained by the MEC. The objective of this paper is less concerned with confirming or rejecting specific theories, rather, it aims to discuss the political economy processes through which the renewable electrical energy sector operates.

1.8 DEFINITION OF CONCEPTS

- **Political Economy**: The definition of political economy has evolved over the course of history taking on different meanings (Weingast & Wittman, 2006). According to Weingast and Wittman (2008), political economy is a set of political science and economics methodologies that are used to analyse politics and institutions (Weingast & Wittman, 2006). Historically, it was defined as the study of the relationship between political incentives and economic policy (Alesina, Benhenda, Grobon, & Imberti, 2016). Currently, it is defined as the study of the relationship between economics and the broader social sciences (Alesina et al., 2016). Therefore, this study will use the current definition by

Alesina et al. (2016) as it is appropriate to building the understanding of the political economy of South Africa's renewable electrical energy sector.

- **Renewable Electrical Energy**: Electrical energy refers to energy that has been converted from electrical potential energy (BYJU'S, 2022). Renewable energy refers to energy sources that are produced from infinite or replenishable sources (Office of Energy Efficiency & Renewable Energy, 2022). As such, this study will define renewable electrical energy as electrical energy that has been generated from renewable energy sources (BYJU'S, 2022; Office of Energy Efficiency & Renewable Energy, 2022).
- ***Just* Electrical Energy Transition**: Energy transition refers to structural changes in the energy industry where there is a shift away from dominant fossil fuels as sources of energy to renewable sources of energy (Calery & Konisky, 2020; Baker et al., 2014). A *just transition* refers to a socio-technical transition that accounts for social, economic, and environmental justice during the displacement of the prevailing regime (Gambhir et al., 2018; Trade & Industrial Policy Strategies, 2021). As such, a *just* electrical energy transition in this study refers to a socio-technical transition in the electrical energy sector that is underpinned by social, economic, and environmental justice.

1.9 CHAPTER OUTLINE

- **Chapter 1: This chapter introduces the study by presenting the background and objectives of the study.**
- **Chapter 2: This chapter looks at the current literature within the scope of the study.**
- **Chapter 3: This chapter is on the research design, research methodology, the research objectives, research questions, population, and sampling together with data collection instruments and data analysis.**
- **Chapter 4: This chapter will be a presentation of an analysis of developments in South Africa's electrical energy sector.**
- **Chapter 5: This chapter will present the application of the Political Economy approach to understand positions and interests in South Africa's electrical energy sector.**

- **Chapter 6: This chapter will present the application of a Multi criteria decision framework to determine policy recommendations.**
- **Chapter 7: This chapter concludes the study.**

CHAPTER 2. LITERATURE REVIEW

2.1 INTRODUCTION

The purpose of this section is to gain an understanding of the existing research and prevailing debates around the political economy of South Africa's electrical energy sector, renewable electrical energy sector and the effectiveness of renewable energy policies. South Africa's political economy dovetails with the political economy of the electrical energy sector as the South African economy is underpinned by a reliance on electricity. Consequently, the political economy of the electrical energy sector, much like the overall political economy, is shaped by the socio-political legacies of the Apartheid regime. As South Africa charters an energy path towards renewable energy and a green economy, a *just* transition has become a key policy objective. It is therefore necessary to dissect the political economy of the renewable electrical energy sector to understand how to bring about a *just* transition together with an inclusive green economy. The literature review section has been divided into nine sections, namely: energy transitions; the Minerals-Energy Complex; the political economy; South Africa's political economy; political economy of electrical energy sector; political economy of renewable electrical energy sector; Electricity Policy Formulation, policy fissures and the effectiveness of renewable electrical energy policies in South Africa, and lastly, the theoretical framework.

2.2 ENERGY TRANSITIONS

As defined in section 1.8, energy transition refers to structural changes in the energy industry where there is a shift away from dominant fossil fuels as sources of energy to renewable sources of energy (Calery & Konisky, 2020; Baker et al., 2014). Essentially, energy transitions are a socio-technical processes that shape the changes in extraction, transportation, use and disposal of energy (Mulvaney, 2020). Underlying these processes are environmental deterioration, the exploitation of labour and inequality with regards to access to energy/impact of environmental deterioration (Mulvaney, 2020). As such, a *just transition* refers to a socio-technical transition that accounts for social, economic, and environmental justice during the displacement of the prevailing regime (Gambhir et al., 2018; Trade & Industrial Policy Strategies, 2021). The study of just transitions is framed by the application of social, economic, and environmental justice principles to decarbonization policies (Mulvaney, 2020).

A key question in energy transition literature is centered on how to transform economies and societies to follow a low carbon path (Mulvaney, 2020). The first debate that stems from this question is how energy systems should be organized: distributed versus centralized generation (Mulvaney, 2020). The axis of this debate speaks to energy system ownership models, where a distributed system would be characterised by community ownership and interconnected yet operationally independent energy systems (Mulvaney, 2020). Currently, the dominant structure is centralised generation which raises a question around the political and technological implications of distributed energy systems (Mulvaney, 2020). As such, energy transitions are inherently political and are influenced by the dominant political economy – shaping the scale, design and pace of the transition (Mulvaney, 2020).

Globally, there is an ongoing energy transition focused on decarbonising the global energy system (Fiorino, 2022a). The energy transition is necessary to stymie the proliferation of climate change as a substantial proportion of greenhouse gas emissions (which cause climate change) are accounted for by the energy system (Fiorino,2022b). This energy transition remains slow and challenging due to the complicated political processes that underpin policy formulation, co-ordination, and implementation (Fiorino, 2022a). This is mainly driven by relationship between energy systems and economic growth- where fossil fuels have been an underlying driver of economic growth (Fiorino,2022b). South Africa's economy is dependent on coal-generated energy, where this coal-based energy system has proven to be vulnerable and faces headwinds as the economic costs of continued coal use mount (Vogel & Swilling, 2019). With that said, low-carbon technologies have become economically viable alternatives and energy policy in South Africa is increasingly creating a conducive environment for the adoption of these technologies (Vogel & Swilling, 2019). As such, South Africa is well poised to embark on an energy transition, however, the proliferation of the Minerals-Energy Complex (MEC) poses the risk of carbon lock-in (Vogel & Swilling, 2019; Mohamed, 2019). Where the carbon lock-in is underpinned by the physical infrastructure, institutional infrastructure, socio-economic relationships, sunk costs, investments and distribution of political power that exist within the MEC (Fiorino,2022b). Consequently, the politics of carbon lock-in are a significant barrier to change (Fiorino,2022b).

2.3 THE MINERALS-ENERGY COMPLEX

The Minerals-Energy Complex (MEC) has been used to detail the industrialisation of South Africa's economy, moreover, it has been described as the core of the capitalist accumulation within South Africa's economy that determines the patterns of industrialisation within the broader economy (Fine & Rustomjee, 1996). The MEC dominates the South African economy as it has forward linkages with the rest of the economy, however, backward linkages to the MEC are relatively weak or do not exist (Fine & Rustomjee, 1996). Essentially, it is an account of the strong linkages between the mining, energy, financial and manufacturing sectors related to mining sectors (Rustomjee, 1993). Underpinned by a set of relationships held by the Coal Lobby, the State, Eskom, and the Axes of Capital (Mining, Financial and Manufacturing sectors) (Macdonald,2009). A key linkage in the MEC is between electricity and mining - where a significant proportion of the electricity generated goes into supporting mining and a large proportion of the electricity is generated from coal - a product of mining (Froestad, Nøkleberg, Shearing, & Trollip, 2018). This system of accumulation emerged and was institutionalised during Apartheid, it is underpinned by cheap electricity and cheap labour (Froestad et al., 2018). As such, the MEC can also be viewed as an account of South Africa's political economy.

2.4 THE POLITICAL ECONOMY

The political economy can be viewed as the study of the relationships between economics and politics, moreover, it can be viewed as methodological approach (Weingast & Wittman, 2006; Clark, 2016; Jakob & Steckel, 2022). Political economy helps bring an understanding of how the structure of the economy, politics and institutions shape the outcome of policy (Jakob & Steckel, 2022; Clark, 2016). Moreover, as a methodological approach it is applied in the study of economics when analysing politics and institutions (Weingast & Wittman, 2006; Clark, 2016). With that said, there is no unified methodological approach as politics and institutions are also areas of study where economics can also become the subject of analysis, as such, a set of methodological approaches from economics, politics and institutions is applied (Weingast & Wittman, 2006; Clark, 2016). The usefulness of the political economy as an approach is its ability to investigate institutions, including the State, as variables (Weingast & Wittman, 2006; Clark, 2016; Jakob & Steckel, 2022). Consequently, the

MEC presents a relevant political economy methodological approach which can be used to describe the relationship between politics and economics through the analysis of the relationship between the four institutions: the Coal Lobby, the State, Eskom and the Axes of Capital.

2.5 SOUTH AFRICA'S POLITICAL ECONOMY

South Africa's current political economy is underpinned by the socio-economic legacies of Apartheid, despite fundamental reforms to replace racialised criteria with market principles, structural inequalities along race lines are still entrenched in economic outcomes (Stadler, 2023a). These reforms are underpinned by neoliberal capitalist ideology (Stadler, 2023a). White people account for the largest proportion of wealth, income, access to economic opportunities and education (Stadler, 2023b). Comparatively, the prevailing labour sector, which constitutes a majority of Black people, is an extension of the labour sector that was prevalent during Apartheid (Stadler, 2023b). As such, these reforms have sustained a large pool of cheap Black labour to maintain the system of accumulation described as the MEC (Fine & Rustomjee, 1996; Baker et al., 2014; Froestad et al., 2018). These reforms have worked to benefit the MEC and the upward mobility of the black political elite while the economic realities of a majority of the country remain unchanged (Baker, 2017; McDonald, 2009; Stadler, 2023a).

2.6 POLITICAL ECONOMY OF ELECTRICAL ENERGY SECTOR

South Africa's electrical energy debate is characterised by two core objectives - universal electrical energy access and the sustainability of the electrical energy sector from an environmental and economic lens (Büscher, 2009). Universal electrical energy access is a key political goal, intended to address the inequitable access to electrical energy, which is also a key objective for the DMRE (Büscher, 2009). The second objective is largely concerned with the impact of South Africa's coal-generated electricity dependent economy on the environment, with the aim being to transition to cleaner electrical energy sources while promoting economic growth (Büscher, 2009). At the centre of this debate lies the MEC, which links both aspects of the electrical energy debate to give a foundation on which to discuss the political economy of South Africa's renewable electrical energy sector. According to Büscher (2009), the starting point to conceptualising the Political Economy of South Africa's electrical energy

sector is the critique of the neoliberal capitalist ideology that is dominant in electrical energy policymaking. The author emphasised that the importance of this starting point was linked to the role of electrical energy in capitalist production and how this relationship shaped the political economy, which then linked back to the MEC framework (Büscher, 2009). Rustomjee (1993) described the MEC as a system of accumulation embedded in South Africa's economy that shaped the pattern of industrialisation (thus policymaking), with its mechanism being key economic sectors (Rustomjee,1993). The MEC is essentially a market distortion underpinned by institutional power that has had a profound effect on South Africa's economy – particularly on non-MEC linked economic sectors that have been disadvantaged by the artificial comparative advantage of the MEC (Rustomjee, 1993). The MEC was developed on the back of interlinkages between the South African Apartheid State, English and Afrikaner capital to operationalise racial capitalism through the use of exploited black labour and cheap energy, all done to unevenly distribute the mineral wealth of South Africa to a white minority (Büscher, 2009; Rustomjee, 1993). The advent of the MEC brought about a conglomerate corporate structure across the private and public sector, it also brought about financialization- cutting across these key economic sectors (Rustomjee, 1993). Post-apartheid, the MEC had expanded beyond the initial key economic sectors to an economy-wide process of commodification and financialization under a neoliberal political-economy ideology that was supported by the State (Büscher, 2009; Baker, 2017). This evolution also includes the ascendance of a Black industrial and financial class that benefitted from the MEC (Baker, 2017). As such, the interests of capital took precedence over the two core objectives that define the energy debate in South Africa, which is a contradiction to the goals and mandates of energy policymakers (Bode, 2013). What this assertion then highlights is that the political economy of South Africa's energy sector is fundamentally positioned against the eradication of class inequality (as it is dependent on a permanent underclass for cheap labour) and is also against the development of a renewables sector that can bring about the desired developmental dividends (Büscher, 2009).

2.7 POLITICAL ECONOMY OF RENEWABLE ELECTRICAL ENERGY SECTOR

The convergence of pressure towards developing a renewable electrical energy sector presents a challenge to the MEC's structure and Eskom's social licence to operate (Bode, 2013). The intrinsic structure of the renewable electrical energy sector is one that is decentralised, where ownership, operation and economic interests can lend themselves to socio-economic equality - where communities are the stalwarts of their own electrical energy generation and consumption (Bode, 2013). The MEC structure is contradictory to this composition, which is indicative of a misalignment of interests between the dominant electrical energy sector and the nascent renewables energy sector. Despite Eskom being a State-owned enterprise (SOE), it operates on the neoliberal principles where it prioritises the MEC and profitability as opposed to traditional public sector operational principles such as meeting the basic needs of ordinary citizens, which puts its social licence to operate into question (Büscher, 2009; Bode, 2013). These operating principles have been legitimised by the State through the Eskom Conversion Act (2001), which adapted Eskom into a public company (Baker, 2017). Furthermore, Eskom generates a sizable proportion of its electricity using coal, which makes the organisation one of the largest polluters on the continent and further puts its environmental licence to operate into question (Bode, 2013). In addition to this, Eskom (and by extension, the MEC) is the core customer of the renewable electricity energy sector and it operates the grid into which renewable electrical energy is fed into (Baker, 2017). The political economy of the renewable electrical energy sector is the political economy of the overall electrical energy sector, with the nuance of the renewable electrical energy sector's structure being a challenger to the status quo (Baker, 2017).

