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The socio-economic impact of Eskom's Just Energy Transition on the town of eMalahleni, Mpumalanga Province

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A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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ABSTRACT

The United Nations Framework Convention on Climate Change (UNFCCC) established the need to reduce global warming by lowering temperatures. This involves the reduction in fossil power plants which are a major source of global warming. South Africa (SA) relies heavily on fossil power plants and Eskom is now transitioning toward the reduction of fossil energy generation. However, the impact of this transition is not yet understood fully. This calls for research into the socio-economic impacts of the transition, specifically in the town of eMalahleni, which is the largest source of coal in SA. Understanding these impacts will therefore assist in designing a transition which minimises the negative impacts and maximises positive impacts. The study adopted a qualitative approach with a case study to understand the socio-economic impacts of the Just Energy Transition (JET) in eMalahleni. Descriptive and thematic analyses were utilised. The study found that this JET would result in a loss of income and jobs, increase social ills and the expansion of 'ghost towns' in SA. The results suggest that this impact could be mitigated by using the gradual approach, upskilling plant employees, providing financial support and ensuring fairness between those who will lose their income and jobs and those who will gain jobs and income thus the losers can be compensated. It was concluded that the negative socio-economic impacts of the JET in eMalahleni are inevitable. People of eMalahleni are going to face the negative consequences from the energy transition. It was also concluded that there are positive impacts on the people of eMalahleni from the energy transition such as the improvement in the environment and health of people due to less carbon emissions. However, there are ways to mitigate these impacts, which are far outweighed by the positive impacts the change in power generation would bring. From the research, it is clear that a slow transition would ensure fairness and justice for all employees involved.

Keywords: Just Energy Transition, Fossil, Eskom, Decarbonisation, Socio-economic, eMalahleni

DECLARATION

I, Maila Bildard Mamoleka, declare that this research report entitled 'The socio-economic impact of Eskom's Just Energy Transition on the town of eMalahleni, Mpumalanga Province' is my own unaided work. I have acknowledged, attributed, and referenced all ideas sourced elsewhere. I am hereby submitting it in partial fulfilment of the requirements of the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. I have not submitted this report before for any other degree or examination to any other institution.

……

Maila Bildard Mamoleka

Signed at ……

On the …….. day of …… 20…..

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LIST OF ABBREVIATIONS

Abbreviation	Description
C	Celsius
EE	Energy Efficiency
ESRB	European Systemic Risk Board
GHG	Greenhouse Gas
ILO	International Labour Organization
JET	Just Energy Transition
RES	Renewable Energy Sources
RQ	Research Question
SA	South Africa
SDGs	Sustainable Development Goals
SOE	State-owned Enterprises
SPSS	Statistical Package for the Social Sciences
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
US	United States

CHAPTER 1: INTRODUCTION TO THE RESEARCH

1.1 CONTEXT OF THE STUDY

As stated by United Nations Framework Convention on Climate Change (UNFCCC) global warming is required to be kept below 2ºC above pre-industrial levels, with the United Nations (UN) Climate Change Conference in Paris that took place in November 2015, putting forward a more ambitious target of 1.5ºC (European Systemic Risk Board [ESRB] Advisory Scientific Committee, 2016). This will require a notable reduction in the global greenhouse gas (GHG) emissions over the upcoming few decades, which would be possible by lowering carbon intensity and using current technology to shift away from fossil-fuel energy and related physical capital. In a benign scenario while the transition to a low-carbon economy occurs gradually and in the adverse scenario, the transition to a low-carbon economy will be a delayed yet abruptly occurrence (Gros *et al.*, 2016). It is, therefore, necessary to understand the impact that the transition to a low-carbon economy will have on a country, specifically within a developing country such as South Africa (SA). The impacts may be positive or negative; hence, it is necessary to understand whether the negatives outweigh the positives and *vice versa*. Negative impacts can come in different forms but the most severe of these would be socio-economic impacts. These would immediately affect energy generation; therefore, the impact of the Just Energy Transition (JET) in areas where high carbon sources are used must be investigated. Mpumalanga is one of the areas in SA that relies on energy generation from coal, which is high in carbon and the JET by Eskom may see the province suffering in different aspects. The town had a population of about 485,000 in 2022 and it mainly relies on electricity generation from coal (All-populations.com, 2022).

Some social dynamics will arise in a shift in electricity generation from coal to alternative sources of energy, such as job losses. The town under investigation in this paper, namely eMalahleni, relies on the entire energy generation chain thus a whole town and its workforce would be affected by a transition. These jobs include general labour, white-collar, and blue-collar jobs. Moreover, some would need to relocate to find other forms of employment. However, whilst this may be daunting for some families and employees, others may benefit from the transition. Jobs would be created in alternative energy production; however, this could be limited as the plant may not have prepared its employees well enough for the change.

There are concerns about the impact that the transition from electricity generation using coal to green energy will have on society and the economy in Mpumalanga. This study will, therefore, investigate the socio-economic impact of Eskom's transition on the town of eMalahleni which houses the majority of the coal-fired power stations in Mpumalanga.

1.2 PROBLEM STATEMENT

There is an increased pace toward a low-carbon economy in the world (Muttitt, 2016). The Paris Agreement, the emergence of low-cost renewable energy and extensive policy action across the world are all contributing to speeding up towards the transition to a low-carbon economy. The acceleration is associated with many benefits for the economy, but it also calls into question the degree to which the transition may affect communities, economic sectors, and regions in South Africa adversely. In South Africa, eMalahleni is one of the areas with coal-fired generating power stations that employ a large number of people. The people of eMalahleni rely on the power stations for income.. The transition may result in negative impacts to the town of eMalahleni which may include increasing unemployment as the economic activity is reduced. The impact may also include deteriorating livelihoods as people lose their jobs and income. People of eMalahleni may not be able to maintain their livelihoods as before the energy transition. It is, therefore, unclear whether the energy transition to renewable energy will do better than harm in eMalahleni. The current study, therefore, aims to investigate the socio-economic impact of the JET by Eskom in eMalahleni, Mpumalanga and identify the mitigations to the adverse impacts.

1.3 PRIMARY RESEARCH QUESTION

What is the likely socio-economic impact of Eskom's JET on eMalahleni?

1.4 SECONDARY RESEARCH QUESTIONS

1) What is the likely socio-economic impact of the JET on employment and livelihood in eMalahleni?
2) What can be done to mitigate the adverse impacts of the JET in eMalahleni?

1.5 RESEARCH AIM

The study aims to investigate the socio-economic impact of the JET by Eskom on eMalahleni in Mpumalanga.

1.6 RESEARCH OBJECTIVES

The objectives of the study are to:

1) To examine the potential impact of the JET on employment and livelihood in eMalahleni; and
2) Identify measures to mitigate potential adverse impacts of the JET in eMalahleni.

1.7 SIGNIFICANCE OF THE STUDY

The transition from fossil power plants is inevitable and hence preparation is necessary. To prepare for it, the impact that the transition will have on the economy, especially at the town or provincial level must be known. Knowing the impact of the transition will assist in better planning and identifying the measures that can be taken to mitigate the impact of the transition. The current study will specifically look at the socio-economic impact of the JET on the town of eMalahleni since it is a town which currently mainly relies on fossil power plants.

1.8 RESEARCH LIMITATIONS

1) The study is limited to eMalahleni and there are other SA towns which may not have the same results; hence, the results of the current study may not be generalised; and
2) There might be bias from the respondents who are affected by the transition.

1.9 LIMITATIONS OF THE STUDY

1) The study is limited to one town, as that is what was manageable; and
1) The study will mainly consider the coal-fired power stations and their stakeholders.

1.10 RESEARCH ASSUMPTIONS

2) All the power stations are moving towards renewable energy; and
3) Other impacts except socio-economic impacts are assumed to be known already.

1.11 ORGANISATION OF THE REST OF THE REPORT

The rest of the report is organised in 5 sections which are the chapter 2 (Literature review, chapter 3 (Research methodology), Chapter 4 (Presentation of the results, Chapter 5 (Discussion of the results) and Chapter 6 (Summary).

CHAPTER 2: LITERATURE REVIEW

2.1 INTRODUCTION TO LITERATURE REVIEW

In various countries, sectors and regions, the ongoing energy transition to a low-carbon energy generation is highly likely to accelerate (Gambhir *et al.*, 2018). The UNFCCC Paris Agreement created momentum to reduce GHG emissions and energy users are now looking for alternatives to carbon-intensive energy sources (ESRB Advisory Scientific Committee, 2016). From a climate change perspective, the momentum created is positive, but it requires to understand how a low-carbon transition might benefit all stakeholders. It is, therefore, necessary to understand the impact that the transition to renewable energy would have on the different sectors and regions of the economy. To understand the impact, the findings from previous studies will be reviewed in this chapter; this review will also allow the building of a framework that can be used for the current study. Moreover, the literature review will assist in identifying any literature gaps that will need to be filled by the current study. This section, therefore, reviews the literature on the socio-economic impact of the transition from non-renewable energy to renewable energy on economies, regions, and sectors.

2.2 DEFINITION OF TERMS

‘Just’ refers to justice and energy. Justice relates to several aspects which include normative issues (Gambhir *et al.*, 2018). According to Sovacool *et al.* (2015), there are eight principles of energy justice namely availability, affordability, transparency, due process, inter-generational equity, sustainability, intra-generational equity, and responsibility.

'Transition’ refers to the gradual movement towards low-carbon emissions. The transition is difficult to measure in terms of what gradual means and the extent to which it is gradual (Gambhir *et al.*, 2018).

