THE ROLE OF LAW AND GOVERNANCE IN ADDRESSING CLIMATE CHANGE IMPACT ON THE ENERGY SECTOR IN AFRICA: THE CASE OF SOUTH AFRICA

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ABSTRACT

Sectors in cities are susceptible to climatic change's implications; however, cities are also in rare opportunity to promote the shift to mitigating and adapting to these impacts. While there is no one-size-fits-all answer to climate change, cities must take steps to transition these sectors toward a more sustainable future. One of such sectors is the Energy Sector, thus this paper reviews the impact of Law and Governance to address climate change's influence on this sector in Johannesburg, South Africa.

This paper attempts to present a standardized approach to implementing the adaptation strategies to climate change that will contribute in building efficient, clean, safe, and cost-effective energy and renewable energy use within the city of Johannesburg. The main objectives are (1) to examine climate change's consequences on energy sector (2) to assess implementation approaches of Johannesburg using the Law and Policy tools listed above, to achieve climate adaptation in the city (3) to identify the missing links and challenges inherent so far in using these tools to implement climate adaptation strategies and further provide recommendations.

These objectives are addressed using the methodological approach of primary data collected through interviews with relevant stakeholders to assess readiness of governments to implement climate change Laws and policies for the energy sector, also the analysis of secondary data i.e., Laws and policy documents to evaluate how Law and Policy tools are implemented. These tools include an analysis of Johannesburg's Institutional framework, Local policy development, relevant stakeholders' engagement, Climate Litigation, and Energy Transition projects.

The thesis comes to an end with a consideration of some shortcomings discovered from the methodologies used in the paper. Further recommendations are proposed to create a more adequate legal and policy approach to this universal issue in the future.

Keywords: Law, Governance, Implementation, Climate change, Energy Sector

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AFDB- African Development Bank

CAP- Climate Action Plan

COJ- City of Johannesburg

CDM- Clean Development Mechanism

DFFE-Department of Forestry, Fisheries, and the Environment

EISD- Environment and Infrastructure Services Department

ERA- Electricity Regulations Act

IEA- International Energy Agency

IGCCC- Integrated Coal Gasification Combined Cycle

IPP- Independent Power Producer

GDS- Growth and Development Strategy

GHG- Green House Gas

JOBURG - Johannesburg

LFG- Landfill Gas Generation

M&E- Monitoring and Evaluation

MES- Minimum Emissions Standard

NEMA- National Environmental Management Act

NEPAD- The new partnership for Africa's development

NERSA- National Energy Regulator of South Africa

NDC- Nationally Determined Contribution

SAPP- The Southern Africa Power Pool

OECD- The organization of Economic Co-operation and Development

POCA- Prevention of Organized Crime Act

SALGA-The South African Local Government Association

PPA- Power Purchase Agreement

PPP- Public-Private Partnership

PRECCA- The prevention and Combating of Corrupt Activities Act

REIPPP- Renewable Energy Independent Power Producer Procurement Programme

UNFCC- United Nations Framework Convention on Climate Change

CHAPTER 1
INTRODUCTION

1.1 Introduction

April 2022 in South Africa, came with the news of a flood that claimed the lives of 448 people, displaced more than 40,000 people, and destroyed thousands of houses, according to a CBS News headline. This time, it is the flood. Other times, it is due to human-caused climate change such as activities in energy sectors.

Analyzing some underlying causes of these climate changes especially the human-caused by energy sectors, the paper agrees with The Consultancy Africa Intelligence (2008) outrightly said the African continent might be at great risk because there are no structural implementation mechanisms to deal with. This paper decides to focus on the energy sector because it supports the argument of Davidson & Winkler (2003) that Access to energy is a major challenge for developing African countries as they seek to enhance and expand industrial production, as well as economic expansion when in fact, they should be more focused on strategic implementation strategies aimed at minimizing CO2 emissions and mitigating climate change. Davidson et.al. (2002) said that despite that those developing countries seem to be the greatest countries exposed to the effect of climate change, they refuse to see climate change as an urgent or a major problem to be treated carelessly. In contrast, most African leaders and policymakers, as evidenced in the NEPAD (2005) commitment, have connected the problem of energy to poverty eradication. Vuuren (2008) thinks that the African leaders consider the biggest hurdle confronting the world.

Nevertheless, Ågerup et al (2004) maintain that African leaders are not the only ones who feel that emerging countries should make more room for energy-intensive activity aggressively. African commentators and their supporters keep endorsing this stance, claiming "whether climate change is mild or destructive, deliberately trying to limit it through global emissions regulation would be self-defeating" the reason being that, this

would not actively work on sustainable development projects that would enhance the living conditions of the people.

What needs more attention and evidence now is to consider how effective are some key Law and policy tools used in some countries to implement climate adaptation strategies. Why is it important to evaluate their effectiveness? To assess the government's capability and preparedness to support the needed transition of the whole economy towards climate resiliency. It is as well important to highlight positive developments using these Laws and Governance tools so far within the country and identify areas of improvement. Globally, it provides a framework for comparing how different countries handle climate governance. After this evaluation, further recommendations will be given on the insufficiencies and problems identified in using the Law and policy tools to address climate change, and recommend ways to better implement adequate transformational policies, to enable the required transition toward a climate resilience city.