2.8 ELECTRICITY POLICY FORMULATION

It has been suggested that electricity policy formulation in South Africa is inherently political (Baker, 2016). Underpinned by the policy formulation of the 2010 IRP, which came under public scrutiny for the lack of transparency and overrepresentation of groups with vested interests in coal. This was interpreted as a failure to uphold laws on public participation such as the *Protection of Administrative Justice Act 3 of 2000* (Baker, 2016). A key observation that was made about electricity policy formulation is that even technical exercises within the process were political, as players with vested

interests in coal were embedded in that part of the policy formulation (Baker, 2016). All this together is again indicative of the MEC's influence on electricity policy formulation.

Governance of South Africa's electricity sector is held by various State players (Baker, 2017); the key stakeholder being the DMRE where the Minister of Energy holds the seat of power – the department is responsible for setting the energy policy, which is inclusive of the electricity policy (Baker, 2011). The Department of Public Enterprises (DPE), National Treasury and the National Energy Regulator of South Africa (NERSA) are also key players in the electricity policy formulation based on their mandates with regards to Eskom - where the DoE and NERSA report to the Minister of Energy (Baker, 2017). Furthermore, the Department of Forestry, Fisheries, and the Environment (DFFE) and municipalities are also involved in the policy formulation (Baker, 2017).

With that said, informal channels of electricity policy formulation undertaken by different players, sanctioned by the DoE, continue to persist (Baker, 2017). For example, Eskom undertakes electricity planning for the DoE (Baker, 2017). Furthermore, the Independent Power Procurement (IPP) unit, which was setup by the National Treasury, runs the REIPPPP on behalf of the DoE (Baker, 2017). Moreover, Eskom led the development of the IRP, with inputs from a government based technical task-team, coal firms and energy-intensive users, which is also indicative of the informal influence from these non-State players (Baker, 2011). Other key players include foreign donors, particularly those from Denmark and Germany (Baker, 2011). Development finance institutions including the World Bank together with the Development Bank of South Africa are also notable players, including investors in IPPs (Baker, 2011).

2.9 POLICY FISSURES AND THE EFFECTIVENESS OF RENEWABLE ELECTRICAL ENERGY POLICIES IN SOUTH AFRICA

The effectiveness of South Africa's renewable electrical energy policies has largely been impacted by the prevailing political economy within the electrical energy sector and the lack of policy coordination across key government departments (Morris & Martin, 2015). Despite meaningful outcomes that were produced by renewable energy policies, particularly the REIPPPP, effectiveness remained low due to a failure to maximise on the policy's impact (Morris et al., 2020). As discussed in the previous

section, the structure and political economy of the electrical energy sector undermines the effectiveness of renewable electrical energy policies. To understand how this outcome has come about, there is a need to build comprehension on the negotiating process of conceptualising and operationalising the IRP and the REIPPPP (Baker, 2017). Historically, electricity policy formulation has been a challenging process for the DMRE, as the process has been underpinned by union resistance, tensions between key State decision makers in the energy sector, loss of institutional knowledge due to 'white- flight' and a low appetite for generating new capacity on the back of surplus generation capacity (Baker, 2017). Consequently, due to this institutional weakness within the DMRE, electricity policy formulation and the mandates of the DMRE have been influenced and implemented by external stakeholders (Baker, 2017). For example, the engagement process for the IRP 2010 was protracted and was eventually compiled by Eskom with inputs from the stalwarts of the MEC, excluding the renewable electrical energy sector and civil society (Baker, 2017). This then resulted in a lack of transparency with respect to the formulation of the IRP 2010 (Baker, 2017). Unsurprisingly, the IRP firmly entrenched South Africa's electrical energy path on coal generated electricity, which is also was indicative of the advancement of the MEC's interests in policymaking that ultimately undermined the effectiveness of renewable electrical energy policies (Baker, 2017).

Moreover, the REIPPPP was initially conceptualised as the renewable energy feed-in tariff (REFIT) by individuals at NERSA with the support of bilateral donors and individuals within the National Treasury and DFFE (Baker, 2017). REFIT was introduced with the objective of catalysing the development of a renewable electrical energy sector to generate new capacity (Baker, 2017). This development faced resistance from within NERSA, the DMRE and Eskom (Baker, 2017). Although the REFIT never got off the ground in its initial form, the push by the DMRE and the Public-Private Partnership (PPP) unit at the National Treasury circumvented this opposition through the transference of power away from NERSA, thus facilitating the emergence of the REIPPPP (Baker, 2017). Post the conceptualisation and implementation of the REIPPPP, a process of political stalling that occurred in 2015, which derailed and reversed the localisation gains within the green industries (Morris et al., 2020). The negotiation process to bring about the REIPPPP and political interference in its

implementation gave a look into how the structure of the electrical energy sector and its political economy were poised to prevent the delivery of the objectives of renewable electrical energy policies.

Furthermore, the lack of a supportive industrialisation policy framework in relation to green industries and policy coordination across key players has further undermined the effectiveness of renewable energy policies (Morris et al., 2020). For example, the low reference to green industries in Industrial Policy Action Plans (IPAP), which are owned by the Department of Trade, Industry and Competition (DTIC), is indicative of South Africa's industrialisation path being unprepared for green economy industrialisation (Morris et al., 2020). Moreover, the lack of policy coordination between the National Development Path, IPAPs and the New Growth Path (NGP) is further indicative of an industrialisation path not positioned to bring about a localised green economy (Morris et al., 2020).

2.10 THEORETICAL FRAMEWORK

This section relates to the theoretical framework that will be applied to effectively answer the research question and prioritise policy recommendations (see Figure 1). Figure one is a conceptual diagram of the theoretical framework where the political economy approach will be underpinned using the MEC and the Political Economy Analysis of Climate Change Policies (P.E.A.C.H)methodology as analytical frameworks. Moreover, the MCDM will be used to rank policy recommendations leveraging the energy trilemma as criteria to rank the policy recommendations. The energy trilemma refers to three pillars: energy security, energy equity and environmental sustainability. Energy security refers to the ability to meet current and future electricity demands, moreover, it also refers to the reliability of energy infrastructures (World Energy Council, 2022). Energy equity refers to the ability to provide basic universal access to affordable electricity to meet residential and commercial needs adequately, this provision must promote socio-economic improvements and economic growth (World Energy Council, 2022). Energy sustainability, which refers to the transition of electrical energy systems to clean sources in order to reduce environmental damage, moreover, this metric also refers to more efficient electrical systems with minimised generation, distribution, and transmission losses (World Energy Council, 2022). It is important that the target

audience of this research paper is able to use the policy recommendations and recognise the benefits of these recommendations. The evaluation and recommendation of policies require analytical tools that enable the description and evaluation of the policy's dimensions while incorporating the value judgements of various key stakeholders (Greening & Bernow, 2004). Additionally, these analytical tools should enable the determination of the importance and relevance of these dimensions in a consistent manner with reducing alternatives to a common benchmark (Greening & Bernow, 2004).

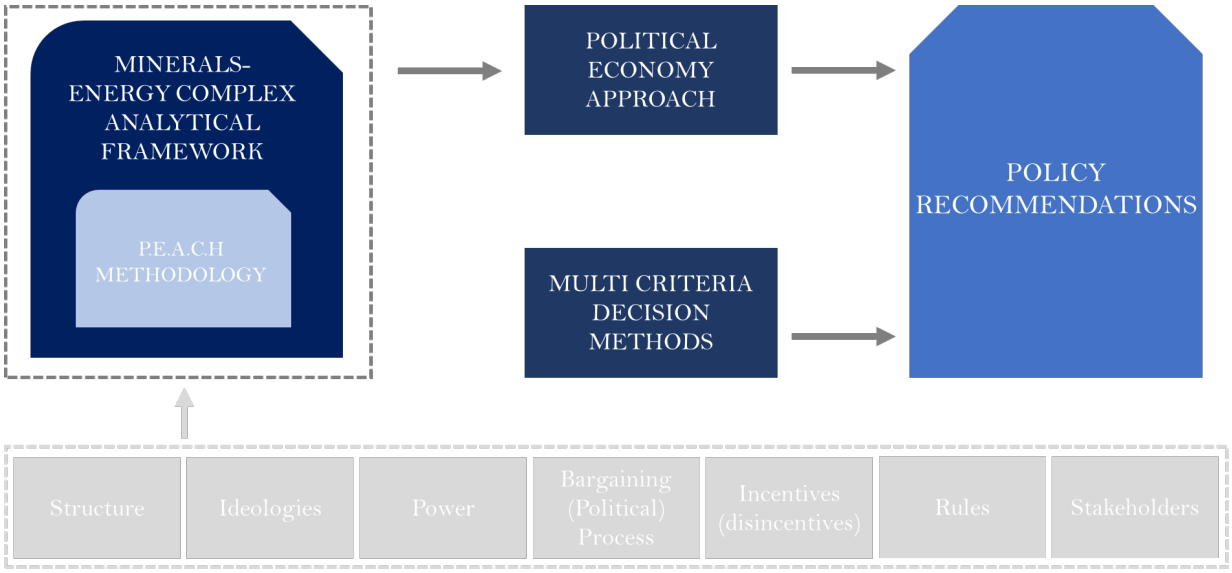

FIGURE 1: THEORETICAL FRAMEWORK

Source: Author's own illustrations

2.7.1 MINERALS-ENERGY COMPLEX

The MEC, as a concept, can also be applied as an analysis tool to explain the process of industrialisation in South Africa (Rustomjee, 1993). In this research study, the MEC framework will be used to analyse the industrialisation of the green economy in relation to the renewable electrical energy sector. Furthermore, it will help build the understanding of the impact of the neo liberalisation of the South African economy on the renewable electrical energy sector's ability to bring about an inclusive green economy. Moreover, this analytical framework will help ascertain the positions and interests of key players within the MEC with regards to the emergence of an equitable

renewable electrical energy sector. A key critique of the MEC comes from Bell & Farrell (1997), where they highlight the lack of statistical or historical evidence to support the assertion that the MEC essentially shaped industrialisation in South Africa (Bell & Farrell, 1997). Consequently, the authors go on to postulate that Fine and Rustomjee (1996) fail to establish the MEC as a system of accumulation that explains industrialisation patterns in South Africa by relying on semantics and misleading statistical evidence (Bell & Farrell, 1997). Bell & Farrell (1997) argue that industrialisation in South Africa has followed a path not influenced by the MEC- thus an optimal industrialisation path that is underpinned by expected economic diversification (Bell & Farrell, 1997). Fine & Rustomjee's (1998) rebuttal focuses on epistomological differences in defining the MEC where Bell & Farrell lean into instrumentalism leading to an apolitical definition of the MEC (Fine & Rustomjee, 1998). As such, according to Fine and Rustomjee (1998) this critique fails to disqualify the MEC as a system of accumulation (Fine & Rustomjee, 1998).

2.7.2 P.E.A.C.H METHODOLOGY

The Political Economy Analysis of Climate Change Policies (P.E.A.C.H) methodology was developed for the P.E.A.C.H project by the Institute of Development Studies (IDS) (Morris & Martin, 2015). The P.E.A.C.H methodology aims to answer the question, "Who drives/obstructs climate change policies in the rising powers?" by mapping stakeholder objectives in a power matrix (according to the level of influence in policy formulation and implementation) during transformation (Schmitz, 2012). This analytical framework will facilitate the extraction of insights into the impact of the political economy of the electrical energy sector on the deployment of the IRP and the REIPPPP by laying out the position and interests of State and non-State actors in the electrical energy sector.

2.7.3 MULTI CRITERIA DECISION METHODS

The application of multi-criteria decision methods (MCDM) can facilitate the identification of non-dominated alternatives in complex policy problems (Greening & Bernow, 2004). MCDM facilitates the selection of best alternatives where there are multiple decision criteria through the process of analysing the scope of each criterion, informing weights attributed to decision criteria, and then facilitating the selection of optimal alternatives using MCDM techniques (Aruldoss, Lakshmi, & Venkatesan,

2013). MCDM consists of various widely used methods, and as such, a mixed methods approach is taken to create a comprehensive decision support framework (Velasquez & Hester, 2013). These methods range from simple to complex approaches with varying input requirements (Greening & Bernow, 2004). MCDM will be suitable for this study, as methods will be useful in assessing existing policies and shaping appropriate policy recommendations as these tools are well positioned to overcome the challenges of analysis and best poised for the selection of best alternatives where key dimensions of policies are public goods without an established market value (Greening & Bernow, 2004).

2.7.4 MULTI-LEVEL PERSPECTIVE

The multi-level perspective (MLP) is a theoretical framework that examines fundamental changes in critical systems in the context of addressing sustainability (Geels, 2019). As such, the MLP is a well-suited theoretical framework for describing socio-technical transitions such as energy transitions (Geels, 2019). The MLP is commonly used as a core framework in sustainability research to analyse sustainable technologies and innovations (Geels, 2019). Additionally, the framework is able to codify the manner in which technological and political change is rooted in and influenced by broader processes and stakeholders facilitating multi-dimensional analysis of how socio-technical transitions are catalysed, by recognising the critical interaction between influences at the landscape, regime, and niche levels (Baker et al., 2014). However, the MLP focuses on provisioning systems and does not address distribution systems that speak to *just* energy transitions, which would limit the framework's ability to analyse the political economy of South Africa's energy transition and assess the socio-economic impact of renewable electrical energy policies (Geels, 2019).

2.7.5 TRANSITION MANAGEMENT

The transition management (TM) framework is a theoretical framework with a dual function, it is used to understand and initiate fundamental changes in social systema (Stephens & Graham, 2010). As such, TM is used for both descriptive and prescriptive processes (Stephens & Graham, 2010). The TM framework is used as an analytic tool to capture insights from socio-technical transitions literature on how to catalyse this change then recommend interventions that would trigger a transition by engaging

stakeholders using a bottom-up approach (Meadowcroft, 2009). As such, TM does not adequately consider key decision makers and stakeholders such as the government and firms. This approach would not be suitable for this study as South Africa's electrical energy sector is characterised by the relationship between industry's dependence on low-cost electricity and the economy (MEC) (Baker et al., 2014). Furthermore, a considerable proportion of socio-technical transitions literature is predicated on the experiences of the Global North, which then presents a credibility issue around the relevance of the insights gathered to South Africa's context (Baker et al., 2014).