2.3 JUST TRANSITION AGENDA

The term ‘just transition’ is now widely recognised and is embodied in the UN International Labour Organization’s (ILO) 2015 *Guidelines on a just transition towards environmentally sustainable economies and societies for all* (Gambhir *et al.*, 2018). Just transition has become a central aspect of the energy transition to low-carbon energy, originating in the late 1970s when labour unions in the United States (US) were seeking workers’ support in pollution-high industries whose jobs were under fire by environmental regulations (Gambhir *et al.*, 2018).

The transition has been referred to as a just transition to factor in justice, which is expected to prevail for the parties that will be affected by the transition, such as workers and other stakeholders in the mining industry (Hägele *et al.*, 2022). Hägele *et al.* (2022) argue that if the different tenets of justice are addressed, the socio-economic impacts will be reduced. Thus, justice involves the impact being reduced by providing a transition for those affected, such as creating jobs for anyone who might lose theirs in the process.

In the first body of work on just transition, academics took a historical perspective on the idea's evolution and further explored how it might be used in the modern world. Numerous academics emphasised how the idea of a just transition developed from labour movements and how it saw the economic and energy transitions as being inextricably intertwined. The failure of some companies to adapt as a result of failing to satisfy environmental standards had a detrimental impact on employment during the 1970s. Thus, for a very long time, labour unions have been a crucial voice for people who are facing widespread unemployment, providing a gateway for the just transition principles to be introduced to protect employees within the sector.

According to Wang and Lo's (2022) findings, injustice concerning low-carbon transitions arises not only from the fossil fuel industry decline but also from the inequitable distribution of benefits. Researchers such as Middlemiss (2020) and Carley and Konisky (2020) point out that renewable energy, the so-called green jobs creators, may not benefit marginalised populations. The representation of women and people of colour in the US solar industry workforce is well below the national average for most of the other groups. In Germany, solar energy shares many of the same inequalities that characterise the fossil fuel industry, resulting in the creation of localised sacrifice zones. Historically, roles within the Energy sector have been male dominated. Strikingly, the disproportionate distribution of low-carbon energy technologies and rising electricity prices caused by such transitions raise major concerns for environmental justice and energy issues (Wang & Lo, 2022).

The just transition is not only a labour–oriented concept but it can also be an social and economic framework for change. In this case, it will include the tenants such as environmental justice (Bowen, 2002). The environmental justice movement has a long history of leading the struggle for marginalised populations who are very much affected by the inequality of environmental protection (Schlosberg, 2004). Bowen (2002) argues that environmental justice proponents contend that all residents should have an equal say in the

creation, implementation, and enforcement of environmental justice laws and those underprivileged groups should not be forced to bear an unfair share of the burden of environmental harm. Wang and Lo (2022) advocate that the environmental justice idea adopts a more comprehensive approach to identify who is harmed, in what ways, and how to solve such disparities in light of the awareness that the causes of environmental degradation are entrenched in political, economic, and cultural imbalances.

Climate justice must also be considered in an integrated framework. Since they both have activist roots, the ideas of environmental justice and climate justice have developed in lockstep (Harris, 2019). The climate justice movement unites a broad and diverse range of organisations that work to challenge the structures that cause climate change and place disproportionate environmental costs and risks on weaker groups (Bowen, 2002). According to Harris (2019:16), responding to climate change challenges should be "fair, equitable, and right," and the author defines climate justice as a broader notion of justice in this way.

2.3.1 Just Transition Framework in SA

In August 2022, SA's Cabinet of Ministers approved the Just Transition Framework, which was published by the Presidential Climate Commission in July 2022 after rounds of broad consultation, for implementation. The Cabinet also indicated that a highlighted a detailed plan would be developed for integration into government planning and budgeting (Creamer, 2022). The Framework estimates that SA will need an estimate of US$250 billion over the next three decades to transform its energy system, as well as at least US$10 billion to minimise the impact of the transition by supporting workers and communities with compensation, retraining, relocation, and rehabilitation of regions and communities. The nation is at this present time working on a JET Partnership Investment Plan that can unlock US$8.5 billion in concessional finance from developed-country governments to accelerate SA's transition from electricity generation using coal to renewable energy whilst supporting people who are currently relying on the coal supply chain. The framework outlines the actions social partners should take to minimise the negative societal and financial impacts of such a transition on those either linked to carbon-intensive activities or who are most exposed to climate variation impacts. It also defines the principles and policy measures for transitioning to greater climate resilience.

2.4 DRIVERS OF THE FAST-PACED LOW-CARBON TRANSITION

The sudden increase of the bottom-up drive leading to the end of the 2000s by institutional investors, multinational corporations, local community groups and subnational authorities is one of the major drivers of the low-carbon transition (Gambhir *et al.*, 2018). The bottom-up initiatives have identified possibilities of moving to the low-carbon transition and how these groups will benefit from such a transition; hence this has pushed the pace towards low-carbon transition (Carley *et al.*, 2020). Additionally, there is a growing realisation that the costs and other barriers to low-carbon transition than what has previously been thought about. The low cost of the low-carbon technology has made it cost-effective and hence this has driven the transition to low-carbon since it has proved to be beneficial. According to Gambhir *et al.* (2018), in their report on a just and equitable energy-free transition, the scientific community is also a driver of low-carbon transition since it has presented the risk of climate change. This has prompted people to consider the low-carbon transition to avoid the risks associated with climate change. In the economic space there are financial opportunities and risks. The report further indicated that the *New Climate Economy* report on the financial prospects and gains of decarbonisation is also the driver of the rapid low-carbon transition.

2.5 SOCIO-ECONOMIC IMPACT OF LOW-CARBON TRANSITION

This section outlines the socio-economic impact of low carbon transition from previous studies.

2.5.1 Loss of skills and unemployment

In their study, Helm (2017) found that there are certain regions in the world that experience detrimental effects from the low-carbon transition; such areas include Russia and the Middle East since their economies depend on oil and gas. The study argued that some sectors will suffer if they transition because they lack the skills that are needed for low-carbon energy generation. In contrast, Nahm and Steinfeld (2014) argue that certain countries such as China have developed unique technological capabilities in commercialisation and innovation related to manufacturing. In Germany, Galgóczi (2014) looked at the radical change from a steel-based and coal-founded economy to a knowledge-driven economy. It was found that the former coal mine employees also found employment in building restoration and some plants converted the former mining areas into plantations which would create more employment. Thus, the socio-economic impact of an energy transition is not only negative but there are

positive impacts as well. Galgóczi (2014) believes that collaboration between the government, municipalities, employers, and labour unions, as well as a clear future outlook backed by a complete regulatory framework, are essential for a successful transformation.

Levels of unemployment will rise due to various reasons (such as the lack of skills, as mentioned). Helm (2017) found that some sectors will suffer in during the transition because they lack the skills that are needed for low-carbon energy generation. In short – those with outdated skills will become unemployed. However, unemployment can also result from the reduction in the need for manpower, as some renewable energy is so innovative that it requires a less hand-on approach.

In Australia, Evans and Phelan (2016) focus on coal mining in Australia, a field that employs 16% of the population. The mining sector accounts for a third of the national economic activity. They argue that communities need civil movements that incorporate environmental law and fair transitions to be more stable, that focus on equal results during these changes. Australia's transition was, overall, positive. This could be owed to the Workforce Transition Committee, which ensured that the closure was orderly, as well as the Pathways Recruiter Services, which was set up to target employee retention. Local advocacy organisations and governments must take an active role in extending the economic basis of their communities by creating new skills and technology and supporting new enterprises. Wiseman *et al.* (2017) suggest that political-economic institutions and conditions can ensure somewhat orderly and just transitions. However, in Australia, politics regarding climate policy and coal regions played a role as it was not conducive to long-term transition planning and cooperation between employees, corporations, and the government.

2.5.2 Poverty

The energy transition is also associated with some poverty dynamics, as the poor are afraid of becoming poorer. Luciani (2022) provides several notable findings. Unless fully countered by declining returns on industrial investment or interest rates on borrowed capital, an increasing capital injection ratio automatically results in a growing percentage of revenue going to capital. Although interest rates are historically low, there is no sign that businesses are willing to take lesser profits. On another note, because risk perception has grown significantly, and the energy sector's view of decarbonisation has elevated risk even more. As a result, the energy transition's increase in the capital/output ratio also unavoidably leads to a swift change

in income from labour to funding, which results in a rise in income and wealth inequality. The impact of rising energy prices on various income groups must be added to this influence on income distribution. Since energy costs make up a higher portion of the budgets of poorer households, it is generally agreed that rising energy costs have a regressive effect on income distribution. Households are also expected to make investments to reduce the cost increase, such as investing in new electric vehicles or home insulation, yet the great majority of households have neither net savings nor borrowing capacity. Richer households can, therefore, invest to offset the increased cost, while poorer residents will simply have to face the brunt of the decarbonisation program (Luciani, 2022).

In Africa, most governments are facing the issue of removing fossil fuel subsidies in the changeover to a carbon free future (Gambhir *et al.*, 2018). The money saved by removing such subsidies can provide governments with funds which can be used for social protection programs which will mitigate the impact of the increasing energy prices when subsidies are removed. In Ghana, the government began removing subsidies on petroleum in 2005, with compensating measures aimed at improving the poorest members of society (Gambhir *et al.*, 2018). This, therefore, shows that the energy transition will not only result in poverty, but it can also result in lessening poverty with the intervention of the government which will then shift some resources toward assisting the poor.