Therefore, within this approach, this thesis will answer specifically this question:

1.2 Research Question

How effective is the use of Law and Governance in implementing climate change adaptation, and energy transition policies in South Africa?

1.3 Background of the study

This paper intends to examine the implementation strategies to adapt to climate change in South Africa in an attempt to answer the research question. To examine these strategies, this paper will consider the effectiveness of some law and policy tools used over time to achieve climate resiliency and energy transition in South Africa. To evaluate a government's preparedness to ratchet up climate policy, notably in the energy sector, and execute necessary climate-resilient policies, it aims to provide both a theoretical and practical methodology.

While the paper makes some references to national laws and policies, the paper also specifically assesses the local government's readiness because the fast rising climate risk has more clear consequences for cities and the financial status of local governments. It is very possible that well-developed adaptation may enhance urban life, preserve individuals and infrastructure, develop community relationships, and boost economic output.

Therefore, we will be taking a case study of Johannesburg city for our methodology to make a comprehensive assessment of the local government's readiness to implement climate change laws and policies in energy sectors.

Why this Energy sector?

As emphasized in the introduction, accessibility to clean energy is one of the major challenges in so many developing countries. Affirming the IEA Report (2015), Climate change poses many hazards to the energy sector, including serious weather situations. Improved adaptability to impacts of climate change can be critical to the energy sector's technological viability and ability to satisfy rising energy demands caused by global economic and demographic expansion. Regulators, financial institutions like banks, energy firms, and governments will all need to establish and adequately implement adaptation measures.

Why South Africa?

South Africa is one of Africa's main coal-producing countries, and its per total emissions are part of the highest in the developing world. By ratifying the Paris Climate Agreement, South Africa has made a commendable contribution to the fight against global warming. South Africa has consistently enacted and implemented national and municipal climate change legislation and leads international climate discussions. In such a political environment, the legal and policy response to climate change puts more emphasis on how effective law and policy tools have been, to address the implications of climate change in Africa. Findings, challenges, and lessons we identify from the methodology approach will

serve as a landmark that is relevant for other developing economies in Africa as they set out on the path to address and implement climate change issues.

Why the city of Johannesburg?

The study will apply its methodology in the city of Johannesburg, South Africa. Thus, Climate change implications are more pronounced in cities like Johannesburg characterized by the high urbanization and carbon-intensive nature of its energy system. The city relies predominantly on the use of fossil fuels for energy sources, thereby causing air pollution. This presents a dichotomy of emergencies that have presented Johannesburg with an opportunity to build greener and sustainable energy, capable of addressing climate change impacts.

Even though there are more than 30% of households currently without access to electricity [1], the city of Johannesburg is one out of the rare cities in Africa taking giant steps to implement effective and scalable energy policies and laws through collaborative partnerships. Cities like Johannesburg are at the center of targeted climate change response, as they develop, plan, and implement laws and policies. The city of Johannesburg has committed in some ways to address climate change impacts such as the enactment long-term strategy for the city, known as "2040 Growth and Development Strategy" (GDS) [2] which provides for a resilient, livable, sustainable urban environment, compatible with a healthy natural environment. Thus, the paper argues that there is also scope for improvement in the city's implementation approach. But it is further necessary to balance the need for a transition towards cleaner energy production within the city borders, promoting climate

[1] Climate change, development, and Energy problems In South Africa pg. 2 https://www.preventionweb.net/files/11490_oiclimatechangesouthafrica1.pdf Accessed on March 15, 2022

[2] Enacted in 2011, Comprehensive version–March 2019 https://joburg.org.za/documents_/Documents/Joburg%20GDS%202040/Joburg%202040%20GDS_March%202019.pdf Accessed on March 12, 2022

change adaptation, while also enlarging the access to energy that is denied to the most vulnerable residents.

1.4 Research Method

Contributions to the analytic discussion of this paper are made with empirical qualitative investigations, using narrative analysis. The empirical analysis is based on qualitative data gathered through a twofold process: (1) Law and Policy document analysis and (2) Interviews with relevant stakeholders. The research method also employs the use of literature review from relevant articles in peer-reviewed journals, textbooks, and other sources, to give a better understanding of the topic. The paper makes use of both primary data (Interviews), and secondary data (Case laws, journals, treaties, national reports, government policies, articles, textbooks, news, and websites). This paper believes the use of primary data will provide a first-hand experience and information from the interviewees while using secondary data i.e., national and government published documents are quality-assured, with a great level of accuracy in analyzing law and policy issues in the country. Thematic coding procedure is also used to analyze the interview by closely examining the data to identify common themes and ideas that came up repeatedly during the interviews. To analyze the data collected from the interviews, the process involves familiarizing with the data, coding, generating themes from the data collected, reviewing themes, defining, and naming themes, and writing some findings. Thus, empirical findings will be analyzed using the following methodology approach:

- Use of primary data collected through interviews with relevant stakeholders to examine the readiness of various tiers of government to implement climate change Laws and policies for the energy sector.
- Use of secondary data i.e Law and Policy documents to analyze the implementation of Law and policy tools mentioned below;

    1. Institutional framework tool
    2. Local policy development tool

3. Relevant stakeholders' engagement tool
4. Climate Litigation tool
5. Energy Transition projects

1.5 Aims of the study

The general objective intends to recommend a standardized and imitable approach to implementing laws and policies that will contribute to the efficient, clean, safe, and cost-effective energy and renewable energy use within the city of Johannesburg.