2.8 CONCLUSION

The literature review for this research study indicates that the political economy of the electrical energy sector, including the renewable electrical energy sector, does not provide a supportive framework for a *just* energy transition. The vested interests of the MEC are positioning South Africa's energy path towards a high carbon future by locking in the generation of electricity using coal. Furthermore, political interference and policy fissures across key government departments are undermining efforts toward a *just* electrical energy transition and the industrialisation of a green economy that can pay developmental dividends. In this research report, the MEC analytical framework and the Political Economy Analysis of Climate Change Policies methodology were chosen to undertake the political economy analysis. Moreover, the multi criteria decision methods were selected to support the development of policy recommendations.

CHAPTER 3. RESEARCH METHODOLOGY

This section will present the methods and procedures that were employed in the collection and analysis of data. Below, the research methodology will be discussed by describing the research approach, research tools, sampling, data analysis and the validity of the research.

3.1 RESEARCH APPROACH

This research study used a qualitative research approach, undertaking a critical qualitative approach to understand the political economy of South Africa's renewable electrical energy sector. Merriam (2002) suggests that qualitative research is useful when attempting to study the socio-political elements of a specific phenomenon. Additionally, a qualitative study is useful in delineating processes to understand how the phenomenon occurs, this will be useful in investigating the political economy of the renewable electrical energy sector (Merriam, 2002). The study also made use of a critical research approach. This approach is useful in that it focuses on context, such as social structures, to frame the understanding of how power relations play out to produce the phenomena being investigated (Merriam, 2002).

3.2 DATA COLLECTION METHODS

In this study, both primary and secondary data was used to answer the research question. Primary data was collected using semi-structured interviews. These interviews were conducted with the identified target group, with no limitation on geographic scope. The same interviews were undertaken face-to-face, on video calls and telephonically to overcome geographical constraints. Secondary data was collected through the document analysis of national policy documents, GMRE annual reports, existing literature on South Africa's electrical energy sector, and industry reports on the electrical energy sector.

3.3 POPULATION AND SAMPLE

For this study, purposive sampling was used to ensure that the selected interviewees are the correct sample from which key learnings about the political economy of the renewable electric energy sector can be gathered. Purposive sampling is a type of non-probability sampling whereby the researcher uses their discretion to select respondents for a study based on the qualities the respondent possesses (Alchemer,

2021; Etikan, Sulaiman Abubakar, & Alkassim, 2016). This sampling method is non-randomised and is not underpinned by an underlying theoretical framework or set number of participants (Etikan et al., 2016). It is a method most appropriate for qualitative research studies where the researcher identifies individuals that are well versed in the research topic and are willing to participate (Andrade, 2021). In this paper, expert sampling was used, where the researcher purposefully reached out to experts on the research topic to extract insights on the phenomena being studied (Etikan et al., 2016). With that said, the purposive sampling method does limit external validity (Andrade, 2021). Therefore, the criterion for interviewees was that they should be key stakeholders in the renewable electric energy sector. The recruitment process of respondents from the target population was inclusive. Respondents were 18 years of age and older and also fell under the description of the target groups below.

- **National government agencies and State-owned enterprises officials**: Responsible for the setting and implementation of electrical energy policy, particularly the IRP and REIPPP.
- **Members of the Intense Energy User Group South Africa**: The largest consumers of electrical energy and key stakeholders in informing electrical energy policy.
- **Renewable Electrical Energy Industry (private sector)**: Key players in the renewable electrical energy industry and have interfaced with the REIPPPP process.
- **Financiers (banks, donors, and private investors)**: Responsible for the flow of investment into the renewable electrical energy sector.
- **Academics**: Respondents include economics, energy, and policy practitioners.
- **Civil society**: Respondents include community activists in the renewable electrical energy space.

3.4 PROCEDURES FOR DATA COLLECTION

3.4.1 SEMI- STRUCTURED INTERVIEWS

Semi-structured interviews were used as the main data collection method. Semi-structured interviews are a combination of structured and unstructured interviews where structured interviews are characterised by predetermined specific questions in a specific order, while unstructured interviews have neither (Merriam, 2002). Structured interviews are similar to quantitative questionnaires as they limit responses to the predetermined structure of the interview, often producing quantitative data (Brinkmann, 2014). Unstructured interviews are undertaken together with the collection of observational data and limit the interviewer from leading the discussion (DiCicco-Bloom & Crabtree, 2006). Therefore, the semi-structured interview was the most appropriate research instrument for this research as it allowed for the interviewer to focus the interview on the research questions and included emerging themes relevant to the research (Brinkmann, 2014). The structured part of the interview was set up to ensure the collection of specific information relevant to the study by guiding the exploration of issues that relate to the research questions, usually characterised by open-ended questions that are determined prior to the interview (Merriam, 2002). The unstructured part of the interview is the set of questions that emerge from the conversation between the interviewer and interviewee (DiCicco-Bloom & Crabtree, 2006). As part of this study, 30 interviews were run with a dedicated section in the interview guide for each targeted sample group to ensure the exploration of specific themes relating to these groups. Interviews were recorded with a digital recorder for in-person and telephonic interviews, and embedded recording technology for video calls. Post these interviews, the interviewer transcribed the interviews. Interviews were on average between 45 - 60 minutes. The in-person interviews were conducted in a secluded location for confidentiality, and the respondent selected the location with which they were most comfortable.

3.4.2 DOCUMENT ANALYSIS

Document analysis is the process of evaluating printed and digital documents for the purposes of gaining data to produce knowledge (Bowen, 2009). It is useful in that documents related to the research exist outside of the influence of the researcher, strengthening the validity of the findings (Merriam, 2002). Document analysis enables

the corroboration and verification of findings from the primary data collection method as a means of triangulation (Bowen, 2009). Furthermore, document analysis provides context in relation to the study and data collected from interviews (Bowen, 2009). The data obtained from document analysis can also inform the research instrument-complementing the semi-structured interviews (Bowen, 2009). In this study, content and thematic analysis approaches were undertaken in relation to the research question. Document analysis was particularly helpful in identifying developments in the political economy of South Africa's electrical energy sector through the analysis of policy documents and periodic reports over an extended period. With that said, documents are often produced without a research agenda and may be limited in answering research questions (Bowen, 2009).

3.5 DATA ANALYSIS AND INTERPRETATION

The study made use of the thematic data analysis method, which is a commonly used method in qualitative data analysis where themes are identified in the data (Terry, Nikki, Clarke, & Braun, 2017). Thematic analysis is useful in that it has theoretical flexibility, not bounded by epistemological or ontological frameworks (Terry, Nikki, Clarke, & Braun, 2017). This data analysis method was useful across the data collection methods employed in this study. The study undertook an inductive approach to thematic analysis, using the data to identify themes, then developed them as an interpretive framework for the data. Moreover, the thematic analysis was undertaken manually. The data analysis explored developments in South Africa's electrical energy sector; policy formulation and integration processes; political processes; ideological schisms in the electrical energy sector, and the MEC's response to an the evolution of the electrical energy sector.

The first step was familiarisation with the data during the data collection phase, this was then followed by the generation of codes that prepared for the coding and analysis of the data. Familiarisation with the data is a key step in the data analysis process as it enables the reflection on and interrogation of the data while making top line observations (Terry, Nikki, Clarke, & Braun, 2017). Following this step, codes were then generated through the systematic segmentation and labelling of the data in relation to the research question (Terry, Nikki, Clarke, & Braun, 2017). As a third step,

the construction of themes followed, which is a process of analysing codes and organising (combining or collapsing) them into meaningful patterns (Terry, Nikki, Clarke, & Braun, 2017).

3.6 LIMITATIONS OF THE STUDY

Qualitative research methodology can be time and resource intensive, resulting in the study being limited by timelines. A key challenge being time constraints on fieldwork and data analysis. Undertaking purposive sampling may overcome this challenge as this non-probability sampling method will allow the researcher adequate time to conduct fieldwork and analyse data within the timelines specified by the university.

Additionally, the study did not have geographical limitations, as such, this presented a challenge in conducting face-to-face interviews due to time and budget constraints associated with travelling. Furthermore, due to the covid-19 pandemic, meeting respondents face-to-face proved difficult due to apprehension towards in-person interviews. Although face-to-face interviews could have provided a wealth of information and insights, suitable alternative mediums were used where in-person interviews were not possible- such as video calls telephonic interviews, and correspondence via email.

3.7 VALIDITY AND RELIABILITY

The concept of validity in qualitative research refers to the truthfulness of the results (Golafshani, 2003). Reliability in qualitative research refers to the trustworthiness of the research, as such, the replicability of the observations (Golafshani, 2003). A key strategy for improving both validity and reliability is triangulation (Golafshani, 2003). In this study, combined methods were used to collect data as a means of triangulation. The primary method of data collection were semi-structured interviews supported by a literature review and document analysis. In this study, multiple methods of data collection were used to bolster the validity and reliability of the findings.

3.8 ETHICAL CONSIDERATIONS

This research was guided by the commonly recognised research norms. The researcher did not treat all collected data as raw data, as such, the researcher did not tamper with or misrepresent the data. The researcher disclosed their identity and fully explained the nature of the research to respondents to ensure that respondents are

not misled or deceived. The respondents were required to sign a consent form so that the researcher obtained their permission to use the information gathered from the interviews in the research. Respondents were informed that they are free to withdraw from the research at any stage. Furthermore, respondents were informed that participation is voluntary and there are no incentives provided for participating in the research. The researcher ensured that the contributions of respondents to the research are acknowledged.

The researcher ensured that they reduced the risk of unanticipated harm to the respondents, as such, the researcher prepared to provide moral support and referral to professional help should the interview create undue stress (DiCicco-Bloom & Crabtree, 2006). The researcher maintained the anonymity of the interviewees in relation to the information provided. Due to hierarchical relationships between interviewees and conflicts of interests between institutions identified in the sample, it was vital to ensure that the respondents were protected from any repercussions that may arise from participating in the research. Respondents were informed that confidentiality was to be maintained throughout the research process. As such, in addressing this concern, respondents signed confidentiality forms. Data gathered from the interview recordings and transcript was stored in a dedicated password protected external drive, only known to the researcher where the data is to be archived for five years.

This study was evaluated by the relevant ethics committee within the Wits School of Business to ensure it met the required ethical considerations. The researcher then obtained ethical clearance from the University of the Witwatersrand before undertaking the research.

CHAPTER 4: ANALYSING DEVELOPMENTS IN SOUTH AFRICA'S ELECTRICAL ENERGY SECTOR

This chapter will answer the first sub-research question, "*Do the developments in South Africa's electrical energy sector constitute a socio-technical transition?*" Across the breadth of respondents, it is agreed that the developments in South Africa's electrical energy sector constitute a transition (Baker et al., 2014; interviews[1]). However, there was a diversity of views on the factors driving the transition, the pace of the transition, and whether the transition was *just*. A general observation being that State actors interviewed for this research project held the view that the electrical energy transition is driven by policymaking, at an expected speed, and meeting the qualification of a *just* electrical energy transition (interviews[2]). Comparatively, non-State actors held the view that the advent of load shedding triggered a transition out of necessity, the speed of the transition could be significantly faster, and that the transition was not truly *just* (Morris et al., 2020; interviews[3]).

4.1 FACTORS DRIVING SOUTH AFRICA'S ELECTRICAL ENERGY TRANSITION

There were many factors that were cited as the drivers of South Africa's electrical energy transition. A key factor that was mentioned by a majority of the respondents was policymaking, namely, the Integrated Resource Plan (interviews[4]). The IRP is believed to have created the institutional framework to initiate and guide a transition in the electrical energy sector (interviews[5]). This was underpinned by plans to decommission coal fired plants and the charted path towards higher proportion of renewables in the electrical energy mix through allocation of megawatts towards renewable projects (DMRE, 2019). Furthermore, the IRP led to the formation of the IPP office which then "*catalysed the renewable energy program*" (Interviews[6]).

"*The government is the guarantor for all these independent power projects. So, I think the regulatory landscape allowed it. It created an enabling environment*" (interviews[7]).

[1] This view was expressed by all respondents interviewed.
[2] Respondents 2,3,6 and 10.
[3] Respondents 1,4,5,6, 7, 8,9 and 10.
[4] A majority of respondents across the sample expressed this view.
[5] A majority of respondents across the sample expressed this view.
[6] Respondent 3.
[7] Respondent 1.

Regulation was also cited as a factor, whereby respondents held the view that NERSA was creating a conducive environment for the growth of the renewable electrical sector. A respondent commented, *"I would say there is a shift and also, the regulators are coming to the party. You might know that NERSA increased the limit of private production*" (interviews[8]). This respondent was referring to the lifting of the licence-exemption threshold from 1MW to 100MW (Creamer Media, 2022). Furthermore, respondents highlighted that the government had been liberalizing the market to overcome barriers around renewable electrical energy investments (interviews[9]).

Advances in renewable electrical energy technologies, which have helped overcome investment hurdles and lowered the cost of renewable electricity, were driving greater adoption of renewables in South Africa (interviews[10]). According to one of the respondents in the IPP sector, older technologies in this space required long-term capital with payback periods that could go up to 30 years (interviews[11]). As such, this was a large barrier to adoption, and with improved technology over time, the requirement for patient capital had reduced enabling more activity in the electrical energy sector (interviews[12]). Furthermore, low feasibility of different electrical energy technologies (clean coal, gas and nuclear) in South Africa had made renewable electrical energy technologies attractive (interviews[13]). An example given was that due to the foreign exchange component and long-term contracting practices in international gas markets made this solution unattractive (interviews[14]). Moreover, the falling cost of electricity generated from renewable technologies had been fundamental in driving greater adoption as renewable electrical energy became economically viable. "*The cost has become so cheap that it's no longer about supporting this industry, it is self-sustaining now economically*" (interview[15]).

[8] Respondent 5.
[9] Respondents 2,5, 6 and 10.
[10] Respondents 6 and 8.
[11] Respondent 6.
[12] Respondents 6 and 8.
[13] Respondent 6 and 10.
[14] Respondent 6 and 10.
[15] Respondent 3.