2.5.3 Economic growth and employment

On a positive note, some studies have found that the energy transition will result in improved economic rise and job creation. According to Wei *et al.* (2010) and Cameron and van der Zwaan (2015), the energy shift will have macroeconomic effects on employment and economic growth, among other things. These are brought on by funding in renewable energy sources (RES) and energy efficiency (EE) measures, changes in the need for labour and other primary and intermediate inputs in the electricity generation industry, decreased imports of fossil fuels, changes in electricity pricing, and decreased energy demand. The energy transition involves radical restructuring changes that have an impact on the sectorial and geographical sharing of economic added value in addition to its effects on the economy as a whole (Sievers *et al.,* 2019).

Another view on economic growth is given by Sievers *et al.* (2019), who state that investment will be increased and improved during the transition. It was found that there are direct effects

which will materialize in the sector that provide the operation and maintenance of the technologies that are utilized in the energy transition - for example, solar technology. There are also direct positive effects on sectors equipping the capital goods for the energy transition which is in the sectors that manufacture sustainable energy (Sievers *et al.*,2019). On this note, it has been found that there will be some negative effects on the industries that supply capital goods in conventional energy technologies. In support of these views, Luciani (2020) discusses the impact of the transition on the allocation of income to investment versus consumption by looking at the GDP. Two key main effects are at play. The first is the existing capital stock's accelerated obsolescence. Fixed assets will get stranded even though they have decades or years of technological life left in them. This has an impact on Net Fixed Capital Formation, which is calculated as Gross Fixed Capital Formation less the replacement of worn-out capital from the existing stock. Investment is defined as the whole amount of structures and machinery added to the production process. Accelerated obsolescence refers to the fact that more of the new fixed capital acquired yearly will be used to offset the retirement of older capital rather than boosting output. A predicted rise in the capital or output ratio, also known as greater capital intensity, is the second effect. As previously indicated, the energy business has always required a fair amount of capital, but in a world that is decarbonising, this will only increase. The characteristics of almost all RES are high initial investment costs and low ongoing operating expenses. The latter are primarily maintenance expenses that are unrelated to the level of production, whereas marginal costs could be non-existent or insignificant.

These different studies have found different socio-economic impacts of the transition to low-carbon energy. However, information on the impacts in SA is still lacking.

2.6 MEASURES TO MITIGATE THE ADVERSE IMPACTS OF JET

The measures to mitigate the adverse impact of JET from the literature will be outlined in this section.

2.6.1 Foresight and timing

The transition to low-carbon energy will take time and several processes and activities are needed to ensure a just transition. As there is a need for gradual adjustment, the transition must be agreed upon amongst stakeholders who will put measures in place based on past experiences. Muttitt (2016) notes that a sudden change will be disruptive, costly and painful.

The transition should therefore be managed efficiently and fairly to the maximum benefit of everyone who is involved. This argument is supported by Trebilcock (2014), who focuses on gradualism, states it could include border tax adjustments to protect local industries which are carbon-intensive from losing out to the less regulated overseas competitors in the short term. Gambhir *et al.* (2018) argue that there is a risk that these policy measures may be too late for the transition that is already gathering pace based on the bottom-up economic fundamentals, as well as the top-down policy action which may limit the scope of the policymakers. This means that the window of opportunity for gradual adjustment may be shrinking with regard to public policy.

2.6.2 Active industrial policy

The case studies of successful transitions from high carbon content such as coal mining, or other declining industries, show that active government intervention plays a significant role in pushing areas toward new and alternative businesses, including 'green' sectors (Gambhir *et al.*, 2018). There are proactive and reactive policies that can be used. The reactive policies aim at assisting workers in the sectors that are negatively impacted by the transition. The proactive policies aim at optimising the long-term advantages of the changeover. Bridle *et al.* (2017) recommended policy prescriptions of short-term welfare or early retirement for the workers. The UNFCCC's (2016) report recommends that there should be higher education and technology centres to support the workforce in being better equipped for the change. Caldecott *et al.* (2016) point out that governments have incurred enormous costs in trying to support the company with declining profits and workers.

2.6.3 Multiple and coordinated stakeholders

It has been argued that there is a need for dialogue and coordination between the government, businesses, and labour unions. The ILO guidelines have advocated for such a dialogue. Different measures have been proposed by studies reduce the effects of the low-carbon transition and the objective remains to find the measures that can be used in SA.

The literature review shows that a just transition is on the world agenda due to its positive outcomes. The bottom-up initiatives, the scientific community and the opportunities from the just transition are some of its drivers. The socio-economic impacts of the just transition include the displacement of jobs in certain sectors of the economic sectors. There will be a shortage of skills in the new energy generation industry and income will be reduced as well in

certain sectors of the economy. However, positively, new skills will be developed within the low-carbon sector. The transition must be supported by institutions and programs, as well as measures, that ensure a slow and steady changeover; these measures include foresight and timing, active industrial policy and multiple and coordinated stakeholders.

Whilst literature has indicated the positive and negative impacts, it is still unclear how an economy can be affected by a rapid transition. There are too few studies that investigate the impacts of a JET in SA, with little clarity on how towns would be affected - especially those that rely on coal-fired power stations. This calls for research into actual socio-economic impacts on towns that rely on high-carbon energy generation activities. This study will, therefore, investigate the socio-economic impacts of Eskom's JET on the town of eMalahleni in Mpumalanga, thus adding to the stock of literature.

2.6.4 Just transition

The energy transition is not obviously 'just'. The World Banks's findings (presented in their Agenda for Action on Climate and Development) state that even though the climate policies may have a beneficial effect in totality, they can have large negative impacts on specific communities, sectors and regions that minimise these positive impacts. One of the ways to minimise these impacts is to use a 'just' transition. It has been put forward that to design programs and policies that will help impacted workers and their families transition to alternative livelihoods and sustainable and growth-enhancing economic activities, a just transition necessitates thinking broadly about impacted workers and their families. Education, labour market policies, and conducive regulatory environments all play important roles in this. The just transition involves identifying the role to equip people with the skills and information they need to make the transition - there is a need for learning, reskilling, active labour market programs, and investing in people. Labour market laws can also help to ease and lower the macroeconomic cost of transformation. Training policies that go along with them will equip people and make it easier for them to access new options for sustainable employment and entrepreneurship. A foundation for determining which sorts of employees would be impacted by the deterioration of climate change and the challenges of moving to better employment come from profiling workers in relevant industries (by skill level, gender, mobility, and vulnerable group) (World Bank, 2022).

One of the ways to ensure a just transition is to consider democracy; a lack thereof will result in policies that will speed up the transition. For example, in China, the transition has been fast paced by the government's policies (Wang & Lo, 2022). The Chinese Government favours a integrated, one-size-fits-all approach to governing the energy transition to hasten the low-carbon transition. The formulation and implementation of China's energy transition policies have strict command-and-control policies and a non-participatory policymaking process, which assist in advancing a rapid energy transition (Wang & Lo, 2022). This contrasts with energy transition processes in liberal democracies, which are typically participatory and gradual. Nonetheless, there are occasions when the central and local governments' incentives and motivations for energy changes are incompatible (Malakar *et al.*,2019).

2.6.5 Inclusion

Beyond reskilling, countries should also consider the interests of poor communities in the transition toward a low-carbon economy (Luciani, 2022). It has been noted in the literature that the energy transition can make poor people poorer, hence it is imperative to include them in the matters of the energy transition to reduce its impact. Authors such as Malakar *et al.* (2019) and Wang and Lo (2022) have found that there is a need for the inclusion of affected parties who are affected by the energy transition – thus ensuring just transitions. Understanding how the poor are affected by the energy transition is one way to include the poor; for example, studies in Africa have indicated that the transfer of subsidies from fossil power generation to communities can be used in supporting the poor.

2.7 THEORETICAL FRAMEWORK

The study will follow an integrated framework, as developed by Hägele *et al.* (2022). The framework jointly applies the issues of energy justice and 'just transition'. It shows how the two concepts can be applied used to successfully implement energy transitions and thereby achieve the 2030 Zero Carbon Agenda. The framework looks at the theoretical education of energy justice and its practical grounds as is shown in Figure 1 below.

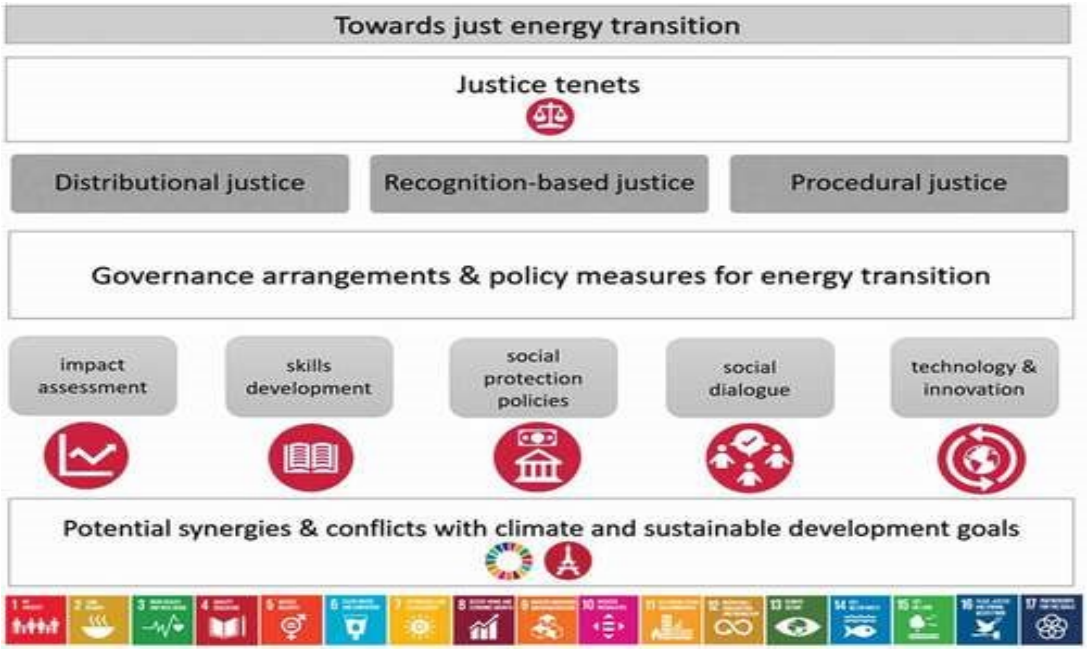


Figure 1: Theoretical framework for JET (Source: Hägele *et al.*, 2022)

From Figure 1, the guiding framework focuses on the tenets of justice, and these form the basis of the socio-economic impacts of the JET. If justice is served in all tenets, it is expected that the negative socio-economic impacts will be reduced as well, and sustainable development goals (SDGs) will be achieved. An impact assessment forms a part of the framework; therefore, this study will investigate the socio-economic impact of the JET in Mpumalanga.