The paper works toward three specific objectives:

(1) to examine the consequences of climate change activities on the energy sector.

(2) to assess implementation approaches of Johannesburg using the Law and Policy tools listed above, to achieve climate adaptation in the city.

(3) to identify the missing links and challenges inherent so far in using these tools to implement climate adaptation strategies and further provide recommendations.

In the end, the paper would be able to provide some good recommendations for policymakers and stakeholders on better approaches to implementing climate adaptation strategies in Johannesburg, to achieve more efficient climate adaptation results. Likewise, the paper will be able to provide an analytical way to assess the effectiveness of already made implementation plans, not only in Johannesburg but a replica approach for other cities. Also, it is believed that this study can be used later as guidance and references for academic and research purposes.

1.6 Outline of the study

Chapter 1 outlines the study's introductory part, which includes the introduction, research question, research method, and aims of the study.

Chapter 2 evaluates some literature reviews on climate change's implications on South Africa's energy industry. It will as well examine the relationship of research to the existing literature and as well outline some existing gaps.

Chapter 3 focuses more on the Methodology approach using secondary and primary data. It evaluates Climate Governance at the local level in Johannesburg, also the level of implementation of some law and policy tools such as local policy development, institutional frameworks, stakeholders' engagement, climate change litigation, and energy transition projects. Interviews will also be conducted to further investigate the implementation of these tools in the City of Johannesburg.

Chapter 4 analyzes the results from the methodology used in Chapter 3. Then discussions are given and recommendations for the future are further made, aimed at Johannesburg city, in the country of South Africa but can be used as a landmark that can apply to other developing cities.

CHAPTER 2
LITERATURE REVIEW

2.1 Climate Change in South Africa

Salvador et al (2020), Nyahunda & Tirivangasi, (2019), and Mahapatra et al., (2018); in their various articles comment that Climate change is amongst the greatest crises affecting humanity in this era. In both poor and affluent countries, climate change has an influence. Hurricanes, floods, and droughts are some examples of climate change's harmful effects on people. In the article of Firdaus et al. (2019), they emphasize that asides from occurrences like the effects mentioned above, climate change as well, has consequences on agriculture, ecosystems, and general livelihoods. Salvador et al. (2020) compliment the report of Ncube & Tawodzera, (2019) that these consequences are so severe that it results in the death of people ranging from diseases, storms, heatwaves, and other health effects. To find a lasting solution to climate change effects, South Africa aligned to some international agreements that have its mission to combat the impact of climate change i.e. The Rio Declaration of 1992. According to Bauer & Scholz, (2010:91), European Commission, (2020), and United Nations Conference on Environment and Development UNCED (1992), the Rio Declaration has its root in the belief that humans are putting efforts regarding sustainable development, they deserve a safe existence that balances with the environment.

In the article of Midgley et, al (2002), they postulate that South Africa has been witnessing a steady, consistent change in climate, particularly considerable rising temperatures well over the previous 60 years. With these consistent changes, Madzwamuse (2010) believes that there will also be high records of air pollution issues together with an alarming rate of floods and droughts in South Africa. These findings, which have been confirmed by Kruger and Sekele (2012), reveal that the impacts of climate circumstances suggest that temperature on average, ranges rising by 1-3°C, alongside irregular weather, occasional and severe droughts, and floods. According to Shongwe (2013), accumulated CO2 emissions likely influenced global average temperature rise almost at the end of 21st century and afterward. Due to these tendencies, precipitation patterns have changed, with droughts being more and

more common in South Africa. South African National Climate Change Response White Paper (2011) and IPCC (2013) assert that climate change is a severe danger to South Africa's biodiversity, health, and especially infrastructure. Christidis et al. (2011) predict the likelihood of South Africa becoming drier. These effects remain a source of worry for policymakers and the government.

2.2 Law and Climate Change in South Africa

The Kyoto Protocol investigated and analyzed South Africa's lack of emission reduction objectives for the first commitment period, 2008–2012, since it is not an "Annex I" nation (Kyoto Protocol to UNFCCC 1998). As South Africa is among the top-emitting non-Annex I nations, the country knows it must act (Debbie Sparks 2006). South Africa's environment minister, Marthinus van Schalkwyk described climate change adaptation as creative, ambitious, and very effective. South Africa is pitched to investors and developers. Soon after its founding, the group gathered information to create energy-efficient homes with four private projects, which are the first CDM project in Africa, the Kuyasa Low-Cost Housing Project in Cape Town, and Khayelitsha, (Themba Gadebe 2005).