Global decarbonization trends in the electrical energy sector also came up as a catalysing force in interviews (Baker et al., 2014; interviews[16]). South Africa is beholden to these decarbonization trends due to the net zero commitments that the country had declared such as subscribing to the Paris Agreement (Baker et al., 2014; World Resources Institute, 2021; interview[17]). Moreover, future international trade in the European market is anticipated to be contingent on whether goods are produced with clean energy-which provides an economic impetus to decarbonize in South Africa (interviews[18]).

Without the State apparatus that can provide reliable, affordable, and clean electricity infrastructure, then industry is at a competitive disadvantage globally (interviews[19]). As such, industry has been increasingly taking up the role of generating electricity to remain competitive by deploying renewable electrical energy technology at scale (interviews[20]). A key factor that was cited as the critical driver of the transition of the electrical energy sector are the challenges in electricity supply (interviews[21]). With increased rolling blackouts and inefficiency of running diesel generators, there has been a widespread uptake of renewable electrical energy technologies across industries and households (interviews[22]). *"And then the other one, which is not by design, is the fact that ESKOM is not performing. Therefore, the poor performance of Eskom is driving faster adoption of renewable energy*" (interviews[23]). These inefficiencies led to the scale of renewable electrical energy technology installations rising rapidly (interviews[24]).

4.2 THE SPEED OF TRANSITION

Notwithstanding State actors, there was a general consensus among respondents that the speed of the electrical energy transition was not at an optimal level (Baker, 2017;

[16] Respondents 3,4 and 6.
[17] Respondent 9
[18] Respondents 3 and 6.
[19] Respondent 5, 6 and 9.
[20] Respondent 6 and 10.
[21] This view was expressed by all respondents interviewed.
[22] Respondent 8.
[23] Respondent 3.
[24] Respondents 1,2,3, 6 and 10.

Kessides, 2020; interviews[25]). "*Yes, I think they are, although the pace isn't as fast as what people would like*" (interviews[26]).

Policy fissures and incoherence across different State institutions led to policy mandates that often were at odds - thus reducing the momentum of the electrical energy transition (Baker, 2017; Morris et al., 2020). "*There isn't much integration because there's different mandates from these different bodies*" (interviews[27]). Underpinning this, the hiatus that the REIPPPP took led to many players in the renewable electrical energy sector shutting down and abandoning assets, a setback in the development of this sector (Morris et al., 2020; interviews[28]). This development was at odds with the objective to grow the renewable electrical energy sector. Additionally, political interference was also seen as a major hurdle that limited the pace of transition significantly as it led to below optimal outcomes (Morris et al., 2020; interviews[29]). Respondents held the view that the State does not fully understand the true initial conditions of the electrical energy sector and is making decisions that are based on incorrect assumptions (interviews[30]). An out-of-date IRP that was not regularly updated was cited as a major hurdle, as the guidance on South Africa's electrical energy transition no longer reflected reality (Green Building Africa, 2022; interviews[31]). Underpinning this point, respondents highlighted that without understanding South Africa's base load and being able to guarantee reliable electricity supply, then the speed of transition would continue to lag expectations (interviews[32]). Consequently, respondents questioned the relevance of the IRP considering the possibility of the input assumptions not being credible (Baker et al., 2014; Baker, 2017; Morris et al., 2020; interviews[33]). As such, the State itself was viewed as the key barrier to a faster electrical energy transition. The relationship between the State and the Coal Lobby was also viewed as a significant hurdle to a faster transition due to its political

[25] Respondents 1,4,5,6, 7,8 ,9 and 10.
[26] Respondent 5.
[27] Respondent 4.
[28] Respondent 5.
[29] Respondents 4, 5 and 8.
[30] Respondents 4,7 and 8.
[31] Respondent 6.
[32] Respondent 4 and 8.
[33] Respondents 4,7, and 8.

influence and opposition towards renewables (Baker et al., 2014; Baker, 2017; Morris et al., 2020; interviews[34]). As such, the lagged pace of transition was viewed as the consequence of little political will to transition away from coal in the electrical energy mix, underpinned by significant actions taken to protect the coal industry through large subsidies and costly investments into prolonging the lives of ageing coal fleets (Baker et al., 2014; Baker, 2017; Morris et al., 2020; interviews[35]). These actions distorted the competitiveness of coal vis-à-vis renewable technologies (interviews[36]).

"*There isn't enough grid capacity. So that's the big issue*" (interviews[37]). A technical issue that was widely reported by respondents to be dampening the speed of the transition is grid capacity (Bloomberg, 2023; interviews[38]). Feeding in renewable electrical energy into the grid is limited, thus leading to projects being closed (Reuters, 2023; interviews[39]). Without grid capacity, the speed of the electrical energy transition will remain below expectations as it will not be feasible to run large scale renewable projects (Reuters, 2023). Furthermore, respondents held the view that grid capacity will remain as one of the largest constraints on South Africa's electrical energy transition as this issue will take a long time to resolve and requires large upfront investment (interviews[40]). Moreover, crime and vandalism of key electricity infrastructure was highlighted as an underlying factor of grid capacity issues (Mail & Guardian, 2023; interviews[41])

"*Red tape. Financing process and landscape in South Africa is prohibitive*" (interviews[42]). The financing of these projects still remains a challenge despite improvements in investment horizons over time (Baker et al., 2014; Morris & Martin, 2015; interviews[43]). Many renewable electrical energy projects are not viable due to the capital outlay required, making it difficult for IPPs to contract at the right price

[34] Respondents 4 and 8.
[35] Respondents 4 and 8.
[36] Respondent 4 and 8.
[37] Respondent 1.
[38] Respondents 1,4, 5,6, 7 ,8, 9 and 10.
[39] Respondent 4, 5 and 7.
[40] Respondents 4, 6, 8 and 9.
[41] Respondent 8.
[42] Respondent 4.
[43] Respondent 5.

(Morris & Martin, 2015; interviews[44]). Respondents bemoaned the fact that South African banks were not creating a conducive environment, which could be achieved by pivoting away from corporate finance principles to project finance principles that are better suited for IPPs (Baker et al., 2014; Morris & Martin, 2015; interviews[45]). Moreover, the *Public Finance Management Act of 1999* (PFMA) has been cited as an ongoing barrier to a faster electrical energy transition, as it limits and delays procurement at market prices (interviews[46]).

4.3 IS SOUTH AFRICA'S ELECTRICAL ENERGY TRANSITIONS *JUST*?

Respondents viewed the electrical energy transition as not *just* due to a lack of electricity security(loadshedding), and the lack of adequate stimulation of domestic green economy (Baker, 2017; Trade & Industrial Policy Strategies, 2021; interviews[47]). Respondents highlighted that with unreliable electricity supply and costly alternatives such as installing solar or purchasing a generator, then some will be pushed into a form of energy poverty (Trade & Industrial Policy Strategies, 2021; interviews[48]). Although this may not be caused by high electrical energy prices, inadequate electrical energy supply may produce similar outcomes (Trade & Industrial Policy Strategies, 2021; interviews[49]). Moreover, respondents highlighted that an unreliable supply of electricity was constraining economic growth which limits the ability to create employment in the economy, leading to negative societal outcomes that were essentially unjust (interviews[50]).

Furthermore, a key component that was viewed as working against a *just* transition, is policy incoherency across electrical energy and industrial policies which limited investment into the domestic renewable electrical energy economy (Morris et al., 2020; interviews[51]). As such, the scope for stimulating local manufacturing and thus job creation was limited, which respondents anticipated may lead to the

[44] Respondents 4 and 5.
[45] Respondents 4, 5, and 6.
[46] Respondents 2 and 8.
[47] Respondents 4, 5, 6, 8 and 10.
[48] Respondent 4.
[49] Respondent 4.
[50] Respondent 6.
[51] Respondents 1, 4, 5, 6,7 and 8.

disenfranchisement of economic communities that once relied on the coal economy (Trade & Industrial Policy Strategies, 2021; interviews[52]). "*Yeah, it's going to be, unfortunately, a loss for South Africa. Ideally, we should be building an economy around this. To such an extent that, you know, we can start exporting some of these components to the rest of the continent*" (interview[53]). With that said, respondents still held the view that the REIPPPP had an impact in establishing and stimulating a green "spin-off" installations economy[54], including cultivating local expertise in the green economy (interviews[55]). "*I think the REIPPP did help in ensuring that the local green economy is supported and does grow. I mean it formed the fundamentals of the many companies that are now able to go and do your installations for industrial and commercial, your commercial and industrial facilities are offspring off the REIPPPP project"* (interviews[56])

4.4 ANALYTICAL CONCLUSIONS AND POLICY RECOMMENDATIONS

The main research question has now been answered: the developments in South Africa's electrical energy sector constituted a socio-technical transition. As discussed in the previous sections, numerous factors were driving this transition towards a lower carbon path in the electrical energy sector, namely:

1. Policy: the IRP to initiated institutional changes in the electrical energy sector.
2. Enabling regulatory environment: which enabled the emergence and continued growth of the renewable electrical energy sector.
3. Advances in renewable technologies: which have improved the economics of the renewable electrical energy sector, making the sector more competitive vis-à-vis the incumbent fossil fuels regime.
4. Global decarbonization trends: which have created the political impetus for South Africa to pursue socio-technical transition in the electrical energy sector and,

[52] Respondents 4 and 8.
[53] Respondent 3.
[54] Refers to the companies that emerged to participate in REIPPPP, spinning off into installations for commercial and residential clients (source: respondent 9).
[55] Respondents 2,3,4, 5, and 6.
[56] Respondent 6.

5. Loadshedding: the lack of reliable electricity supply increased commercial and residential impetus to adopt renewable electrical energy technologies to meet gaps in electricity demand.

Moreover, in the previous section, the discussion also looked at the speed of the transition and whether the transition was *just*. The speed of the transition was found to be sub-optimal by non-State actors and was viewed as not *just*. The key factors for sub-optimal speed of transition and lack of a *just* transition overlapped. Namely:

1. Policy fissures: policy across different government departments was not aligned to bring about a conducive environment that would spearhead a speedy and *just* transition. Energy and industrial policies were highlighted as the key gaps.
2. Incorrect IRP assumptions: respondents believed that the assumptions that went into the IRP were outdated and did not reflect the current circumstances in South Africa's electrical energy sector.
3. Political interference: interference in the electrical energy sector on the back of a strong and institutionally entrenched Coal Lobby is believed to have constrained the growth of the renewable electrical energy sector by delaying the transformation of the electrical sector.
4. Grid capacity: South Africa's failing grid is believed to have made it difficult to procure more IPP projects in the renewable electrical energy sector as there was no capacity to take on these projects.
5. Financing: the State of play in the renewable electrical energy sector financing landscape was highlighted as being limiting.
6. PFMA: was viewed as limiting the speed and scope for procuring power from IPPs.

As such, the researcher proposes the updating of the IRP, electricity regulations, the PFMA and REIPPPP requirements to catalyse structural changes in the electrical energy sector towards a fast and *just* electrical energy transition. Furthermore, these interventions would accelerate the transformation of Eskom to improve performance:

1. Energy and climate policy prioritisation to create an institutional framework that supports and facilitates a *just* electrical energy transition. This should be

supported by a regularly updated, transparent and reformed IRP formulation process that includes higher representation from IPPs and civil society.

2. Mandated policy coordination exercises across key government departments to ensure that any policy divergence risks are mitigated and that policies lead to supporting action across the government.
3. Regulate lobbying practices to mitigate the undue influence of lobby groups and to promote effective policy making.
4. Reform of the electrical energy sector through the reworking of Eskom to be better suited for a transitioning electrical energy sector. This would necessitate the unbundling of Eskom to facilitate the break-up of its monopoly.
5. Reasonable relaxation of electricity regulations to stimulate investment into the renewable electrical energy sector and increased generation capacity.
6. Policy to increase investment into electricity infrastructure through grid maintenance and expansion to improve Eskom's performance and electricity supply reliability.
7. Incentivise the commercial and residential adoption of renewable electrical energy technologies adoption. This can be achieved through reforming the PFMA, tax incentives for the procurement of these technologies, and regulations to enable Eskom to purchase excess power supply generated by the commercial and residential sectors.

CHAPTER 5: APPLYING POLITICAL ECONOMY APPROACH TO UNDERSTAND POSITIONS AND INTERESTS IN SOUTH AFRICA'S ELECTRICAL ENERGY SECTOR

This chapter is in response to research sub-questions 2 and 3, "*What are the positions and interests of the State and non-State actors in the electrical energy sector (including renewable electrical energy)?*" and "*How was the emergence of a renewable electrical energy sector negotiated and operationalised, and who were the drivers or detractors of this emergence?"*. This section used the MEC as an analytical framework to understand the structure, power, incentives, rules, and stakeholders. This was achieved by leaning into literature and interviews. Furthermore, in this section, the researcher enquired into the process of developing the IRP to gain further insights into the political economy of the electrical energy sector. Moreover, the researcher employed the P.E.A.C.H methodology and interviews to gain an understanding of the ideologies and bargaining (political) process of bringing the REIPPPP to fruition for the purpose of understanding influence.