Distributional justice is addressed through the assessment of employment, and socio-economic impacts of transition. According to Jenkins *et al.* (2016), skills development and measures to permit transitions in labour markets are linked to both distributional and recognition-based justice because dedication adds to the distribution of benefits and considers overlooked social groups.

For recognition-based justice to protect employees and disadvantaged groups, social protection programs are required (Plagerson & Ulriksen, 2016). Social discourse is crucial to procedural justice and can guarantee an optimum outcome in recognition-based justice by enabling for the inclusion of more voices (Jenkins *et al.*, 2016). Such discussions promote representative and inclusive adoption of decisions (SDGs 10 and 16), and social welfare programs can aid in lowering inequality and poverty (SDGs 1 and 10).

Energy transitions' socio-economic implications have sparked efforts to make sure that these transitions are fair. The term just transition dates back to the 1980s when labour organisations push/ed for worker justice and a reduction in socio-economic disturbances in sectors that were heavily impacted by environmental regulations (Goddard & Farrelly, 2018; Stevis & Felli 2015). Since just transition has expanded over time for unions and their allies, unions are now directly linking just transition to climate action on climate change and stable development.

Justice theory serves as the foundation of just transition since it addresses issues of fairness, equity, and trade-offs between various demands and goals (Newell & Mulvaney, 2013). Energy policy decision-makers must balance the competing interests of elites and powerful players with the lives and energy requirements of impacted people, particularly in the context of fast energy changes (SDGs 7 & 10). Here, discussions on socio-technical transitions centre on issues of justice and equity (Heffron & McCauley, 2017; Jenkins *et al.*, 2016; McCauley & Heffron, 2018).

Local innovation and prudent investments could improve procedural and distributional justice while knowledge and technology transfer between/within nations supports recognition-based justice and improves procedural justice. With the latter step, local expertise would be mobilised, the private sector would be involved as a stakeholder, employment would be created, economic activity would benefit more people in the nation, and negative effects would be managed through responsible investment (Jenkins *et al.* 2016).

2.8 EMALAHLENI TOWN

East of Pretoria in the SA province of Mpumalanga is the city of eMalahleni, originally known as Witbank. It was founded in 1890 as Witbank and is located in the heart of a coal-mining region that is home to more than 20 collieries. The eMalahleni Local Municipality serves as a gateway municipality and town into the province for eight of the nine provinces of SA due to its strategic location within Mpumalanga. A power plant at the Witbank Dam provides electricity to a large area, and the city has expanded quickly around heavy industries. Numerous leisure activities are available at the dam, in its watershed, and in nearby nature reserves. After the City of Mbombela, eMalahleni is the province's second-largest economic contributor in Mpumalanga province.

In 2018, it contributed 18% to provincial GDP and it was estimated that the eMalahleni economy was worth R66 billion. The mining industry is the most robust sector, accounting for

over 55% of eMalahleni's economy in 2017. The town had an approximate population of 485,000 in 2022, and it depends considerably on coal for power production (All-populations.com, 2022). The unemployment rate in eMalahleni declined from 27.3% in 2011 to 25, 4% in 2015, and 26.6% in 2016 (Emalahleni Local Municipality, 2022).

The literature has identified various issues and drivers in line with the transition to low-carbon energy generation. These drivers include:

4) the bottom-up initiatives towards the end of the 2000s by institutional investors, multinational corporations, local community groups and subnational authorities.
5) the growing realisation of expenses and other obstacles to low-carbon transition than what has been assumed in the past.
6) the role of the economic community in highlighting the financial opportunities and risks alliances in emphasizing the economic opportunities and threats.

From the literature, the socio-economic impact of the JET includes the loss of employment and income, social ills and shortage of energy. Various mitigating measures included foresight and timing, active industrial policy, and multiple and coordinated stakeholders. The literature has neglected SA, yet it is a country which relies heavily on fossil power plants. Therefore, it is necessary to understand the socio-economic impact of the JET in SA.

CHAPTER 3: RESEARCH DESIGN

3.1 INTRODUCTION

The previous chapter provided a literature review on the phenomenon under investigation, namely the JET in a global and local context. Based on the framework described in Chapter 2, this chapter will discuss the research paradigm, approach, method and strategy used in this study. The chapter also gives further details such as the research population, sample and analysis used to investigate JET in eMalahleni.

3.2 RESEARCH PARADIGM

The study followed the interpretivism paradigm. The interpretivist paradigm entails understanding the perceptions and interpretations of a phenomenon. This brings new understandings and worldviews as contributions (Saunders, Lewis & Thornhill, 2018). According to Saunders *et al.* (2018), interpretivism is typically inductive and is used in brief samples with thorough enquiry investigations in qualitative methods of analysis. The current study used qualitative methods with in-depth interviews for data analysis methods, hence the interpretivism paradigm was suitable.

3.3 RESEARCH APPROACH

An inductive research approach was used in the current study. This involves understanding what is going on, as well as the nature of the problem (Saunders *et al.*, 2018). The researcher must make sense of the collected data, according to Evans & Phelan (2016), to understand the perceptions of a post-carbon society. The current study will, therefore, use inductive reasoning.

3.4 METHOD

A mono-qualitative research method was followed in the current study. The qualitative method is useful in cases where qualitative data will be collected from participants (Saunders *et al.*, 2018), as was done in this study. Specifically, the mono-method can be applied to less complicated research questions (RQs); this study seeks to investigate a relatively simple phenomenon, and thus this method was deemed appropriate (Saunders *et al.*, 2018).

3.5 RESEARCH STRATEGY

This study also made use of a case histories, which is a thorough inquiry into a topic within its real-life setting (Saunders *et al.*, 2018). Once a case is chosen, the boundaries are determined to understand the dynamics of a topic. Case study research is often used when the boundaries between the phenomenon being studied and the context within which it is being studied are not always apparent (Saunders *et al.*, 2018). In the current study, the boundary between the JET and the context is not always apparent; therefore, understanding the context is fundamental.

3.6 POPULATION

Anderson *et al.* (2016) defined the population as the totality of all units of interest in a study. Following this definition, the study used people and businesses involved in the energy generation value chain in eMalahleni as the population. This included the stakeholder forums, coal-fired power station employees, and suppliers of services to the coal-fired power stations. All these groups are affected by the JET as they rely on electricity generation using coal and were therefore an appropriate population for the study.

3.7 SAMPLE SIZE

The study used the rule of thumb in choosing the sample size. The rule of thumb for qualitative studies is at least eight units of the population where the population cannot be determined with certainty, as suggested by Cresswell (2014). The interpretivism paradigm works on small samples to gain a deeper understanding of a phenomenon without being distracted by large information datasets. The study followed Cresswell (2014) and used a sample size of 22 which is also in line with the positivist paradigm. This was also done by Galgóczi (2014).

3.8 SAMPLING METHOD

The sample was selected using purposive and simple random sampling methods. Anderson *et al.* (2016) put forward that a researcher can use purposive sampling when investigating a specific group which suits the desirable characteristics of the study. The purposive method was, therefore, used in ‘purposely’ selecting participants involved and affected by the JET. Simple random sampling was also used to select participants, in order to reduce bias (Cresswell, 2014).

3.9 RESEARCH INSTRUMENT

The study used a questionnaire to collect data from participants. The questionnaires were distributed to the anticipated participants, which included Eskom and non-Eskom workers. A questionnaire is used when the researcher seeks to understand a phenomenon from people's perspectives (Jhangiani *et al.*, 2019). It gives participants the space and autonomy to respond to issues as answering face-to-face might encourage bias or altered responses (Jhangiani *et al.*, 2019). This study used questionnaires to collect qualitative data in response to the RQ.

3.10 DATA COLLECTION

The study used a questionnaire to collect qualitative data from the participants in order to understand the participants' perceptions of the JET (Jhangiani *et al.*, 2019). Questionnaires were distributed to participants through email and in person. Thereafter, the researcher collected the physical copies and received the electronic copies via email.

3.11 DATA ANALYSIS

The data were analysed using descriptive and thematic analyses. Descriptive analysis is used in a situation where there is a need to summarise and make sense of data, which is the case with the current study. Descriptive data analysis allows an understanding of a phenomenon (Cresswell, 2014). The descriptive analysis was therefore suitable, as it aims to understand a phenomenon. Within a descriptive analysis, data are summarised using tables and graphs, which are then used to make inferences regarding the data.