Key Laws and Regulations	Description
Draft Climate Change Bill, 2018	The measure would create an organized, and collaborative response to the climate crisis. The legislation specifies carbon neutrality, sector-based emissions goals, and a federal emissions commitment. The legislative draft is still being undertaken for 2 years.
Carbon Tax Act, 2019	The first phase of the tax will be in place from June 2019 through 2022, when the second phase will begin. CO2 and greenhouse gases are regulated by the Act.
Carbon budgets	DEA's carbon budgets will offer a GHG emissions fee that intends to monitor a company's physical emissions.
National Greenhouse Gas Emission Reporting Regulations, 2017	A company or procedure that produces more than 0.1 megatonnes per year must report activity and emissions activity to DEFF by 31st March

National Pollution Prevention Plans Regulations, 2017	A company which produces above 0.1 Megatonnes per year must present pollution prevention plans to reduce emissions and yearly progress reports to assess their PPPs.
The National Environmental Management: Air Quality Act 34 of 2004	The aim of the Act is to manage air quality while also safeguarding the environment. It makes provision for the law that developed GHG reporting regulations and PPPs
Electricity Regulation Act: Licensing exemption and registration 2021	Raise the small-scale power generating license barrier from 1MW to 10MW
South Africa Budget 2021/22	Increased fuel taxes are 27 cents per liter. Carbon taxes will rise.

Table 1: Overview of general key legislations to address climate change in South Africa at the national level

The policy, which some consider "the moment the government started directing the economy toward sustainable development," taxes non-renewable power sources 2 rands per kilowatt-hour (Ingil Salgado 2008). A carbon tax is one of South Africa's numerous measures to curb GHG emissions. The proposed carbon tax will start at 100 Rand per tonne of CO2 equivalent and rise to 250 Rand per tonne by 2020. (Sanchia Temkin 2009). The 2003 White Paper on Renewable Energy established a long-term goal of developing a non-subsidized energy resource. (SA Department of Minerals and Energy, White Paper on Renewable Energy 2003). This policy approach is concreted by financial assistance for renewable energy R&D. (Trade Knowledge Network 2003).

2.3 Overview of the Energy sector in South Africa and its structure to address climate change

Having a gross domestic product of USD 350 billion in 2019, South Africa can be categorized as an upper-middle-income country (World Bank, 2020). Davidson & Winkler (2003) report that South Africa is rich in minerals, diamonds, coal, and other natural resources, like metals and coal. The whole economy relies on power generation and

consumption, particularly coal contributes approximately 75% of fossil fuel use and 91% of energy output. According to Eskom (2019), South Africa's power sector supplies 40% of Africa's electricity. South Africa's power sector contributes more than 75% of SAPP's producing capacity. Inequality remains a concern in the nation since ten percent of the population controls ninety five percent of the wealth (AfDB, 2018b). The mining industry is a significant contributor to South Africa's economy, which also features well-developed agricultural, commercial wood, and pulp-producing subsectors. It is a notable energy exporter of mostly petroleum and coal products, and most of its exports go to nations that are geographically close to it (Allen et al., 2013; DEA, 2017). Coal was responsible for 83 percent of the nation's power generation in 2018, making it a very important portion of the country's energy mix (Energy Department, 2019). Despite the relatively low amount of installed capacity for renewable forms of energy, South Africa has been making progress in recent years toward the generation of clean energy, and it will likely continue in the future (AfDB, 2018a; Department of Energy, 2019).

South Africa's emissions reflect its economy and energy mix. 2015 GHG (excl. LULUCF) emissions were 550 MtCO2e (Department of Environmental Affairs, 2019a). Energy accounts for 84% of activities of the country's emissions, and industry for 8%. (Department of Environmental Affairs, 2016). Poor regulation has led to high corporate costs, contributing to the country's basic economic problems (OECD, 2017). High poverty, unemployment, inequality, inflation, and debt are some of these problems (AfDB, 2018b). Drought, floods, unpredictable rainfall, violent storms, and fires have over time aggravated these problems. Extreme drought in 2015 and 2016 resulted in animal fatalities, decreased crop output, soaring food costs, and food insecurity (Department of Environmental Affairs, 2019b). Through stakeholder mechanisms and bilateral government dialogue, industry groups promote industry interests in policy talks. Coal's prominence in South Africa's energy mix raises worries about its effect on environmental decisions (Worthington, 2015). The government assistance for Independent Renewable Producers was lobbied against by Eskom, South Africa's main energy provider (Makgetla, 2017). Since 2011, decreasing revenues have damaged the corporation and hurt the South African economy. Since the end of COVID,

Eskom kept implementing load shedding owing to power supply constraints, hurting the country's economic development. Eskom's fall has encouraged a broad-based decarbonization movement. Business interest may drive this.

The economy of South Africa relies much on energy in comparison with other African nations, and the rate of energy consumption is quite significant. South Africa has promising prospects for renewable energy generation, which is used to substitute mostly some existing prevailing coal production and considerably reduce emissions from the energy market at a low cost. Since 1994, numerous regulations, laws, and policies, in South Africa have been enacted to address climate change impacts, especially arising from utilizing resources like coal.

Main national actors in South Africa's energy sector

Entity	Description
Department of Mineral Resources and Energy (DMRE)	Develops, uses, and manages the country's power sources.
Department of Environmental Affairs (DEA)	Oversees South Africa's state-owned companies, notably Eskom
Department of Public Enterprises (DPE)	Oversees South Africa's state-owned companies, notably Eskom DoE, NT, and DBSA form a collaboration.
IPP Office	Laws and rules regulate the energy business.
National Energy Regulator of South Africa (NERSA)	"Multi-Year Price Determination" - how NESRA determines power pricing.
Eskom	National utility that owns, operates, controls, generate, distributes, and transmits, the national grid.
Sasol	Chemical and energy giant.