5.1 STRUCTURE, POWER, INCENTIVES, RULES, AND STAKEHOLDERS

The structure of the political economy of the electrical energy sector is best described by the MEC, which was introduced by Fine and Rustomjee (1996) and the MEC-plus which was introduced by McDonald (2009). Essentially, the MEC is able to illustrate the evolution of the political economy of South Africa's electrical energy sector while providing insights on power relations and interests within the sector (Baker, 2017; Morris & Martin, 2015). The MEC is a system that is electricity intensive, as such, at the heart of the MEC is electricity, coal, and labour - which uphold the MEC within the context of the electrical energy sector (see Figure 2) (Baker et al., 2014; Baker, 2017; Fine & Rustomjee, 1996; Morris & Martin, 2015). The key characteristics of the MEC are a set of relationships between the State, Axes of Capital, and Eskom, which are held politically by a highly influential Coal Lobby that maintains the interests that underpin these relationships (Fine & Rustomjee, 1996). The relationships between the key players in the MEC can be thought of as mutually beneficial and drive the growth of the MEC (Fine & Rustomjee, 1996). While the advent of the MEC worked to bring about the economic interests of Afrikaners as a political group which had political

power but limited economic power, it evolved to include a Black political elite group (Baker, 2017; McDonald, 2009). As such, the State remained dependent upon the revenues from the MEC (Fine & Rustomjee, 1996). Consequently, Eskom emerged as a monopoly that controls electricity supply, also, as a conduit for the State and the Axes of Capital to advance their common interests (Baker, 2017; Fine & Rustomjee, 1996). The Axes of Capital represent a concentrated number of conglomerates that control the core sectors of the MEC (Fine & Rustomjee, 1996; McDonald, 2009). The Coal Lobby emerged out of this set of relationships to perpetuate the existence of the MEC in its current form, itself having evolved with the changes in stakeholders post-apartheid (interviews[57]). The Coal Lobby resisted efforts that would transform the current structure of the MEC such as: the privatization of the electricity sector, and investments into and the development of the renewable electrical energy sector (interviews[58]). It is important to note that the Coal Lobby consists of the coal industry, MEC key players, labour unions and civil society organisations (News24, 2020; interviews[59]).

With that said, according to McDonald, this set of relationships evolved from a large Axes of Capital transacting with a large State to now *"globally dispersed capital*" and a significantly fragmented State (McDonald, 2009). This is underpinned by the strengthening of the financial sector within the Axes of Capital, where there was the financialization of players within the EIUG through moving primary listings out of the Johannesburg Stock Exchange (JSE), which constituted capital flight (Baker, 2014). Moreover, the electricity supply crisis was also a critical evolution from the electricity surplus which previously characterised the MEC (McDonald, 2009). The fundamental shifts in electricity supply significantly reduced the State's bargaining power with the Axes of Capital (interviews[60]). An outcome of the supply constraints was the rising prices of electricity, whereby a key feature of the MEC had previously been cheap electricity (Baker et al., 2014; Fine & Rustomjee, 1996). Additionally, fundamental shifts in the coal supply chain limited Eskom's ability to access cheap coal (Baker,

[57] Respondent 8 and 10.
[58] Respondent 8.
[59] Respondent 10
[60] Respondent 7.

2017). As such, Eskom's monopoly stronghold in the electricity sector is at the risk of waning– opening up the electricity sector to other players, particularly from the commercial and industrial sectors (Baker, 2017; interviews[61]).

Despite the evolution of the MEC, some of these relationships still hold, underpinned by how the process of bringing about the IRP reflected the political economic dimensions of the MEC (Baker, 2017; Morris & Martin, 2015; interviews[62]). According to Baker (2017), the negotiation process of the IRP was one that was heavily contested whereby the negotiation process was difficult (Baker, 2017). A key feature of the initial IRP (2010) process was the lack of transparency particularly on demand forecasts, assumptions, and methodology (Baker, 2017; interviews[63]). This lack of transparency paralleled policy planning practices of the Apartheid era, whereby the planning process was opaque (Baker, 2017; Fine & Rustomjee, 1996). The initial IRP was done by Eskom (and the CSIR), as the policy owners, the DMRE, did not have the capabilities to undertake the development of the IRP (Baker et al., 2014; Baker, 2017; interviews[64]). This mirrored the same policy making process observed under apartheid, where Eskom was responsible for policymaking in the electrical energy sector (Baker, 2017). Moreover, the technical task team that had undertaken this exercise with Eskom consisted largely of government, Eskom, coal companies and the EIUG, who are the representatives of the MEC's interests and influence (Baker et al., 2014; Morris and Martin, 2015; Baker, 2017). Furthermore, respondents highlighted that the consultative process with IPPs and Civil Society was a tick box exercise where issues raised by these groups are not considered – indicative of where power lies in electricity policymaking (interviews[65]). Despite the technical inputs into the IRP, there still exists political interference through which sub-optimal decisions can be pushed through (interviews[66]). For example, the revised 2013 IRP, which did not support nuclear power, was delayed in an attempt to push nuclear power as a strategic policy objective (Baker, 2017).

[61] Respondents 1,3,4,5, 8, 9 and 10.
[62] Respondents 4,7 and 8.
[63] Respondent 1.
[64] Respondent 6.
[65] Respondent 4.
[66] Respondents 4, 7 and 8.

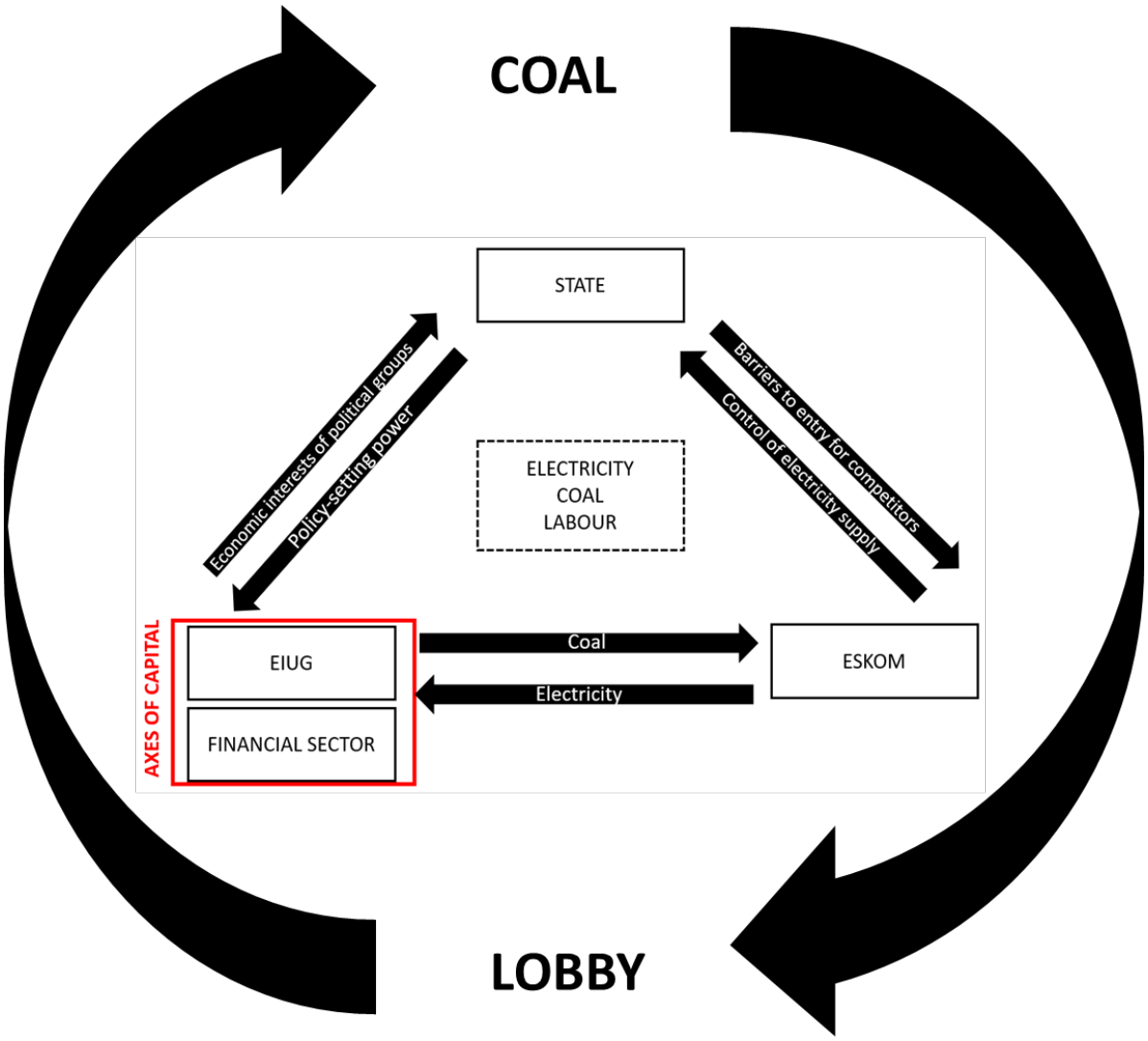

FIGURE 2: SIMPLIFIED MINERALS-ENERGY COMPLEX

Source: Author's own illustrations

5.2 IDEOLOGIES AND BARGAINING (POLITICAL) PROCESS

TABLE 1: SIMPLIFIED POLITICAL ECONOMY DIMENSIONS[67]

Main Stakeholders	State	Eskom	Axes of Capital	Coal Lobby	Independent Power Producers	Civil Society
Positions	State 1: Power Sector Reform State 2: Maintain Current Structure	Eskom 1: Power Sector Reform Eskom 2: Maintain Current Structure	AoC 1: Power Sector Reform AoC 2: Power Sector Reform	Maintain Current Structure	Power Sector Reform	Power Sector Reform
Stages of the policy process	Formulation and monitoring	Formulation, adoption, and implementation	Formulation, adoption, and implementation	Formulation	Adoption and implementation	Monitoring

Source: author's own illustrations based on P.E.A.C.H methodology

According to respondents, ideologically, within the State, there are two camps: one that believes the right direction is towards a *grand electrical energy transition*[68] and one that wants to uphold the status quo (see table 1) (Baker et al., 2014; interviews[69]). This was underpinned by the process of bringing about the REIPPPP which was characterised by bold steps taken by champions of renewable energy, such as NERSA, which was operating beyond its mandate to bring about its emergence (Baker et al., 2014; Martin & Morris, 2015). The REIPPPP came about as an iteration of REFIT, a market framework to bring about the emergence of South Africa's renewable electrical energy sector post the advent of the 2003 Renewable Energy White Paper (Baker et al., 2014). This was driven by players within the DMRE, NERSA, DPE, National Treasury, DTIC, Eskom, Development Bank of Southern Africa (DBSA) and, the DFFE (Baker, 2017; interviews[70]). The DMRE, is viewed as a champion in this process by providing a policy framework that essentially catalysed the renewable

[67] Table 1: this table helps us visualise the ideologies, positions, and an inventory of key stakeholders.

[68] An energy transition that would lead to a 50% shift in the electrical energy mix away from the dominant source (Sovacool, 2016)

[69] Respondents 4, 5, 6, 7, 8 and 10.

[70] Respondents 2,3,5, 6 and 10.

electrical energy sector (interviews[71]). Moreover, the DMRE is viewed as a supporter of fundamental changes in the electrical energy sector through implementing the accommodating amendments in schedule two of the Electricity Regulation Act (interviews[72]). A key initiator being NERSA, which was mandated to undertake a consultation process to find a suitable way of rolling out renewable electrical energy generation which resulted into a feed-in tariff system (interviews[73]). The DoE and National Treasury's collaboration to bring about the IPP office and DBSA as a host entity (interviews[74]). These players represent the camp that ideologically believes in a grand transition.

With that said, there was pushback within the NERSA, Eskom, and the DoE, regarding a feed-in tariff system and renewable electrical energy (Baker, 2017; Morris et al., 2020). As such, the process of bringing about the REIPPPP was fraught with challenges and disagreements over the consultation process, power purchase agreements, financial risks, and bidding vs feed-in tariff system (Baker et al., 2014; Morris et al., 2020). With regards to the camp that upheld the status quo, the aversion towards a grand transition is also believed to be underpinned by patronage, where the economic interests of the political elite seen in the MEC are seemingly threatened by a shift in the electrical energy mix (interviews[75]). Moreover, respondents held the view that current decision making by the State, such as putting investments behind coal infrastructure in the electricity sector underpins the bolstering of the status quo (Creamer Media, 2023; interviews[76]). A key view that was widely held is that ESKOM risks losing its position in MEC with a grand electrical energy transition, as such, the entity had shown willingness to maintain the status quo (Morris et al., 2020; interviews[77]). "*If we come to Eskom, I think Eskom is like all other State-owned entities that have been there. The resistance is really more around the loss of power in as far as the loss of control of the electricity supply more than not wanting renewable energy*

[71] Respondents 2,3,5, 6 and 10.
[72] Respondent 9 and 10.
[73] Respondent 6 and 10.
[74] Respondent 3, 6 and 10.
[75]Respondents 4, 7 and 8.
[76] Respondents 6, 7 and 8.
[77] Respondents 6, 7 and 8.

sources" (interviews[78]). Moreover, the resistance from Eskom was also underpinned by the technical and operational challenges the entity faced when undertaking renewable electrical energy projects: the first rounds of REIPPPP were expensive whereby the opportunity cost of the projects were high, and the intermittent nature of renewable electrical energy is not fit for the design of Eskom (interviews[79]).

Within the Axes of Capital, a widely held view by respondents was that the Axes of Capital was embracing an electrical energy transition as it tried to alleviate electricity supply constraints and rising costs (interviews[80]). With that said, due to the intermittent nature of renewable electrical energy supply, this group of electricity consumers is of the view that there still needs to be a reliable coal fired electricity supply as a stabiliser fuel or any other feasible stabiliser fuel (interviews[81]). Underpinning this view, respondents highlighted that the commercial and industrial sector (including players in the Axes of Capital) has invested significantly in renewable electrical energy supply (interviews[82]). *"I am of the view that the energy intensive users have no opposition towards the use of renewable energies which is solar and wind.They would like to use that as much as possible, but what they have an issue with and or what I would have an issue with if I was from their side, is the sole and complete reliance on sources of power that are intermittent or that are not continuous in in their very design*" (interviews[83]). With that said, parts of the Axes of Capital are also key members of the Coal Lobby which aims to maintain the status quo (Baker et al., 2014; Fine & Rustomjee, 1996).