The study sought to understand the themes of the socio-economic impacts of the JET on eMalahleni; hence, the study used a thematic analysis, which is used to understand the themes within data (Cresswell, 2014). Themes were identified from the data and were presented in line with the objectives, after being analysed as described below.

Step 1 - Familiarising oneself with the data: The researcher began the process by reading and listening audio transcripts to become familiar with the data. The researcher made notes on the data that was collected using the questionnaires.

Step 2 - Generate initial codes: The data were organised in a systematic and meaningful way. Coding reduced large amounts of data into smaller 'chunks' with meaning, as per the methods chosen based on the RQs. These RQs were used to arrange the data under similar sections in line with the initially generated codes (using open coding).

Step 3 - Searching for themes: A theme refers to a pattern performing trend analysis something significant or interesting about the data or the RQ (Braun & Clarke, 2006). According to Braun and Clarke (2006), there are no fixed rules about what makes a theme; however, a theme is characterised by its significance. The researcher examined the codes and some of them fit together into a theme, thus they organised the codes into broader, matching themes.

Step 4 - Reviewing themes: In this step, identified themes were reviewed and modified where necessary. The researcher ensured that themes were comparable by the data. Overlap and sub-themes were also identified.

Step 5 - Define themes: This was the final refinement of the themes, wherein the essence of each theme was identified. The researcher defined the final themes and related them where necessary.

Step 6 - Write-up: In this final stage, the researcher wrote up the results of the analysis. These are presented in the results section of the paper.

3.12 RELIABILITY AND VALIDITY

Reliability refers to the extent to which the study can depend on the results and expect similar results under different circumstances (Cresswell, 2014). The test-retest method is used to ensure reliability – this involves using both a smaller and a complete data set. The data from smaller groups are compared to the larger set and if there is consistency in the responses, then reliability is ensured (Jhangiani *et al.*, 2019). The study collected pilot data and compared it with the complete data to ensure reliability.

This study followed the methods mentioned in the literature review used by other researchers. Furthermore, the research ensured internal validity by manipulating internal variables, to ensure variables outside the model did not affect the results of the study. According to Cresswell (2014), internal validity can be ensured by controlling data collection to ensure that the correct and valid data is collected.

3.13 ETHICAL CONSIDERATIONS

The privacy of all participants is paramount, and their information should never be given to third parties (Taylor, Sinha & Ghoshal, 2006). This study has maintained the anonymity of participants and their information will be stored in a secure and password-protected computer

for 3 years. The study was also conducted professionally and with integrity, ensuring that all sources of information were acknowledged correctly, thus avoiding duplications and plagiarism.

According to Cresswell (2014), the participants in a study should not be forced or harassed in any form. In line with this, the study ensured that all participants were aware of their voluntary status and that they could withdraw from the study at any time without repercussion.

CHAPTER 4: PRESENTATION OF RESULTS

4.1 INTRODUCTION

This section presents the interpreted results from the data analysis. The methodology outlined in Chapter 3 of the study was followed. The Statistical Package for the Social Sciences (SPSS) statistical software was used to review the information acquired.

4.2 RESPONDENTS

The study obtained ethical clearance to interview a maximum of 30 respondents. A total of 28 questionnaires were distributed and 25 were returned. Of the 25 questionnaires, 22 were answered in totality and had enough detail to use within the study. The questionnaires had a response rate of 78.6%, which is considered adequate.

4.3 DEMOGRAPHIC DATA

This section presents the demographic data of the participants in the study.

4.3.1 Gender

Table 1: Gender distribution

Gender					
		Frequency	%	Valid %	Cumulative %
	Female	7	40.9	31.8	31.8
	Male	15	68.2	68.2	100.0
	Total	22	100.0	100.0	

Source: Own illustrations using SPSS

The respondents consisted of 31.8% females and 68.2% males, as shown in Table 1. This shows that the sample was mostly men, which can be explained by the nature of the industry under study, which is still dominated by males.

4.3.2 Age

Table 2: Age distribution

Age				
	Frequency	%	Valid %	Cumulative %
31-40	7	31.8	31.8	31.8
41-50	10	45.5	45.5	77.3
51-60	5	22.7	22.7	100.0
Total	22	100.0	100.0	

Source: Own illustrations using SPSS

From Table 2, the respondents were of different age distributions; 31.8% were between 32 to 40 years; 45.5% were between 41 to 50 years and 22.7% were between 51 to 60 years. The majority of the respondents were between 41 to 50 years which is an age range with sufficient experience in the industry and the energy generation value chain sector.

4.3.3 Occupation

Table 3: Occupational level

What is your occupational level?				
	Frequency	%	Valid %	Cumulative %
White collar	10	45.5	45.5	45.5
Blue collar	12	54.5	45.5	100.0
Total	22	100.0	100.0	

Source: Own illustrations using SPSS

The occupational level shown in Table 3 shows that the respondents consisted of 54.5% blue-collar employees and 45.5% white-collar employees. This presents a good distribution, as both types of employees are well-represented among the respondents.

4.3.4 Union representation

Table 4: Union representation

Are you a union representative?				
	Frequency	%	Valid %	Cumulative %
No	17	77.3	77.3	77.3
Yes	5	22.7	22.7	100.0
Total	22	100.0	100.0	

Source: Own illustrations using SPSS

Among the respondents, only 22.7% were union representatives. The remaining 77.3% were not union representatives and hence their perceptions may not be influenced by the pressures or views from the unions.

4.3.5 Working for Eskom

Table 5: Employees working for Eskom

Are you an Eskom Holdings SOC Ltd employee?				
	Frequency	%	Valid %	Cumulative %
No	11	50.0	50.0	50.0
Yes	11	50.0	50.0	100.0
Total	22	100.0	100.0	

Source: Own illustrations using SPSS

Half of the respondents (50%) were employees of Eskom Holdings and the other 50% constituted Eskom stakeholders. Eskom employees are in a unique position to understand what would happen if fossil power plants closed, thus they could provide relevant information for the study. However, Eskom's stakeholders also understand the general environment and they too contributed useful information.

4.3.6 Experience

Table 6: Experience of the employees in the current industry

How long have you been working in your current industry?				
	Frequency	%	Valid %	Cumulative %
2-5 Years	1	4.5	4.5	4.5
5-8 Years	6	27.3	27.3	31.8
8-11 Years	27.3	27.3	27.3	59.1
11-15 Years	9	40.9	40.9	100
Total	22	100.0	100.0	

Source: Own illustrations using SPSS

The distribution of employee experience shows that the majority had between 11-15 years of experience (40.9%). This was followed by 5-8 years and 8-11 years, respectively, as these two categories constituted 27.3% each. The respondents with 2-5 years of experience constituted only 4.5%. This shows that there was sufficient experience to give relevant and useful information that could answer the RQs and achieve the aims of the current study.

4.3.7 Residence

Table 7: Residential status in eMalahleni

Are you a resident of eMalahleni?					
		Frequency	%	Valid %	Cumulative %
	No	5	22.7	22.7	22.7
	Yes	17	77.31.8	77.3	100.0
	Total	22	100.0	100.0	

Source: Own illustrations using SPSS

A total of 77.3% of respondents were residents of eMalahleni. This majority ensured that a proper understanding of locals' perspectives was provided.

4.3.8 Period of stay

Table 8: Period of residence in eMalahleni

If yes to no. 9 above, how long have you been residing in eMalahleni?					
		Frequency	%	Valid %	Cumulative %
	Below 5 years	5	22.7	22.7	22.7
	5-10 years	4	18.2	18.2	40.9
	10-15 years	7	31.8	31.8	72.7
	15-20 years	6	27.3	27.3	100.0
	Total	22	100.0	100.0	

Source: Own illustrations using SPSS

From Table 8, the majority of the respondents had lived in eMalahleni between 10-15 years and 15-20 years, at 31.8% each. The remaining two categories had 27.3% each. Since the majority have been residents for a reasonably long time, they had a good understanding of how they would be affected by the JET.

4.4 CLOSURE OF FOSSIL POWER PLANTS

This section presents the responses of the participants in relation to the closure of the fossil power plants.

4.4.1 Awareness of closure of fossil power plants

Table 9: Awareness of closure of fossil power plants

Are you aware that some of the fossil power plants in eMalahleni will be shutting down in plus or minus 10 years from now?					
		Frequency	%	Valid %	Cumulative %
	No	3	13.6	13.6	13.6
	Yes	19	86.4	86.4	100.0
	Total	22	100.0	100.0	

Source: Own illustrations using SPSS

From Table 9, the majority of the respondents were aware that fossil power plants in and around the eMalahleni area will be shutting down in the plus or minus 10 years (from the time that this study was conducted). The majority (86.4%) were aware of the closure and could therefore give appropriate information about the JET's impact.

4.5 THEMATIC ANALYSIS

The thematic analysis described in the methodology chapter was used to analyse the data collected in this section. The data was categorised according to the themes generated from coding performed by the researcher. The themes were derived from the RQs and questions within the questionnaires using a deductive analysis.

4.5.1 Research Question 1: What is the likely impact of the transition to low-carbon energy on employment and livelihood in eMalahleni?

This section will present the themes in relation of the research question 1.