Table 2: Main national players of the Energy sector in South Africa[3].

In addition, Davidson et al (2002) in their article write that Energy sector operations are the dominant contributor to GHG emissions in South Africa, responsible for around eighty-nine percent of overall emissions. They further include that more crucially, energy is primarily generated by Eskom, and this contributes to 91% of all energy produced in the nation, and demand is increasing. Meanwhile, Van Vuuren (2008) opines that higher reliance on coal-fired power plants has resulted in massive greenhouse gas emissions. However, in the years afterward, the government has made some effort to live up to its obligation by enacting substantial emission measures. Coal's dominance will fade as those coal facilities exit and more renewables are introduced. South Africa increased energy availability from 84% in 2017 to ninety-one percent in 2018, with a higher increase from seventy percent to ninety percent among rural populations (World Bank, 2019b). South Africa's (2012) goal is universal access by 2030, with grid connections supplying 90%. South Africa has adopted policies, laws, and regulations to achieve this goal. The following chapters cover these policies and legislation. South Africa's 2030 emissions may be eight to ten percent below pre-COVID-19 predictions (Climate Action Tracker, 2020). Despite delays in passing the Climate Change Bill and connecting sector-based policies to the NCCRWP, regulation programs, policies, and efforts exist to decrease emissions. By 2019, a cross-sectoral carbon tax and The Renewable Energy Independent Power Procurement Program (REIPPP, was implemented (Climate Action Tracker, 2020). Even at this, there is still a lack of coherence between various sectoral strategies and policy directives, as well as national climate change commitments (Averchenkova et al., 2019).

2.4 Relationship of Research to Existing Literature and some Identified Gaps

There is some published literature addressing the legal and policy backgrounds of the impact of climate change in South Africa. For instance, much literature is advanced on national

[3] Source: Table 18- Main state players in South Africa. The Renewable Energy Transition in Africa;? IRENA (2020)

climate change governance in South Africa that has been results of more than a decade of evolution of policies. It has also served as a model for a variety of initiatives, regulatory systems, and executive organizations, including the National Climate Change Adaptation Strategy, National Climate Change Response White Paper, and the 2004 Climate Change Response Strategy. Although different policies cut across different sectors in several. Some even aim to avoid emissions or to strengthen more specific sectors. The enactment of these policies at the sectoral level in South Africa is encouraged by looking at the country's greenhouse gas emissions profile, having high-emitting sectors such as energy with more developed climate policy frameworks (Alina Averchenkova et al 2019). As cross-cutting methods, they led to policy tools like the REIPPPP.

Therefore, much of this research and literature is put forward by economists, energy, and environmentalists with little legal input. There is a significant gap in the body of literature. Even from the above, there is a scarce legal analysis that fully critiques the institutional characteristics, rules, and processes, of the domestic climate regime. Cumulative effects of these issues is that potential climate policies are likely to be subsumed within wider issues of environmental protection, land use, or natural resource conservation, with legal analysis being a secondary consideration. In-depth legal analysis of any part of climate change regulation, and the commitment to legally enforcing it, is rare and is basically confined to certain areas of law and policy in this jurisdiction. Such comparative analysis of both international and domestic legal frameworks is rare. Furthermore, the regulation of climate change is evolving, and most of the published literature depicts an inaccurate assessment of some present international and domestic legal frameworks. Likewise, the literature sometimes fails to put into consideration the implementation and relationship of the international and domestic framework, from the global to the local. Additionally, most of the already written South African legal climate change literature addresses only discrete areas of climate change regulation from a singular jurisdictional perspective. There is a need for a comprehensive, published, evaluation of both international and domestic legal frameworks needed in South Africa to monitor greenhouse gas emissions and address the implications of climate change effectively.

CHAPTER 3

METHODOLOGY

3.1 Climate Governance in Johannesburg

The Climate Action Plan 2021 of the City of Johannesburg and the Joburg 2040 Growth and Development Strategy are there to combat climate change in several industries, such as energy production. The Climate Action Plan (CAP), funded by the Environment and Infrastructure Services Department (EISD), was developed to realize GDS 2040 goal of an innovative, sustainable and resilient urban environment. Joburg's CAP prioritizes the Paris Agreement's global goals. Johannesburg's CAP joining the C40 Cities Climate Leadership Group highlights how cities are responding to the Paris Climate Accord's partial implementation.

The 2040 Growth and Development Strategy is Joburg's most significant present and future roadmap for exploiting urbanization's potential. Because it ensures the city's long-term goals, it's become a significant strategic tool throughout time. Johannesburg has been innovative and dynamic. It's impacted social and economic connections. According to plans like "Joburg 2030," "City Safety Strategy," and "Economic Development Strategy, GDS 2006," the city has changed dramatically. The GDS outlines the City's goal for smart and inclusive growth by 2040. 2011 GDS highlighted sustainability, livability, and resilience. Accordingly, the GDS includes these items:

- The City's Vision — a mental image of Johannesburg in the year 2040.
- Long-term outcomes and outputs are the city's vision for the year 2040, as well as how it intends to attain this vision.