5.3 ANALYTICAL CONCLUSIONS AND POLICY RECOMMENDATIONS

This section applies the MEC analytical framework and P.E.A.C.H methodology to answer questions 2 and 3, namely, *"What are the positions and interests of the State and non-State actors in the electrical energy sector (including renewable electrical energy)?*" and "*How was the emergence of a renewable electrical energy sector negotiated and operationalised, and who were the drivers or detractors of this*

[78] Respondent 6.
[79] Respondents 6, 8 and 9.
[80] Respondents 1, 4, 5, 6, 7, 8 and 10.
[81] Respondents 4, 6, 7, 8 and 10.
[82] Respondents 4, 6, 7 and 8.
[83] Respondent 6.

emergence?" To answer question 2, both methodologies were employed, and a dimension of influence was added to determine critical coalitions that drive or detract the emergence of a renewable electrical energy sector. Figure 3 illustrates the dimensions of influence and positions. The y axis evaluates each stakeholder's influence on a scale of low-medium-high influence with regards to their ability to shape electrical energy policies. Each stakeholder is designated according to identified groupings. The scope of positions was limited to two broad categories regarding the electrical energy sector: maintain current structure and sector reform. This scope is informed by the two opposing coalitions: the coalition that wants to maintain the status quo in the electrical energy sector and the *grand transition* coalition which wants reform towards a low carbon path within the electrical energy sector. It is assumed that energy security is a major concern for both coalitions, as such, loadshedding would not be an outcome of maintaining the current structure or reforming the sector. It is important to highlight that this simplified illustration has its shortcomings as it is unable to fully explain the complex dynamics of the two coalitions.

The purpose of the illustration is to give a generic overview of stakeholders, influence, and positions. What is insightful about the illustration is that it reflects the current state of play in the electrical energy sector, particularly the existence of these two coalitions within the same institutions. Moreover, the illustration helped build the understanding of where the locus of power lies. The coalition that seeks to maintain the status quo is considerably influential underpinned by the institutional power and pervasiveness of the MEC. The grand transition coalition is less influential; however, it has been impactful with the successful implementation of REIPPPP. As such, this illustration gave us an understanding of the institutional framework that shapes decision-making in the electrical energy sector which is the MEC. Moreover, this illustration uncovered the forces of the electrical energy sector that can be leveraged within the institutional framework to drive reform towards a low-carbon electrical energy transition.

As such, the researcher proposes the following policy recommendations to catalyse institutional reforms that will support a socio-technical transition in the electrical energy sector: transformation of the formal and informal incentive structures that perpetuate the MEC through legislation.

1. Regulate lobbying practices to mitigate undue influence of lobby groups and to promote effective policy making.
2. Reform of the electrical energy sector through the restructuring of Eskom to make it suited for a transitioning electrical energy sector. Unbundling of Eskom to facilitate the break-up of its monopoly.
3. Liberalisation and regulation of the electricity sector to stimulate fair competitive practices, which is underpinned by the objectives of the energy trilemma: reliability, affordability, and sustainability.
4. Broad based transparency and anti-corruption regulation to mitigate the linkages between the State and the Axes of Capital.

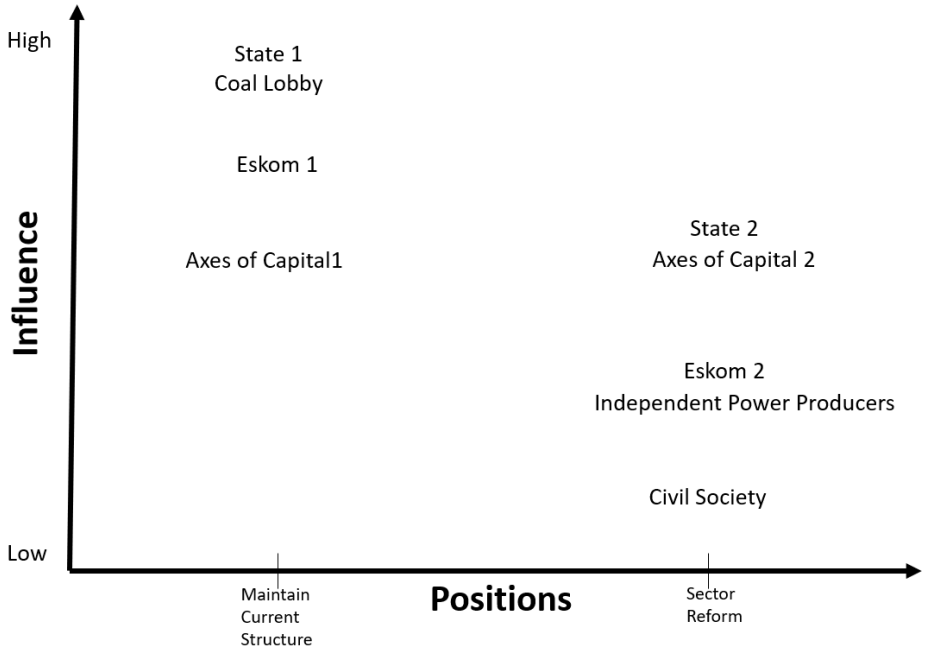

FIGURE 4: SIMPLIFIED LEVEL OF INFLUENCE AND POSITIONS OF STAKEHOLDERS

Source: Author's own illustrations based on P.E.A.C.H Methodology

CHAPTER 6: APPLYING MULTI CRITERIA DECISION METHODS TO DETERMINE POLICY RECOMMENDATIONS

A key objective for this research project was to formulate electrical energy policy recommendations that would facilitate a *just* electrical energy transition, focusing on the IRP and REIPPPP. As such, this chapter evaluated and ranked the proposed policies in Chapters 4 and 5 according to this objective to determine the best policies for a *just* electrical energy transition (see Table 2). To adequately evaluate these policies, the criteria was based on the energy trilemma: energy security, energy equity and environmental sustainability. Energy security refers to the ability to meet current and future electricity demands, moreover, it also refers to the reliability of energy infrastructures (World Energy Council, 2022). This measure remains the most critical on the back of South Africa's energy crisis, as such, the weighting for this attribute was allocated 50% (Business Tech, 2023). Energy equity refers to the ability to provide basic universal access to affordable electricity to meet residential and commercial needs adequately, this provision must promote socio-economic improvements and economic growth (World Energy Council, 2022). This metric was weighted at 35%, as a *just* energy transition remains critical in the context of South Africa which is a highly inequitable country (The World Bank, 2022). The final metric is energy sustainability, which refers to the transition of electrical energy systems to clean sources in order to reduce environmental damage, moreover, this metric also refers to more efficient electrical systems with minimised generation, distribution, and transmission losses (World Energy Council, 2022). This metric was weighted at 15%, although it is a critical component of a *just* transition, South Africa's challenges in the electrical energy sector have led to a higher prioritisation of the first two metrics (Aljazeera, 2023). Below is the numbered list of proposed policies that were evaluated from Chapters 4 and 5, the policies are referred to by their list number in the assessment table:

1. Energy and climate policy prioritisation to create an institutional framework that supports and facilitates a *just* electrical energy transition. This would be underpinned by a regularly updated, transparent and reformed IRP formulation process that includes higher representation from IPPs and civil society.

2. Mandated policy coordination exercises across key government departments to ensure that any policy divergence risks are mitigated and that policies lead to supporting action across the government.
3. Regulate lobbying practices to mitigate undue influence of lobby groups and to promote effective policy making.
4. Reform of the electrical energy sector through the reform of Eskom to be better suited for a transitioning electrical energy sector. Unbundling of Eskom to facilitate the break-up of its monopoly.
5. Reasonable relaxation of electricity regulations to stimulate investment into the renewable electrical energy sector and increased generation capacity.
6. Policy to increase investment into electricity infrastructure through grid maintenance and expansion to improve Eskom's performance and electricity supply reliability.
7. Incentivise commercial and residential adoption of renewable electrical energy technologies adoption. This can be achieved through reforming PFMA, tax-incentives for the procurement of these technologies and regulations to enable Eskom to purchase excess power supply generated by the commercial and residential sectors.
8. Liberalisation and regulation of the electricity sector to stimulate fair competitive practices, which is underpinned by the objectives of the energy trilemma: reliability, affordability, and sustainability.
9. Broad based transparency and anti-corruption regulation to mitigate the linkages between the State and the Axes of Capital.

TABLE 2: MCDM EVALUATION OF PROPOSED POLICIES

	Energy Security – 50 %	Energy Equity – 35%	Energy Sustainability – 15%
Policy 1	✓	✓	✓
Policy 2		✓	
Policy 3			✓
Policy 4	✓	✓	✓
Policy 5	✓		✓
Policy 6	✓	✓	
Policy 7	✓		✓
Policy 8	✓	✓	✓
Policy 9			✓

Source: author's own illustrations based on MCDM.

Post the MCDM evaluation and ranking of the proposed policies, three key policies were prioritized (see Table 3). Namely, policies 1, 4 and 8, which speak to the reforms in the electrical energy sector that would support a *just* electrical energy transition that is underpinned by energy security. Naturally, these three policies would be interlinked, starting from a robust policy framework that would emerge from implementing policy 1. As discussed in Chapter 4, the IRP is a powerful yet underutilised policy instrument that catalysed South Africa's electrical energy transition. A regularly updated and inclusive policy formulation process will lend itself to necessary reforms in the electrical energy sector to accelerate a *just* electrical energy transition. The key reforms that would be underpinned by policy 1 are the reform and liberalisation of the electrical energy sector. However, this liberalisation of the sector would be regulated using the principles of the energy trilemma to ensure that equitable social and economic outcomes are promoted.

Next in the prioritization exercise was policy 6, which would address challenges with the grid, thus addressing energy security. Moreover, the expansion of the grid would also address energy equity as a reliable grid would promote socio-economic development and economic growth. Policy 6 is a critical step in realising the objectives of policies 1, 4 and 8 - essentially, these policies would not be feasible without policy

6. As such, policy 6 should be encapsulated in the three policies to create a policy framework that will enable adequate investment in grid maintenance and expansion.

To further bolster energy security and the growth of the renewable electrical energy sector, *just* electrical energy transition policies 5 and 7 were then prioritised. A key component of these two policies being that they would stimulate investment in the renewable electrical energy sector and increase generation capacity by incentivising the commercial and residential sectors to become *prosumers*[84] . With that said, to implement these two policies and the aforementioned policies, the government would have to be adept at policy coordination which is currently a challenge. As such, next in the prioritisation ranking was policy 2 which would mandate and institutionalise policy coordination across the government. As discussed in Chapter 4, the lack of policy coordination is a barrier to a faster transition.

Last in the prioritization exercise were policies 3 and 9, which would address the influence of the MEC in policymaking by subverting the institutional power that it holds through limiting the power of the Coal Lobby and weakening incentives that maintain the MEC. As discussed in Chapter 5, there are two opposing coalitions within the electrical energy sector. There is the coalition that wants to maintain the current structure of the sector, this coalition holds significant institutional power that is underpinned by the MEC. As such, part of facilitating a *just* electrical energy transition will require formal and informal institutional changes that tips the balance of power away from this coalition.

[84] Prosumers refers to a person who produces and consumes energy usually through distributed energy sources such as renewables (Office of Energy Efficiency & Renewable Energy, 2017)

TABLE 3: RANKED POLICIES FOR PRIORITIZATION

Policy	Ranking
Policy 1-Energy and climate policy prioritisation to create an institutional framework that supports and facilitates a just clean electrical energy transition. Underpinned by a regularly updated, transparent and reformed IRP formulation process that includes higher representation from IPPs and civil society.	**1**
Policy 4-Reform of the electrical energy sector through the reform of Eskom to be better suited for a transitioning electrical energy sector. Unbundling of Eskom to facilitate the break-up of its monopoly.	**1**
Policy 8-Liberalisation and regulation of the electricity sector to stimulate fair competitive practices, which is underpinned by the objectives of the energy trilemma: reliability, affordability, and sustainability.	**1**
Policy 6-Policy to increase investment into electricity infrastructure through grid maintenance and expansion to improve Eskom's performance and electricity supply reliability.	**2**
Policy 5-Reasonable relaxation of electricity regulations to stimulate investment into the renewable electrical energy sector and increased generation capacity.	**3**
Policy 7-Incentivise commercial and residential adoption of renewable electrical energy technologies adoption. This can be achieved through reforming PFMA, tax- incentives for the procurement of these technologies and regulations to enable Eskom to purchase excess power supply generated by the commercial and residential sectors.	**3**
Policy 2-Mandated policy coordination exercises across key government departments to ensure that any policy divergence risks are mitigated and that policies lead to supporting action across the government	**4**
Policy 3-Regulate lobbying practices to mitigate undue influence of lobby groups and to promote effective policymaking.	**5**
Policy 9-Broad based transparency and anti-corruption regulation to mitigate the linkages between the State and the axes of capital.	**5**

Source: author's own illustrations based on MCDM.

As such, despite the ranking and prioritization of the proposed policies, the issues that they aim to address are interdependent, which is indicative of a need to implement the policies simultaneously as a multi-pronged response. The rolling out of these policies would require multi-stakeholder collaboration across the government as part of a governance drive towards a *just* electrical energy transition.

CHAPTER 7: CONCLUSION

The purpose of this research study was to explore the political economy of the renewable electrical energy sector, focusing on the IRP and REIPPPP. Moreover, the study aimed to understand the structure and political economy of the overall electrical energy sector and how it impacts the renewable electrical energy sector. The key outcome being a contribution towards policy formulation that is aligned to a *just* electrical energy transition. This research report has found that the political economy of the overall electrical energy sector and renewable electrical energy sector is underpinned by the MEC – the core of capitalist accumulation within South Africa's economy.

As such, the political economy is underpinned by a set of relationships between the State, Eskom, and the Axes of Capital - encompassed by a powerful Coal Lobby. The interests of the MEC are aligned with a high carbon path as it is underpinned by coal generated electricity, at odds with a *just* electrical energy transition. The MEC is highly influential, particularly in electricity policy formulation, a process that has been found to be inherently political, where the MEC has perpetuated the use of coal in electricity generation. Consequently, the structure of the overall electrical energy sector impacts the renewable electrical energy sector by constraining its growth in favour of the continued use of coal despite the improved competitiveness of the renewable electrical energy sector. Moreover, political interference by actors from the MEC work to limit the effectiveness of renewable electrical energy policies - underpinned by the process to implement the REIPPPP.