4.5.1.1 Theme 1: Awareness of shutting down of power plants and the perceived impact on people in eMalahleni

Q11. Are you aware that some of the fossil power plants in eMalahleni will be shutting down in plus or minus 10 years from now? Please elaborate on how this will impact you, if

Yes. It will obviously impact our livelihood as eMalahleni is a coal town. (R1)

Yes. We may get retrenched as there will be no need for us to provide the service that we currently render. (R2)

Yes, it means a substantial loss of income and poverty. The level of crime will rise due to people losing their jobs. (R3)

Yes. As a community of eMalahleni will lose lot of opportunities, as we speak now job opportunities are scarce. Shutting down Eskom will definitely destroy our hope of a future within Eskom. (R4)

Yes I'm aware. This transition will negatively impact our businesses and communities, jobs will be lost and only few individuals will benefit from this transition. (R5)

Yes. Employment in local mine may be impacted. (R6)

No. I will personally not be impacted as I will be on pension by then and do not intend to stay in eMalahleni. (R7)

Yes. Possible job loss, I'm a single mom or 2 kids, and also look after my parents. (R8)

Yes. Job and business losses and poverty because the power plant resides around Nkangala region. (R9)

Yes. As we are experiencing load shedding due to insufficient capacity, therefore closing the power stations (base load) and looking into cleaner energy with result in more power instability/load shedding. (R10)

Yes. Employment in local mine may be negatively impacted. (R12)

No. I will personally not be impacted as I will be on pension by then and will not intend to stay in eMalahleni. (R14)

Yes. Possible job loss. (R18)

Yes. Job and business loses because the power plant resides around Nkangala region. (R19)

From the analysis of the responses, it is clear that most people in and around eMalahleni are aware that some fossil power plants will be shutting down in plus or minus 10 years. Only one respondent from all captured responses indicated that they were not aware; they mentioned that they would not be affected by the transition as they are retired with no plans to remain in town. This shows that the closure of fossil power plants directly affects the working age group and their dependents. These closures would severely impact the town's residents if their skills could not be used after the JET. From the responses, people are aware that their livelihood would deteriorate if the JET went ahead without any plans in place to assist them with their skill development thereafter.

4.5.1.2 Theme 2: Loss of jobs and or income

Q12. If the coal extraction and processing for electricity generation is abandoned, do you think your job/income will be affected? In brief, please explain how you perceive your job/income will be affected?

Yes. My current job is heavily reliant on Eskom plant that uses coal in the boilers. So definitely my job will be at risk. (R1)

Yes. It will be affected because the current electricity generation power plants will shut down and retrenchments are inevitable. The current skills needed now, will no longer be required. (R2)

Yes. I will be affected because that means of mines and other activities within the power plant will be shut and that will affect buying of goods or products that we currently supply within the two sectors. (R3)

Yes. Employment may be terminated. (R5)

Yes. I believe the jobs of those who will still be working at the power stations will be affected as JET will result in way less jobs being created. (R6)

Yes. Not only income but jobs and business will be gone. (R7)

Yes, most of our family members will lose their jobs. (R8)

Because the closure of coal extraction will result in coal-fired power stations to be shut and impacting my future work prospects. (R9)

Yes. Because the closure of coal extraction will result in coal-fired power stations to be shut and impacting my future work prospects. (R10)

Yes, the end of coal power stations will really cost the country. (R11)

Yes, the power station will close and I will lose my job. (R12)

Yes. Things will become more expensive rendering my income insufficient to cover the basic cost of living. (R13)

I believe so. This will mean that I will be inclined to apply for a new job and since unemployment is SA is high that scares me the most. (R14)

Yes. Not only income but jobs and business will be lost. (R15)

Yes, most of us members will lose their jobs. (R16)

Yes the closure of coal extraction will result in coal-fired power stations to be shut and impacting my future work prospects. (R17)

Yes. since the closure of coal extraction will result in coal-fired power stations to be shut and impacting my future work prospects. (R18)

Yes, the end of coal power stations will really cost the town. (R21)

Abandoning coal extraction and processing will result in a significant portion of the town's population losing their income. From the above responses, people working in coal extraction and processing companies would no longer have any necessary skills – thus, some would lose their jobs as the transition to renewable energy would negate their roles. Renewable energy also provides fewer employment opportunities, therefore unemployment rates would spike, even if currently-used skills could be transferred forward to the new industry.

Q14. Do you think there will be any impact experienced in the town of eMalahleni because of closure (moving away from coal to renewables) of the coal-fired power stations? Please elaborate on your answer.

4.5.1.3 Theme 3: Unemployment and resulting consequences

Yes. eMalahleni will become a ghost town due closure of the mines in the surrounding areas. The economic impact will be huge due to job losses. Socio-economic development will be slower because the local government will not cope on its own. (R2)

Yes, definitely because people of eMalahleni will lose their business and with this unemployment high rate, so will be devastated by the closure of Eskom eMalahleni. (R3)

Yes. There will be a huge impact, more unemployment and crime rate will increase drastically because people have no source of income. (R5)

Yes. Less people with jobs could result in more crime and a poorer environment. (R6)

Yes. Migrations of people, loss in business opportunity, Hunger due to loss of employment. Increase Crime. (R7)

Yes. Job losses and ghost town. (R8)

Yes, there will be. Renewables have not been proven to be reliable e.g. solar is dependent on the sun and therefore cannot be used as base load. (R10)

Yes. There will be an impact. Employment rate will decrease. Renewables are not foreseen to need more people to operate. (R12)

Yes. Job losses not only in the power stations but right across the food and supply chain inclusive of the street vendors who sell vetkoek at the periphery of the power stations. (R14)

Yes. more unemployment and crime rate will increase because people will have no source of income. (R15)

Yes. Less people with jobs could result in more crime and a poorer environment. (R19)

It is clear that from the respondents' understanding, the immediate impact on the town after closures would be a high unemployment rate. Most other companies and vendors in the town are indirectly connected to fossil energy generation and hence will suffer a decline in their operation if the power plants are shut down. The resultant unemployment rate will be accompanied by various socio-economic consequences that will affect the town; these range from an increased crime rate and poor environment to the town devolving into a ghost town, as outlined by several respondents. This would naturally occur as the retrenched population migrated to other towns in search of employment.

Q15. Do you think there will be any gains in the town of eMalahleni because of the transition (moving away from coal) to renewables? Please elaborate on your answer.

4.5.1.4 Theme 4: Positive impact on the environment

Yes. Improvement in environment having a positive impact on residents' health. (R1)

Yes. Only to the selected few entrepreneurs. (R2)

No, there will be losses instead of gains. (R4)

No. I don't think so instead there will be massive job losses. (R6)

Not at all, we will lose what we built for years and our resources will be non-void, let's use the right way of our resources. (R9)

No I don't think so, there only gains there will be are for those who have those IPP Tenders. (R10)

No, Renewables if privatised will benefit a few individuals. (R13)

With regard with jobs availability I am not sure, because I am not very familiar with renewable energy. I am really not sure in terms of EAF, how renewable energy will help the city. (R14)

Yes, the air will get less polluted but this is not sustainable development as it comes at the expense of economic needs. For sustainability, there must be a balance because the stomach must eat today. (R16)

No. Nothing will change. Electricity will be produced as much as is currently produced. (R17)

The only advantage eMalahleni will enjoy because of the transition to renewables is a reduction in air pollution – which was perceived by very few respondents. Most felt that the transition would cause more harm to the town than good. The analysis of the responses shows that the town will suffer a fall in social welfare from income loss as the potential economic benefits may be only enjoyed by a few individuals. Very few individuals are sure if the transition will bring about any gain to the town and few believe that electricity generation would remain the same after the transformation.

Q16. Is there any other impact on the community/the town of eMalahleni that you think will arise because of the transition/closure of coal-fired power stations? Please list below.

4.5.1.5 Theme 5: Social ills

There is a possibility of it becoming a ghost town as a lot of people will need to move away to look for work. (R1)

eMalahleni will be like a ghost town. (R2)

Poverty will increase and many people will be depressed due to job losses. They will also lose their homes. (R3)

Crime rate will increase in the town. (R4)

Loss of skill, the power industry provided for the training of key skills e.g. welders and fitters. (R5)

The trucking businesses that haul coal will be negatively affected, mechanical and electrical industries such as workshops will close down. (R7)

There will be breaking of family ties. (R8)

Significant job losses will exacerbate the already high unemployment rate. Many social ills such as crime will emerge. (R9)

It will be a ghost town Crime will increase even more due to competition for resources, Municipality services will deteriorate further as rates payments are defaulted upon due to job losses Municipal debt to Eskom will increase due to non-payments due to job losses and Load Reduction will increase, More Businesses especially in Retail with close down feeding this vicious cycle Private schools will shut down as most rely on sponsorships. (R12)

I think the community will benefit less polluted air they can breathe in. (R13)

People will migrate from the town. (R14)

There is a possibility eMalahleni becoming a ghost town as a lot of people will need to move away to look for work. (R15)

eMalahleni will be a ghost town. (R18)

Poverty will increase. (R19)

Crime rate will increase in eMalahleni. (R21)

Loss of skill. (R22)

As mentioned, the closure of coal-fired power stations will cause the community/town of eMalahleni to become a ghost town as, after losing their jobs, people will relocate to other areas. The community will also suffer an increase in crime rate and other social ills. Family ties will be broken; however, some residents may get new jobs in the renewable energy production industries and would thus remain in the town. Unfortunately, the majority of citizens' skills would no longer match industry requirements and they would need to relocate.

4.5.2 Research Question 2: What can be done to mitigate the adverse impacts of the transition to low-carbon energy?

This section will present the themes in relation of the research question two.

4.5.2.1 Theme 1: Low-carbon energy being able to support the whole country

Before looking at the actual ways of mitigating the adverse effects of the transition to low-carbon energy, the meaning of justice concerning the transition to renewables was asked of the respondents. The following question was asked:

> Q.17 With the impact of the transition to low-carbon energy shown in the previous sections, there are several ways to mitigate the impact. What does justice mean to you with respect to the transition to the renewables?