Population dynamics in Johannesburg

In 2001, the population of the city quadrupled to 5.04 million inhabitants. The city's contribution to the population of Gauteng grew to about thirty percent in 2011 from roughly twenty three percent in 2001. As a result, between 2011 and 2017, nearly one-third of the inhabitants of Gauteng lived in Johannesburg.

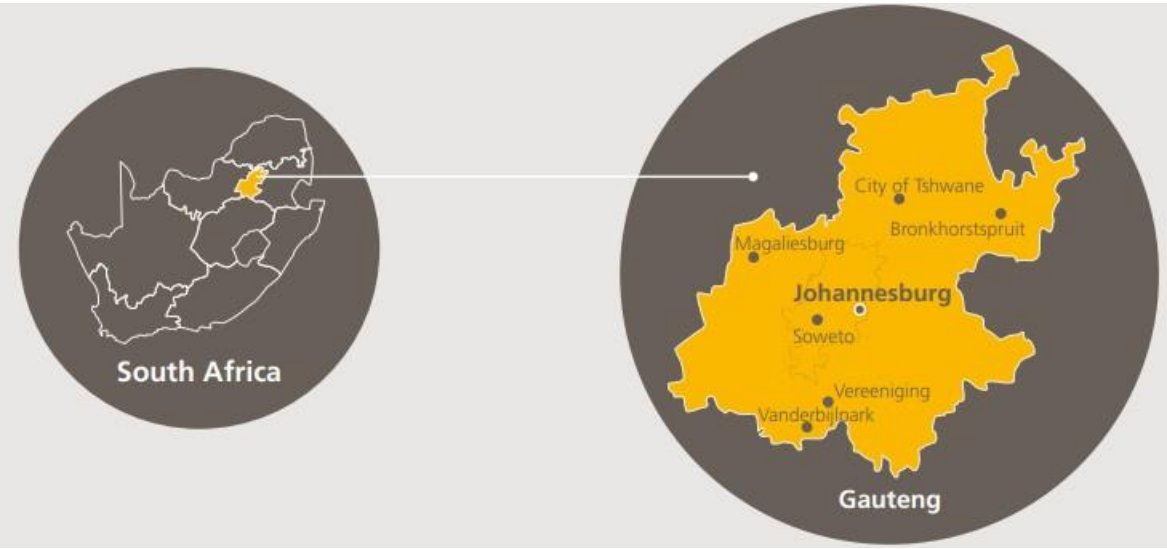

Figure 1: City of Johannesburg location map.

Source: City of Johannesburg (2021). Climate Action Plan.

About 5% of the total general national population resided in Joburg City in 2001. There was a rise in 2011 to roughly 9%, and it stayed at 9% in 2017. This means that in 2017, nearly one in ten South Africans lived in Johannesburg, which is the capital of South Africa. Between 2001 and 2011, the city's population grew within a compound yearly growth rate of seven percent, according to census data. According to current estimates, the city's population might reach 5.5 million people by 2022.[4] Accordingly, the projected annual growth rates vary from about 2% to around 2.3%.

[4] IHS Markit Regional Explorer version 1479

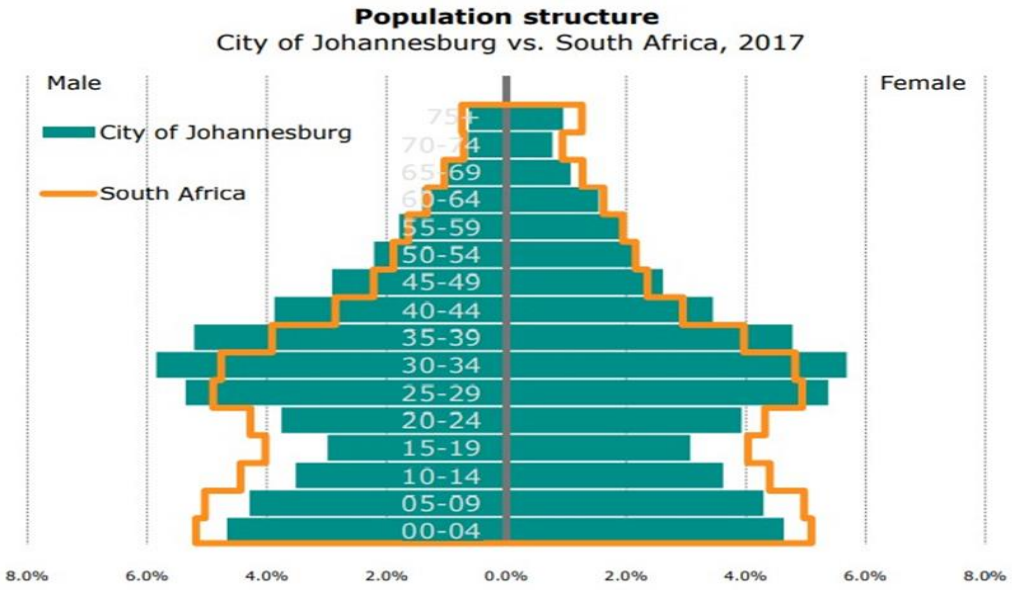

Figure 2. City of Joburg population structure, 2017

Source: IHS Markit Regional explorer version 1479

Energy Sector in Johannesburg

Johannesburg's economy is based on coal. The electricity sector in Johannesburg is responsible for 66.7 percent of GHG emissions. Eskom provides 80 percent of Johannesburg's electricity. Despite current bulk supply concerns, Johannesburg should diversify its electricity source with renewables. Electricity fosters economic development and progress. Reliable, low-cost power might promote employment and attract private-sector businesses.[5] Access to power has risen from 2011 (90.8%) to 2018 (100%). (95 percent).[6] Nevertheless, population expansion has increased total energy use. In informal housing and informal communities, power outages are more prevalent. Not usually do these households access local electricity or Eskom. The 2016 Community Survey conducted by StatsSA reveals that 335 000 individuals reside in informal settlements. Many of these