With that said, the structure of the renewable electrical energy sector challenges the MEC as it is essentially decentralized. As such, key policy interventions would need to address the stronghold the MEC has on the electrical energy sector. The IRP is a powerful policy tool that can be leveraged to drive structural reforms that would subvert institutional power away from the MEC. Moreover, REIPPPP remains a key program to growing generation capacity in the renewable electrical energy sector which would benefit from a favourable policy environment.

Chapter 1 introduced the research topic, research context, research problem, research objectives and the main research question, "*How has the political economy of the*

renewable electrical energy sector impacted the electrical energy transition in South Africa?". Chapter 2 developed an understanding of the political economy of the electrical energy sector through a literature review that looked at the MEC as a description of the industrialisation of South Africa's economy and thus the political economy of the electrical energy sector. The chapter then went on to explore the political economy of the renewable electrical energy sector within the scope of the MEC. Then exploring policy formulation and effectiveness in the electrical energy sector. Finally, Chapter 2 explored the theoretical framework that would be used in this research report. Chapter 3 went on to address the research methodology that would be applied in this research report.

Chapters 4 and 5 sought to answer the three research questions:

1. Do the developments in South Africa's electrical energy sector constitute a socio-technical transition?
2. What are the positions and interests of the State and non-State actors in the electrical energy sector (including renewable electrical energy)?
3. How was the emergence of a renewable electrical energy sector negotiated and operationalised, and who were the drivers or detractors of this emergence?

Chapter 4 answered question 1, based on interviews with experts in the electrical energy sector and supporting literature. The findings confirmed that South Africa was undergoing an electrical energy transition. However, the equitability and speed of the transition was being dampened by policy fissures, an outdated IRP, and an ailing grid among other factors. Factors driving the electrical energy transition such as the promulgation of the IRP, advances in renewable energy technologies and loadshedding were also identified. The analytical conclusions of this chapter yielded policy recommendations to address the opportunities and challenges with respect to facilitating a *just* electrical energy transition.

Chapter 5 answered questions 2 and 3, where the MEC analytical framework and the P.E.A.C.H methodology were used. In this chapter, the research project confirmed the persistence of the MEC as an institutional and political framework in the electrical energy sector despite the evolution of the set of relationships that make up the MEC. The chapter went on to outline these relationships between the State, Axes of Capital,

Eskom, and the Coal Lobby that underpinned the MEC. Fundamental shifts included globally dispersed capital, a fragmented State, financialization, and electricity supply constraints. The analysis of the political bargaining process revealed that there exists two opposing coalitions within the electrical energy sector. The highly influential coalition is underpinned by the MEC, whose objective is to maintain the current structure of the electrical energy sector. The second coalition is the less influential *grand transition* coalition, which helped bring about the REIPPPP, thus bringing about the renewable electrical energy sector; whose objective is to reform the electrical energy sector. This chapter yielded policy recommendations which would target structural reform and institutional changes that would regulate the MEC. Both chapters yielded nine policy recommendations.

Chapter 6 sought to rank and prioritize the nine proposed policy recommendations:

1. Energy and climate policy prioritisation to create an institutional framework that supports and facilitates a *just* electrical energy transition. This would be underpinned by a regularly updated, transparent and reformed IRP formulation process that includes higher representation from IPPs and civil society.
2. Mandated policy coordination exercises across key government departments to ensure that any policy divergence risks are mitigated and that policies lead to supporting action across the government.
3. Regulate lobbying practices to mitigate undue influence of lobby groups and to promote effective policy making.
4. Reform of the electrical energy sector through the reform of Eskom to be better suited for a transitioning electrical energy sector. This constitutes the unbundling of Eskom to facilitate the break-up of its monopoly.
5. Reasonable relaxation of electricity regulations to stimulate investment into the renewable electrical energy sector and increased generation capacity.
6. Policy to increase investment into electricity infrastructure through grid maintenance and expansion to improve Eskom's performance and electricity supply reliability.
7. Incentivise commercial and residential adoption of renewable electrical energy technologies adoption. This can be achieved through reforming PFMA, tax-

incentives for the procurement of these technologies and regulations to enable Eskom to purchase excess power supply generated by the commercial and residential sectors.

8. Liberalisation and regulation of the electricity sector to stimulate fair competitive practices, which is underpinned by the objectives of the energy trilemma: reliability, affordability, and sustainability.
9. Broad based transparency and anti-corruption regulation to mitigate the linkages between the State and the Axes of Capital.

Chapter 6 used the MCDM to evaluate and rank the proposed policy recommendations. The evaluation criteria was based on the principles of the energy trilemma: energy security, energy equity and environmental sustainability. Where policies 1, 4 and 8 ranked high, meeting all three criteria of the energy trilemma. These policies are aimed at electrical energy sector reforms that would change the structure of the sector to facilitate a *just* electrical energy transition.

As stated above, the research project proposed several key policy recommendations that emerged from the findings and analysis conducted throughout the study. These recommendations were aimed at addressing the challenges in South Africa's electrical energy sector and promoting a *just* socio-technical transition within the sector. The following is a summary of the main recommendations:

1. Recommendation 1 (Policies 1, 4 and 8): Policy and market reforms in the electrical energy sector that would promote a *just* electrical energy transition and electrical energy security

    - This recommendation is supported by the finding that the institutional framework set out by the IRP and REIPPPP catalysed a transition in the electrical energy sector. Moreover, challenges with a slow and unjust electrical energy transition are underpinned by policy incoherence and the structure of Eskom which is not suited for a *just* clean electrical energy transition.

- As such, the implementation of this recommendation can contribute to a well-paced *just* electrical energy transition that fulfils the three pillars of the energy trilemma.

2. Recommendation 2 (Policy 6): Policy to stimulate investment into electricity infrastructure, to improve electricity supply reliability

    - The analysis revealed that a strained electricity grid with limited capacity remains a critical challenge in the entire electrical energy sector (including the renewable sector). Moreover, this challenge hindered the speed of a *just* electrical energy transition and is presented pertinent risks to the electrical energy sector.

    - The implementation of this recommendation has the potential to improve the reliability of electrical energy supply and drive further growth in the renewable electrical energy sector.

3. Recommendation 3 (Policies 5 and 7): Liberalisation of the electrical energy sector

    - The examination of commercial and residential responses to electrical energy supply constraints gave insight into the impetus for these two groups to invest in renewable electrical energy generation. As such, broadening the scope of electricity producers and funding sources towards growing the renewable electrical energy sector

    - By implementing this recommendation, the State can accelerate renewable electrical energy generation while stimulating a renewable electrical energy economy.

4. Recommendation 4 (Policy 2): Mandated policy coordination

    - The analysis of factors dampening the speed of a *just* electrical energy transition revealed that policy incoherence across government departments was a critical challenge. Moreover, it was revealed that this policy incoherence was a significant barrier to stimulating a domestic renewable electrical energy economy.

- By implementing this recommendation, the State will be well positioned to address the complex challenges within the electrical energy sector. Moreover, it will lead to the optimal use of State resources by creating synergies that reinforce the impact of related policies- improving policy effectiveness.

5. Recommendation 5 (Policies 3 and 9): Reducing the institutional power of the MEC

    - This recommendation is underpinned by the findings that the MEC is undermined the propagation of a *just* electrical energy transition. The MEC consists of a coalition that aims to maintain the current status quo in the electrical energy sector and has seemingly worked to stall developments in the renewable electrical energy sector.
    - By implementing this recommendation, the relationships that continue to maintain the MEC can be weakened. Additionally, the regulation of lobbying activities can mitigate patronage and promote transparency which would protect public interests. Furthermore, the implementation of this recommendation would support balanced and informed policymaking.

However, due to the complexity of socio-technical transitions, the nine proposed policy recommendations would require simultaneous implementation and a concerted effort towards policy coordination across government departments. Bringing about a *just* electrical energy transition in South Africa will require sector reforms that will challenge deeply entrenched political and institutional frameworks that preserve the interests of the MEC.

The policy recommendations put forward in this research project have the potential to make a significant impact in the renewable electrical energy sector. By addressing the policy, infrastructure and institutional challenges that burden the entire electrical energy sector, implementing these recommendations can contribute to reliable electrical energy supply, equity, and environmental sustainability. It is critical that policy makers consider these recommendations.

This research project provided insights into the political economy of the renewable electrical energy sector and has contributed to existing knowledge. However, there exist limitations to the research project and opportunities for future research. A key limitation identified within the research project was the sample size, which was limited to 10 respondents. Future research would benefit from a larger sample size to enhance the validity and reliability of the findings. Additionally, the scope of the research project was limited, a broader scope would provide a richer understanding of the political economy of the renewable electrical energy sector. Based on the findings and limitations, the researcher identified two research areas that could be explored by academics.

It would be valuable to for academics to explore broader political economy dimensions within the entire electrical energy sector – beyond the two political economy dimensions identified in the research project. This undertaking could involve a larger study across the main stakeholders in the sector and also employ direct observational techniques to capture contextual factors and the nuances of policy processes.

Another area that warrants further research is the study of the Coal Lobby – composition of members, incentives, relationships, ideologies, and power. The research project focused on the State, Axes of Capital, and Eskom. However, there is a need to undertake a deeper exploration on the influence of the Coal Lobby on the political economy of the electrical energy sector to gain a comprehensive understanding of the underlying mechanisms that maintain the MEC.

Moreover, as previously mentioned, methodological improvements can enhance the insights gained from future research. For instance, incorporating direct observations and case studies alongside in-depth interviews could provide richer insights into the political economy of the electrical energy sector. Additionally, employing other qualitative analysis techniques, such as network analysis, may uncover hidden patterns of influence and relationships.

By addressing the identified limitations and exploring the proposed research topics, academics can further expand the understanding of the political economy of the renewable electrical energy sector. Moreover, through further investigation within these areas, researchers will be able to contribute to the development of more

effective policy interventions to mitigate the impact of the MEC on the renewable electrical energy sector and improve outcomes.

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Appendices

Appendix A
Semi-Structured Questionnaire

	Questions
	National government agencies and State-owned enterprises officials
1	Is South Africa shifting towards a low carbon energy path in the electrical sector? - Why do you believe that this is the energy path that South Africa is shifting towards? **[probe to determine hallmarks of socio-technical transition]**
2	What is the process of formulating and updating the Integrated Resource Plan? **Probe into key aspects:** - Demand forecasting and planning. - Energy mix determination. - Environmental considerations. - Water energy nexus. - Eskom's role. - Consultation process. - Just transition considerations. Is your department included in the consultative process? - Does your company provide inputs into this planning process? - Which inputs do you provide?
3	How do industrial policy owners integrate electricity and renewable electricity policies into the overall industrialisation policy framework? **Probe into just transition goals of IRP and inherent link into industrialisation to develop a localised green economy**
4	How is your department responding to an evolving electrical energy sector that is headed towards a low carbon path? **Probe into:**

	- Internal resistance. - Investments towards renewable electrical energy vs further investments into Fossil fuels and, - Sentiment towards the REIPPPP
5	What is the sentiment of your department towards REIPPPP? - Why? **[probing questions to understand key drivers of prevailing sentiment]**
6	Which departments and/or parastatals ensured that REIPPPP came to be implemented? - Which departments were instrumental in ensuring that REIPPPP comes back online following the hiatus? - Why? **[probe to ascertain positions and interests]**
7	Which departments and/or parastatals worked to stall the initial implementation of REIPPPP? - Which departments were instrumental in suspending REIPPPP bids? - Why? **[probe to ascertain positions and interests]**
8	How have these opposing actions/sentiments between the camps that support or stall REIPPPP been mediated? **[probe to determine attempts and lessons on mediation]**
9	How is REIPPPP helping develop a local green economy? - What is the impact of this economy? - What is preventing the Green economy from developing faster?
10	Who are the key drivers of the renewable electrical sector? - How did they negotiate and operationalise the sector?
11	Who are the key detractors of the renewable electrical sector? - How did they negotiate to stall the sector?
Members of the Intense Energy User Group South Africa	
1	Is South Africa shifting towards a low carbon energy path in the electrical sector?

	- Why do you believe that this is the energy path that South Africa is shifting towards? **[probe to determine hallmarks of socio-technical transition]**
2	What is the process of electricity planning by Eskom? **[probe to determine EIUG involvement and influence in electricity planning]** - Is your company included in the consultative process in relation to the electricity planning? - Does your company provide inputs into this planning process? - Which inputs do you provide?
3	What is the process of formulating and updating the Integrated Resource Plan? **Probe into key aspects:** - Demand forecasting and planning. - Energy mix determination. - Environmental considerations. - Water energy nexus. - Eskom's role. - Consultation process. - Just transition considerations. Is your company included in the consultative process? - Does your company provide inputs into this planning process? - Which inputs do you provide?
4	How is your company responding to an evolving electrical energy sector that is headed towards a low carbon path? **Probe into:** - Internal resistance. - Investments towards renewable electrical energy vs further investments into Fossil fuels and,
5	What is the sentiment of your company towards REIPPPP?

	- Why? **[probing questions to understand drivers of sentiment]**
6	How is REIPPPP helping develop a local green economy? - What is the impact of this economy? - What is preventing the Green economy from developing faster?
7	Who are the key drivers of the renewable electrical sector? - How did they negotiate and operationalise the sector?
8	Who are the key detractors of the renewable electrical sector? - How did they negotiate to stall the sector?
Members of the Renewable Electrical Energy Industry (private sector)	
1	Is South Africa shifting towards a low carbon energy path in the electrical sector? - Why do you believe that this is the energy path that South Africa is shifting towards? **[probe to determine hallmarks of socio-technical transition]**
2	What is the process of formulating and updating the Integrated Resource Plan? **Probe into key aspects:** - Demand forecasting and planning. - Energy mix determination. - Environmental considerations. - Water energy nexus. - Eskom's role. - Consultation process. - Just transition considerations. Is your company included in the consultative process? - Does your company provide inputs into this planning process? - Which inputs do you provide?
3	How do industrial policy owners integrate electricity and renewable electricity policies into the overall industrialisation policy framework?