Minimising the impact on residents livelihood. (R1)

Justice means striking a balance between fossil and renewables. (R2)

It might introduce low-carbon energy but will it be able to carry the whole country? No. (R3)

The renewables must be there together with the coal. (R4)

It is good for the environment to reduce the impact of global warming. (R5)

There's no justice in this, hence will lose jobs and business opportunities as community of eMalahleni, and this energy that they changing to it only the European Union will benefit because it's from overseas investors and still it will be costly to Eskom as we speak with the problem of money. (R6)

Nothing - the reality is that people working directly or indirectly at the stations will be negatively impacted. (R9)

There is/will be justice in terms of the environmental benefits e.g. cleaner air, but other than that I think South Africans will be thrashed into darkness and poverty from job losses. It might take a while for skills to transition to the new mode/s of energy generation therefore some people will face job losses. (R12)

There should be a balance to those that are affected negatively and those that are affected positively. (R14)

Reducing the impact on residents livelihood. (R16)

Justice means striking a balance between removing fossils and putting renewables. (R17)

It might introduce low-carbon energy but it will not be able to carry the whole country? (R19)

The renewables must run together with the coal. (R20)

It is good for the environment to reduce global warming. (R22)

From Theme 1, it can be seen that the respondents were not aware of what justice means concerning the transition to renewables. Looking at the literature, just transition is measured through various dimensions which investigate what will happen to the environment, society, economy and the future after a transition. However, the majority of the respondents indicate that the negative would outweigh the positive impacts; thus it can be deduced that there would be no just transition. The few respondents who understand justice indicate that a gradual change would be appropriate to balance the negatives and positives.

Q18. In your opinion will the transition to low-carbon energy (renewables) be "just" (morally right and fair)? Please explain.

4.5.2.1 Theme 2: Morality and fair justice

It will not be fair because it will cost more money to implement and there is no guarantee that it will work. At least with fossil, we know that it works. (R3)

It is morally right but not fair, it is right for our environment, but it is not fair to the people who will be affected by it. (R4)

People's health will improve for the better and we will see less devastating natural disasters. (R5)

No it is not morally right and fair. What are we going to do with the coal that we have as a city? Relying on renewables is a danger because what if Russia and Ukraine situation

happened with South Africa and Nigeria where we get more our crude oil? That's means will be in dark. So with my opinion I think it is morally right for the Eskom to continue with coal however find a way to reduce carbon emissions from the coal. (R6)

People's health will improve for the better and we will see less devastating natural disasters. (R7)

No. South Africa is a corrupt state, and nothing done under current leadership. (R10)

No - less jobs available, the health benefits will only be seen many years from now. (R12)

It cannot be morally right and fair. Loss of employment, business opportunity, continuous load shedding, increase in crime. (R13)

Never. The only just that its being referred to here is money in other people's pockets in high places that will collapse the energy sector. There is no fairness here. (R14)

People's health will improve. (R17)

No. (R18)

No – with high unemployment, the health benefits will only be seen in the long run. (R19)

It cannot be morally right and fair. Loss of employment, business opportunity, continuous load shedding, and increase in crime will result. (R21)

From Theme 2 above, it is noteworthy that many respondents believe that the low-carbon transition will not be "morally right and fair". However, some respondents said that it will be because the environment and citizens' health would be improved. Looking at the literature, for the transition to be "morally right and fair," the morals of the people cannot be negatively impacted, and no one should be complaining about the low-carbon transition.

4.5.2.2 Theme 3: Maintaining economic growth during the transition

The respondents were asked about maintaining economic growth and their responses are noted below.

Q19. How can Eskom along with the Government maintain the economic growth of eMalahleni town during the energy transition?

By leaving the fossil energy alone and the coal mines. (R1)

Not sure but growth comes through development of needs and limitation of economic impact. If this can be addressed growth will lead from this. (R2)

There is not much they can do. (R4)

Leave everything as it is and just add to it. (R5)

They need to ensure that most of the power plants are built around eMalahleni. (R6)

Educating the communities and give them financial support. (R8)

There's nothing they can do because our economy is based on coal. (R9)

Ensure that the potentially impacted employees are upskilled for the new energy industry and are employed there. (R10)

Keep the station operational. Built a low-carbon energy equivalent to the one operation. Manufacturing of renewable components and maintenance. (R11)

Instead of replacing one with the other, keep them both. (R12)

The local business and community need to be given opportunities to participate and re-skilled members of the community so that they are able to be employed accordingly. (R13)

Don't close the power stations. (R14)

There is less they can do. (R15)

Just leave everything as it is and just improve. (R16)

They need to ensure that most of the power plants are built around eMalahleni to maintain the town. (R17)

There is need to educate the communities and give them financial support. (R18)

There is basically nothing they can do because our economy is based on coal. (R19)

Ensure that the potentially impacted employees are up-skilled for the new energy industry. (R22)

These responses indicate that economic growth can be maintained by keeping the plants as they are now. Economic growth would indeed occur however low-carbon plants could also provide the same function. Respondents feel that communities must be educated, and financial support should be provided during the transition. Interestingly, some respondents feel that the government does not need to be involved and that their "support" could simply be shown by leaving the power stations "alone" (R1). However, others feel that upskilling and ensuring employment in the new industry would require some involvement. According to the respondents, this would buffer the potential downfall of eMalahleni.

4.5.2.3: Theme 4: Gradual implementation of low-carbon sources of energy to mitigate the

Q20. Are there any other ways you think can be used to mitigate the impact of the JET to low-carbon energy (renewables)? May you please list them below?

impact of JET

Studies are in progress to ensure just transition. Need to ensure that these findings are verified and recommendations competently implemented. (R1)

Hands off the fossil energy. (R2)

There must just be an energy mix that still includes some coal. (R3)

Running both in parallel. (R5)

None. Stop Implementation of it. (R6)

Instead of replacing one with the other, keep them both. (R8)

Residents of eMalahleni should be the one operating the renewables as this will assist on keeping the economy of the city stable. (R9)

If possible, the gradual introduction of low-carbon energy while in the process of closing the Power Plants. (R11)

Let there be energy mix of all possible energy generation methods and balance carbon emission. (R13)

Low-carbon energy shouldn't be restricted to renewables; focus should be on adopting technologies that reduce carbon impact from fossil sources. Other countries are stocking

up coal from South Africa to generate electricity. Coal is not the enemy, unhealthy gases from coal are the enemy and technology can address that. Renewables are welcome to supplement and over time with proven reliability they can take over. (R14)

Leave the fossil energy. (R16)

There must just be an energy mix that still includes some coal. (R17)

Running both in parallel for some time. (R19)

Please stop Implementation of it. (R20)

Instead of replacing one with the other, keep them both. (R21)

Make sure the implementation is gradual. (R22)

Various methods can be considered to mitigate the JET. Respondents state that there is a need for gradual implementation of the transition to ensure that the inevitable negative impacts can be reduced. The respondents also advocate for the transition whilst the fossil plants are still operational, so that the two could run parallel and assist in a smoother transition. Thus, when JET is fully implemented, corrections and support would already have been provided. Other respondents feel that the plants should be left alone altogether; this speaks to the fear many have concerning change and is exactly why a gradual transition would be better received. Whilst they may be happy with things 'the way they are', they may not understand the socio-economic impacts that fossil plants will have later on.

CHAPTER 5: DISCUSSION OF RESULTS

5.1 INTRODUCTION

This section will discuss the results that were obtained from the data analysis in Chapter 4. The results will be discussed in detail and compared to the literature found in Chapter 2.

5.2 RESEARCH QUESTION 1

What is the likely impact of the transition to low-carbon energy on employment and livelihood in eMalahleni?

From Themes 1 to 5 in Chapter 4, it was found that there are various socio-economic impacts on eMalahleni. The people of eMalahleni are aware that there will be power plant closures in roughly 10 years. They know they will be affected in terms of their jobs and incomes. It was shown that the JET may *create fewer job opportunities* than those that will be lost; hence, there will be *increased unemployment* in the town of eMalahleni. Additionally, specific jobs will be eliminated that no longer relate to energy generation. This concurs with Helm's (2017) findings - that some sectors will be affected by the transition because they lack the skills that are needed for low-carbon energy generation.

It was also indicated that *income will be lost*, as some suppliers and other business partners will no longer have a reason to trade. In Australia, Evans and Phelan (2016) found that income will be lost as the mining sector accounted for a third of the national economic activity. However, the transition seems to be orderly as there was a Workforce Transition Committee which ensured that the closure occurred correctly; in addition, Pathways Employment Services was set up to retrain the workforce. This example should be followed by eMalahleni to ensure that the transition is orderly and without major job losses.

With unemployment expected to rise, it was noted that *social ills (crime, poverty)* might prevail in response to the lack of income in the area. Sadly, *families may also be separated* as some members may move away to find employment; others might not even be able to leave town as their entire lives are tied up in and around eMalahleni.

Fortunately, it was also noted that there may be some positive impacts on eMalahleni. *Pollution levels would lower*, improving the health and general wellbeing of citizens. However, it is not certain whether low-carbon energy could generate a sufficient amount of

power, thus negating its positive impact. Nahm and Steinfeld (2014) support this view, noting that there is a need to innovate to improve the environment.

From the thematic analysis conducted, it can be seen that there are both negative and positive impacts of the JET on the town of eMalahleni. However, there are more negative impacts than positive impacts – specifically related to employment, income, livelihood, social life and emotional damage (as families are separated). This, therefore, answers RQ 1 - *What is the likely impact of the JET on employment and livelihood in the town of eMalahleni?*

5.3 RESEARCH QUESTION 2

What can be done to mitigate the adverse impacts of the transition to low-carbon energy?