[5] Menyah & Wolde-Rufael. 2010. Energy consumption, pollutant emissions and economic growth in South Africa. Energy Economics. 32

[6] StatsSA. 2018. General Household Survey 2017. Data portal: Quantec.

houses utilize toxic fuels such as oil, candles, and firewood. Incentives for the usage of renewable energy are being implemented because of local policies and laws. Johannesburg may use this chance to generate and use energy more efficiently. By 2060, global energy use will double.[7] A diverse, reliable, and secure energy source for 10 billion people has been envisioned from a variety of viewpoints and objectives. In 2014, solar and wind energy accounted for 4% of global electricity production. This entails replacing oil and coal with renewable energy sources by 2040. The city's actions include diversifying energy sources and limiting loss (e.g., using smart technologies, preventing easy access to cables and securing sub-stations). Future technological improvements might aid with energy management.

3.2 Assessment analysis of Local-level readiness in the Energy Sector of Johannesburg

This local-level research focuses on Johannesburg's preparedness to transition to a clean energy society, identifying good trends and opportunities for improvement. To do this, we examined certain potential indicators.

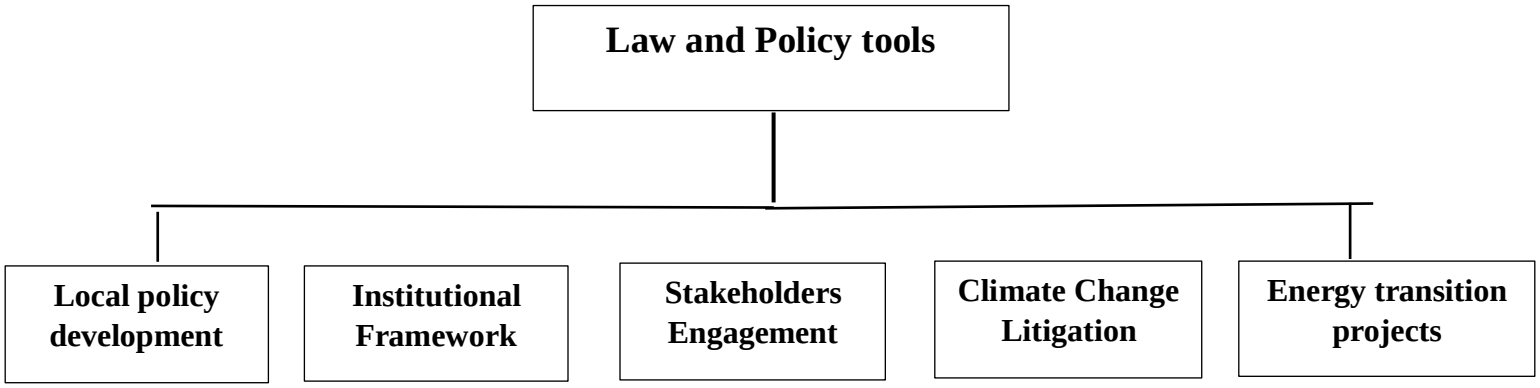

Figure 3: Outline of some Law and policy tools used for the implementation of climate adaptation and energy transition

This assessment is primarily based on analysis of secondary data i.e., law and policy documents, updated reports, and findings from comprehensive Johannesburg City

[7] World Energy Council. 2016. World Energy Scenarios 2016 - The Grand Transition.

departments[8], engagements with City governance structures, technical research, Climate Action Plan, case laws, presentations, and in-depth analysis of the city's energy sector. The paper also undertakes an analysis of the recent Climate Governance Report of South Africa[9]

Tool 1: Local policy development

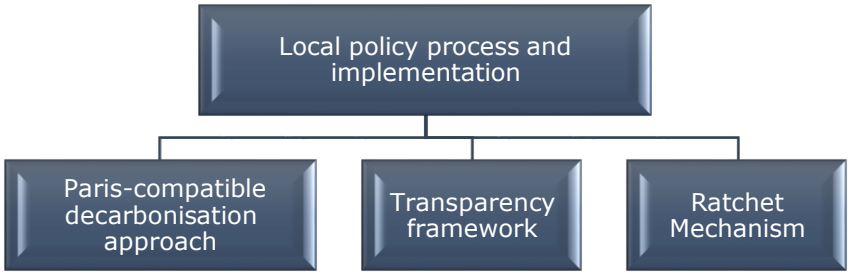

Figure 4: Outline of factors developed to assess the Local policy development tool