	Probe into just transition goals of IRP and inherent link into industrialisation to develop a localised green economy
4	How is REIPPPP helping develop a local green economy? - What is the impact of this economy? - What is preventing the Green economy from developing faster?
5	How is the government/Eskom/EIUG responding to an evolving electrical energy sector that is headed towards a low carbon path? **Probe into:** - Internal resistance. - Investments towards renewable electrical energy vs further investments into Fossil fuels and, - Sentiment towards the REIPPPP
6	What is the sentiment of government/Eskom/EIUG towards REIPPPP? - Why? **[probing questions to understand key drivers of prevailing sentiment]**
7	Which government/Eskom/EIUG ensured that REIPPPP came to be implemented? - Which government/Eskom/EIUG were instrumental in ensuring that REIPPPP comes back online following the hiatus? - Why? **[probe to ascertain positions and interests]**
8	Which government/Eskom/EIUG worked to stall the initial implementation of REIPPPP? - Which departments were instrumental in suspending REIPPPP bids? **[probe to ascertain positions and interests]**
9	How have these opposing actions between the camps that support or stall REIPPPP been mediated? **[probe to determine attempts and lessons on mediation]**
10	Who are the key drivers of the renewable electrical sector? - How did they negotiate and operationalise the sector?

11	Who are the key detractors of the renewable electrical sector? - How did they negotiate to stall the sector?
Financiers (banks, donors, and private investors)	
1	Is South Africa shifting towards a low carbon energy path in the electrical sector? - Why do you believe that this is the energy path that South Africa is shifting towards? **[probe to determine hallmarks of socio-technical transition]**
2	What is the process of formulating and updating the Integrated Resource Plan? **Probe into key aspects:** - Demand forecasting and planning. - Energy mix determination. - Environmental considerations. - Water energy nexus. - Eskom's role. - Consultation process. - Just transition considerations. Is the IRP facilitating an inflow of investment into the renewable electrical energy sector? - Why or why not?
3	How is REIPPPP helping develop a local green economy? - What is the impact of this economy? - What is preventing the Green economy from developing faster?
4	How is the government/Eskom/EIUG responding to an evolving electrical energy sector that is headed towards a low carbon path? **Probe into:** - Internal resistance. - Investments towards renewable electrical energy vs further investments into Fossil fuels and,

	- Sentiment towards the REIPPPP
5	What is the sentiment of government/Eskom/EIUG towards REIPPPP? Why? **[probing questions to understand key drivers of prevailing sentiment]**
6	Which government/Eskom/EIUG ensured that REIPPPP came to be implemented? - Which government/Eskom/EIUG were instrumental in ensuring that REIPPPP comes back online following the hiatus? - Why? **[probe to ascertain positions and interests]**
7	Which government/Eskom/EIUG worked to stall the initial implementation of REIPPPP? - Which departments were instrumental in suspending REIPPPP bids? - Why? **[probe to ascertain positions and interests]**
8	How have these opposing actions between the camps that support or stall REIPPPP been mediated? **[probe to determine attempts and lessons on mediation]**
9	Who are the key drivers of the renewable electrical sector? - How did they negotiate and operationalise the sector?
10	Who are the key detractors of the renewable electrical sector? - How did they negotiate and operationalise the sector?
Academics	
1	Is South Africa shifting towards a low carbon energy path in the electrical sector? - Why do you believe that this is the energy path that South Africa is shifting towards? **[probe to determine hallmarks of socio-technical transition]**
2	What is the process of formulating and updating the Integrated Resource Plan? **Probe into key aspects:**

	- Demand forecasting and planning. - Energy mix determination. - Environmental considerations. - Water energy nexus. - Eskom's role. - Consultation process. - Just transition considerations. Are you or your colleagues included in the consultative process? - Does your institution provide inputs into this planning process? - Which inputs do you provide?
3	How is REIPPPP helping develop a local green economy? - What is the impact of this economy? - What is preventing the Green economy from developing faster?
4	How is the government/Eskom/EIUG responding to an evolving electrical energy sector that is headed towards a low carbon path? **Probe into:** - Internal resistance. - Investments towards renewable electrical energy vs further investments into Fossil fuels and, - Sentiment towards the REIPPPP.
5	What is the sentiment of government/Eskom/EIUG towards REIPPPP? - Why? **[probing questions to understand key drivers of prevailing sentiment]**
6	Which government/Eskom/EIUG ensured that REIPPPP came to be implemented? - Which government/Eskom/EIUG were instrumental in ensuring that REIPPPP comes back online following the hiatus? - Why? **[probe to ascertain positions and interests]**

7	Which government/Eskom/EIUG worked to stall the initial implementation of REIPPPP? 1. Which departments were instrumental in suspending REIPPPP bids? 2. Why? **[probe to ascertain positions and interests]**
8	How have these opposing actions between the camps that support or stall REIPPPP been mediated? **[probe to determine attempts and lessons on mediation]**
9	Who are the key drivers of the renewable electrical sector? 1. How did they negotiate and operationalise the sector?
10	Who are the key detractors of the renewable electrical sector? 2. How did they negotiate and operationalise the sector?
Civil society	
1	Is South Africa shifting towards a low carbon energy path in the electrical sector? 3. Why do you believe that this is the energy path that South Africa is shifting towards? **[probe to determine hallmarks of socio-technical transition]**
2	What is the process of formulating and updating the Integrated Resource Plan? **Probe into key aspects:** - Demand forecasting and planning. - Energy mix determination. - Environmental considerations. - Water energy nexus. - Eskom's role. - Consultation process. - Just transition considerations. Is your organisation included in the consultative process? 4. Does your organisation provide inputs into this planning process?

	5. Which inputs do you provide?
3	How is REIPPPP helping develop a local green economy? What is the impact of this economy? What is preventing the Green economy from developing faster?
4	How is the government/Eskom/EIUG responding to an evolving electrical energy sector that is headed towards a low carbon path? **Probe into:** - Internal resistance. - Investments towards renewable electrical energy vs further investments into Fossil fuels and, - Sentiment towards the REIPPPP
5	What is the sentiment of government/Eskom/EIUG towards REIPPPP? 1. Why? **[probing questions to understand key drivers of prevailing sentiment]**
6	Which government/Eskom/EIUG ensured that REIPPPP came to be implemented? 2. Which government/Eskom/EIUG were instrumental in ensuring that REIPPPP comes back online following the hiatus? 3. Why? **[probe to ascertain positions and interests]**
7	Which government/Eskom/EIUG worked to stall the initial implementation of REIPPPP? 1. Which departments were instrumental in suspending REIPPPP bids? 2. Why? **[probe to ascertain positions and interests]**
8	How have these opposing actions between the camps that support or stall REIPPPP been mediated? **[probe to determine attempts and lessons on mediation]**
9	Who are the key drivers of the renewable electrical sector? 1. How did they negotiate and operationalise the sector?
10	Who are the key detractors of the renewable electrical sector?

	2. How did they negotiate and operationalise the sector?

Appendix B
Covering Letter

Enquiries: Dr Lwazi Ngubevana

The African Energy Leadership Centre at WBS (Supervisor)

Tel: +27 (0)11 717 7396

Email: lwazi.ngubevana@wits.ac.za

2 St Davids Place
Parktown
Johannesburg
2050
[Date]

Participant Address

Dear Mr./Ms./Dr./Professor/H. E Ambassador (Title followed by Name)

My name is Zizipho Khayakazi Waxa, I am a Master of Business Administration student at the Wits School of Business. Part of the requirements in fulfilment of the Masters' qualification includes undertaking a research project. My research topic is ***'***

The Political Economy of the Renewable Electrical Energy Sector Within

the Context of South Africa's Energy Transition' My supervisor is Prof Lwazi Ngubevana. The research aims to answer the following question: ***How has the***

political economy of the renewable electrical energy sector impacted the electrical energy transition in South Africa?

Participation in this research is voluntary and will not include any remuneration or direct benefit. Correspondingly, there will be no disadvantages or penalties for not participating. You may withdraw at any time or not answer any question, should you wish to do so.

The responses will be completely confidential, and any information you provide during this process will not be used for any purpose other than the intended research.

The research will be embarked upon from the 11th of January; your voluntary participation in this study is kindly requested. Attached in this letter are:

- My contact details
- Consent Form
- Questions and areas of interest for discussion in our interview

The individual interview will be 45 minutes to an hour and will use semi-structured questions. Although the questions are attached, your willingness to probe further during the interview will be appreciated. Your participation will be treated with confidentiality and anonymity should you wish to do so. The findings of this research will be published by Wits library, and the researcher undertakes to discuss findings should you wish to discuss them at a convenient time after due process is concluded by the university.

Your participation will be greatly appreciated.

Should you have any questions, feel free to contact me on 083 255 0250 (WhatsApp), +48 510 835 369 (mobile) or alternatively on 452936@students.wits.ac.za.

Yours sincerely,

_____	_____
Ms. Zizipho K. Waxa	Prof Lwazi Ngubevana
	Research Supervisor

Appendix C

Table 1: Consistency Matrix

How has the political economy of the renewable electrical energy sector impacted the electrical energy transition in South Africa?			
Sub-Problem	**Literature Review**	**Source of data**	**Analysis**
Do the developments in South Africa's electrical energy sector constitute a socio-technical transition?	3. Post-Apartheid Electricity Policy and the Emergence of South Africa's Renewable Energy Sector. 4. Power shifts? The political economy of socio-technical transitions in South Africa's electricity sector 5. The Political Economy of Energy Transitions: The Case of South Africa 6. The South African Energy Sector Report 7. Integrated Resource Plan 8. Political Economy of Climate-relevant Policies: the Case of Renewable Energy in South Africa 9. Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The political economy dynamics driving a stuttering localisation process	Interview	Thematic
How is electrical energy policy formulated in South Africa?	1. The Political Economy of South African Industrialisation-The Role of the Minerals-Energy Complex 2. National Development Plan 2030 Our Future-make it work 3. Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The political	Interview	Thematic

	economy dynamics driving a stuttering localisation process 4. The Decline and Fall of Eskom: A South African Tragedy 5. THE SOUTH AFRICAN RENEWABLE ENERGY IPP PROCUREMENT PROGRAMME: Review, Lessons Learned & Proposals to Reduce Transaction Costs		
How are the principles of a just electrical energy transition reflected in policy making?	1. The South African energy sector report 2. Integrated resource plan 3. A just energy transition to facilitate household energy access and alleviate energy poverty 4. Energy and industrial policy failure in the South African wind renewable energy global value chain: the political economy dynamics driving a stuttering localisation process	Interview	Thematic
How is the MEC reacting to a transitioning electrical energy sector?	1. Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The political economy dynamics driving a stuttering localisation process 2. Power shifts? The political economy of socio-technical transitions in South Africa's electricity sector 3. Post-Apartheid Electricity Policy and the Emergence of South Africa’s Renewable Energy Sector	Interview	Thematic

	4. The Political Economy of Energy Transitions: The Case of South Africa **5.** An analysis of collective ownership models to promote renewable energy development and climate justice in South Africa		
What are the positions and interests of the State and non-State actors in the electrical energy sector (including renewable electrical energy)?	6. Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The political economy dynamics driving a stuttering localisation process 7. Power shifts? The political economy of socio-technical transitions in South Africa's electricity sector 8. Post-Apartheid Electricity Policy and the Emergence of South Africa's Renewable Energy Sector 9. The Political Economy of Energy Transitions: The Case of South Africa 10. An analysis of collective ownership models to promote renewable energy development and climate justice in South Africa 11. The Political Economy of South African Industrialisation- The Role of the Minerals-Energy Complex	Interview	Thematic

What is the history and lessons from the attempts to address these positions and interests in the electrical energy sector?	12. Power shifts? The political economy of socio-technical transitions in South Africa's electricity sector 13. Post-Apartheid Electricity Policy and the Emergence of South Africa’s Renewable Energy Sector 14. The Political Economy of Energy Transitions: The Case of South Africa	Interview	Thematic
How was the emergence of a renewable electrical energy sector negotiated and operationalised, and who were the drivers or detractors of this emergence?	15. Power shifts? The political economy of socio-technical transitions in South Africa's electricity sector 16. Post-Apartheid Electricity Policy and the Emergence of South Africa’s Renewable Energy Sector 17. The Political Economy of Energy Transitions: The Case of South Africa	Interview	Thematic
How does a political economy approach to South Africa’s electrical energy debate contribute to a just electrical energy transition framework to produce policy recommendations in the electrical energy sector?	1. Power shifts? The political economy of socio-technical transitions in South Africa's electricity sector 2. Post-Apartheid Electricity Policy and the Emergence of South Africa’s Renewable Energy Sector 3. The Political Economy of Energy Transitions: The Case of South Africa	Literature review	Thematic

	4. Connecting political economies of energy in South Africa 5. The justice and equity implications of the clean energy transition 6. Towards a just and equitable low-carbon energy transition 7. What about the politics? Sustainable development, transition management, and long-term energy transitions 8. Political Economy of Climate-relevant Policies: the Case of Renewable Energy in South Africa 9. Energy and Industrial Policy Failure in the South African Wind Renewable Energy Global Value Chain: The political economy dynamics driving a stuttering localisation process 10. The Political Economy of South African Industrialisation- The Role of the Minerals-Energy Complex		

Appendix D

Table 1: Interview Schedule

Respondent interviews selected for analysis		
Code	**Affiliation**	**Interview Method**
Respondent 1	EIUG	Teams
Respondent 2	National government agencies and State-owned enterprises	Mail Correspondence
Respondent 3	National government agencies and State-owned enterprises	Teams
Respondent 4	Renewable Electrical Energy Industry & Civil Society	Teams
Respondent 5	Renewable Electrical Energy Industry	Teams
Respondent 6	Renewable Electrical Energy Industry & National government agencies and State-owned enterprises	In-person Meeting
Respondent 7	Academic & EIUG	Teams
Respondent 8	National government agencies and State-owned enterprises & Academic	Teams
Respondent 9	National government agencies and State-owned enterprises, Financiers & Academic	Teams
Respondent 10	Financiers, National government agencies and State-owned enterprises & Renewable Electrical Energy Industry	Mail Correspondence