The four themes under RQ 2 were derived from the responses given by the respondents; from these responses it was clear that there are possible solutions to mitigate the adverse impacts of the transition to low-carbon energy. It is noted that there is no just transition if the implementation is to be done as planned - hence there is a need to *support those affected* to reduce these adverse impacts. Renewable energy should be implemented in a way that will support the whole country, therefore there must be *no sectors or people left out* of the process. The themes also indicated that this specific transition is not morally right and fair; thus a general consensus was to stick to the way things currently are (fossil fuels). Muttitt (2016) notes that a sudden change can be disruptive, costly and painful – a likelihood in eMalahleni's case.

It was also noted that to reduce the impacts, there is a need to *take care of the employees* who are being affected by the transition so that they can continue to work and generate more economic growth. *Financial support* was considered to be another viable solution to mitigate the adverse impacts. The employees can be compensated during the time their jobs are affected and they can be supported financially during the time they will be looking for new jobs or when they will be training o gain new required skills for the new industry. It was shown that there is a need to *upskill the employees* so that they are compatible with the new ways of energy generation and therefore not left out of the process. The new employees who will gain new skills will be able to find employment and continue working hence mitigating the impact of the just transition. Gambhir *et al.* (2018) states that there is a need for *proactive policies* that ensure affected parties are prepared and equipped for the transition.

Another possible mitigation measure was the *gradual implementation* of the JET so that people will have time to cope and adjust to avoid any negative impacts. Muttitt (2016) and Trebilcock (2014) also advocate for gradualism, thus employees are prepared for the transition. Therefore there is need to implement the transition gradually which will ensure that people will adjust accordingly in stages and eventually people will be in line with the new forms of power generation.

From the four themes above, RQ 2 (*What can be done to mitigate the adverse impacts of the transition to low-carbon energy?*) has been answered. There are various themes which are derived that indicate the possible solutions to the mitigation of the adverse impacts of the transition to low-carbon energy.

From the data analysis conducted, it is clear that there are both positive and negative socio-economic impacts of the JET, with various ways to mitigate these effects. Both of the RQs of the study have been answered and the research problem has addressed, thereby filling the research gap and fulfilling the research aims. The next section will present the summary and conclusion of the study, as well as recommendations and suggestions for future research.

CHAPTER 6: CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

6.1 CONCLUSION

From the data analysis conducted, it has been revealed that there are both positive and negative socio-economic impacts of the JET, all of which are applicable to eMalahleni. Therefore, employees in the energy sector will be affected by the transition to low-carbon energy generation in two ways, namely loss of employment and loss of income. Some of the employees will not have the required skills in the developing industry and their existing skills may not be compatible with new energy generation methods. This loss of income will not only affect Eskom employees but its suppliers as well.

Results showed that social ills, such as crime and poverty, will be a direct result of this loss of income. Crime may be the only way for citizens to maintain basic needs for themselves and their families. A further, less discussed outcome could also include drug and alcohol abuse.

There was a single positive outcome that was revealed through the research, namely the improvement of the environment and pollution. Through these green energy changes, air and water quality would be improved.

Methods could be implemented to mitigate any negative socio-economic impacts. These include:

- A gradual transition;
- Adjustment of employees' skills/upskilling;
- Policies that ensure employee preparedness for new sectors; and
- Financial support and compensation.

The study has, therefore, concluded that there are more negative impacts of JET than positive impacts on the town of eMalahleni. Therefore, mitigation will be necessary in the near future.

6.2 LIMITATIONS

The study was limited to a qualitative analysis which focused on people's perceptions. Future studies may use other methods such as quantitative analysis which could use data on the real impact in a quantifiable and measurable way. Additionally, the study was limited to the town of eMalahleni, therefore other studies can investigate other towns and extend the analysis.

6.3 RECOMMENDATIONS

It is recommended that the JET be done gradually - that is implementing the transition in smaller steps and stages. The gradual transition should be done while evaluating every stage so that the negative impacts can be identified and mitigated.

It is also recommended that industrial policies that support the employees be developed to ensure that the negative impacts are mitigated. These industrial policies may include financial support, skills development and employment guarantees. The industrial policies will need to provide cushioning and support to ensure that the effects of the JET are limited.

Coordination of multiple stakeholders is needed for the transition to be embraced by all. Therefore, it is recommended that multiple stakeholders be coordinated and engaged. The various stakeholders must share their views, as they are affected by the JET and could provide valuable input and insight.

In line with gradual implementation, it is also recommended that the transition to renewable energy be done parallel to current energy generation. This would provide a buffer – with two methods of energy generation ensuring a successful and smooth transition before eliminating fossil fuels.

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ANNEXURES

ANNEXURE A: CONSENT FORM

Consent Form to participate in the study

Title: The socio-economic impact of Eskom's Just Energy Transition on the town of eMalahleni, Mpumalanga Province

Name of researcher: Mr. Maila Mamoleka
Name of researcher: Prof. Lwazi Ngubevana

I, ……., agree to participate in this research project. The research has been explained to me and I understand what my participation will involve. I agree to the following:

(Please circle the relevant options below).

I agree that my participation will remain anonymous	YES	NO
I agree that the researcher may use anonymous quotes in his / her research report	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that the information I provide may be used anonymously after this project has ended, for academic purposes by other researchers, subject to their own ethics clearance being obtained.	YES	NO

…… (signature)
…… (date)

ANNEXURE B: RESEARCH INSTRUMENTS: SURVEY QUESTIONNAIRE

Section A: Demographic Information

1. Gender	Male	Female	Other
	☐	☐	☐

2. Age	21 - 30	31 - 40	41 - 50	51 - 60	61 - 65
	☐	☐	☐	☐	☐

3. What is your occupational level	Blue collar (skilled/semi-skilled)	White collar (professional)	Other
	☐	☐	☐

4. Are you a union representative?	Yes	No
	☐	☐

5. Are you an Eskom Holdings SOC Ltd employee?	Yes	No
	☐	☐

6. Are you an Eskom business partner (Supplier/ Contractor/ Mine/ Municipality)	Yes ☐	No ☐

7. If your answer is Yes to no. 5 above, please indicate the service you provide?

_____

_____

8. How long have you been working in your current industry?

Less than 2 years	2 to 5 years	5 to 8 years	8 to 11 years	11 to 15 years	More than 15 years
☐	☐	☐	☐	☐	☐

9. Are you a resident of eMalahleni?	Yes ☐	No ☐

10. If yes to no. 8 above, how long have you been residing in eMalahleni?

Less than 5 years	5 to 10 years	10 to 15 years	15 to 20 years	20 to 25 years	More than 25 years
☐	☐	☐	☐	☐	☐

Section B: Socio-economic impact of Eskom's "Just" Energy transition

1. Are you aware that some of the fossil power plants in eMalahleni will be shutting down in plus or minus 10 years' time from now? Please elaborate how this will impact you, if any.

2. If the coal extraction and processing for electricity generation is abandoned, do you think your job/income will be affected? In brief, please explain how you perceive your job/income will be affected?

3. How are the coal fired power stations currently contributing to the socio-economic development of eMalahleni?

4. Do you think there will be any impact experienced in the town of eMalahleni because of closure (moving away from coal to renewables) of the coal fired power stations? Please elaborate on your answer.

5. Do you think there will be any gains in the town of eMalahleni because of the transition (moving away from coal) to renewables? Please elaborate on your answer.

6. Is there any other impact on the community/the town of eMalahleni that you think will arise because of the transition/closure of coal fired power stations? Please list below.

Section C: Mitigation of the adverse impacts of the transition to low-carbon energy

1. With the impact of the transition to low-carbon energy shown in the previous sections, there are several ways to mitigate the impact.
   What does justice mean to you with respect to the transition to the renewables?

2. In your opinion will the transition to low carbon energy (renewables) be “just” (morally right and fair)? Please explain.

3. How can Eskom along with the Government maintain the economic growth of eMalahleni town during the energy transition?

Thank you for your participation.

4. Are there any other ways you think can be used to mitigate the impact of the Just Energy Transition to low-carbon energy (renewables)? May you please list them below.

_____

_____

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ANNEXURE D: ETHICAL CLEARANCE CERTIFICATE

Graduate School of Business Administration
University of the Witwatersrand, Johannesburg

Wits Business School Ethics Committee
Constituted under the University Human Research Ethics Committee (Non-Medical)

Ethics Clearance Certificate

Ethics protocol number: WBS/BA2529938/874

This certificate is only valid with a legitimate ethics protocol number and signed by the Researcher (below).

This certificate is only valid if accompanied by formal permission from the relevant stakeholder(s).

Project title	The socio-economic impact of Eskom's Just Energy Transition on the town of eMalahleni, Mpumalanga Province
Investigator / Researcher	Mr Maila Mamoleka
Nature of Project	MBA (Research Article)
Decision of the Committee	Approved, provided stakeholders and participants are guaranteed confidentialty.
Issue Date of Certificate	04 10 2022
Expiry date	Date of submission of the project / research report
Chairperson	Prof Anthony Stacey ☎ +27 11 717 3587 +27 82 880 4531 anthony.stacey@wits.ac.za

Declaration by Researcher

One copy must be signed by the Researcher and returned to the Chairperson of the Wits Business School Ethics Committee.

I fully understand the conditions under which I am authorized to carry out the abovementioned research and I guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I undertake to resubmit the protocol to the Committee.

Signature

2022 - 11 - 29
Date:

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ANNEXURE E: TURNITIN REPORT