Comprehensive Paris-compatible decarbonization improves long-term alignment and planning with commitments of Paris Agreement. The CAP aims for carbon neutrality by 2030, 2040, and 2050. Johannesburg's CAP is outstanding. By 2030, 35% of Johannesburg's electricity will come from renewable sources, and by 2050, all inhabitants will enjoy safe, economical, net-zero emissions energy. Green buildings, and net-zero emission buildings by 2030, these goals align with Paris. This aim fits with South Africa's White Paper and Development Plan. By 2050, Johannesburg's GHG emissions should be zero. Under Paris Agreement, South Africa's NDC is for maximum GHG emissions between 2020 and 2025. This proposal included zero-emission buildings and energy sources, substantial expansions in public transportation, and replacing private autos with electric vehicles (EVs) driven by renewable energy. Johannesburg views net-zero emissions to uphold the Paris Agreement and accomplish environmental objectives. The CAP will help the city become climate-resilient. The City's long-term Growth and Development Strategy (GDS 2040) focuses on

[8] https://collections.nwu.ac.za/dbtw-wpd/textbases/law/documents-cles/JHB_Growth_Development_Strategy%202040_2019_Strategies.pdf

[9] https://climateactiontracker.org/documents/837/2020_12_CAT_Governance_Report_South_Africa.pdf

climate change adaptation and environmental preservation to create a liveable, sustainable urban environment.

Nevertheless, some stakeholders have their observations about most of these strategies and plans[10]. Some say the proposals don't emphasize climate change's urgency. They're "too ambitious" to complete in five years. Hybrid and Electric vehicles are yet to be generally adopted. It is hoped that these plans will become binding on stakeholders, but it is yet to be noticed how their conclusions will influence political choices. A more open structure is required to monitor progress toward the Paris Agreement's carbon reduction goals and verifies government climate promises. Johannesburg's operational transparency framework needs improvement. Although the city has a transparent framework, more may be done to boost organizational efficiency and eliminate fraud and corruption.

GFIS establishes the City's Anti-Corruption Strategy and executes its zero-tolerance fraud policy, designs and implements fraud and corruption reporting, prevention, and administration methods, investigates fraud and corruption as organized crimes under POCA and PRECA, establishes a city-approved open bid system, promotes anti-corruption, ethics, and good government. Implement infosec minimums (MISS), empower integrity, and disciplinary units to address fraud and corruption. Municipal employees must uphold the highest ethical standards by promoting integrity, competence, responsibility, accountability, fairness, and openness. The city wants to develop anti-corruption initiatives and activities to enhance professional ethics and good governance. To monitor the City's progress toward the above outputs, City plans, and strategies works alongside organizational monitoring and evaluation (M&E) framework, to manage efforts and make sure that strategic choices are made by evidence, specifically in the area of resource allocation. GDS is the M&E pinnacle of the City's organizational hierarchy. The GDS provides indications for long-term M&E planning. According to the M&E framework, the city will use assessments and impact evaluations to monitor development goals and objectives. Regular information gathering,

[10]https://www.iol.co.za/saturday-star/news/concerns-over-gautengs-action-plan-to-tackle-climate-change-38984022

data collection, and analysis will aid decision-making and city understanding. All relevant accomplishments will be reported to promote transparency and accountability.

The City of Johannesburg's performance management system includes a Monitoring and evaluation (M&E) procedure. This method is meant to boost responsibility, learning, and improvement, and to notify leaders and managers of possible hazards to the Integrated Development Plan. South Africa has embraced the outcomes approach to M&E, identifying 12 Key Outcomes. Intergovernmental Protocols have conveyed these results to provincial and local governments. At the local level, Outcome 9 "A responsive, responsible, effective and efficient local government system" is most relevant. Local governments have committed to achieving this via a national agreement. Johannesburg's 2040 Growth and Development Strategy (GDS) uses the same strategy as the national government. Outcome 2 calls for a safe, healthy, and sustainable urban environment

Planning timeframe	**Planning mechanism**	**Monitoring and Evaluation period**	**Reporting mechanism**
Short term (1 year)	Individual scorecards	Quarterly reviews: Bi-annual evaluation	Quarterly review report; annual evaluation report
Short term (1 year)	Business plans (1 year)	Quarterly and annual reviews	Quarterly review report; annual evaluation report
Short term (1 year)	SDBIP	Quarterly review and analysis: annual evaluation	Quarterly reports
Short term (1 year)	Annual IDP	Review performance &compliance bi-annually	Mid-year and quarterly reports

Medium-term vision-for Mayoral Term of Office	5-year IDP with cluster-specific priorities and plans	Review at midterm; revise every 5 years	Midterm performance Assessment Report & Annual Report
Medium-term vision for Mayoral Term of Office	Mayoral Flagship Programmes (for every 5 years)	Track annually: Review at mid-term: revise every 5 years	Mid-term Performance Assessment Report: Annual Report; 5year Assessment Report
Long term vision &|plan (20-30 years)	City GDS- focused on long term outcomes	Consider midterm review: Review every 5 years	5-year Assessment Report; Mid-term review

Table 3: An overview of planning, monitoring, evaluating, and reporting structures in the city (Based on the City of Johannesburg's M&E Framework)

The first official ratchet mechanism for climate action in the city did not come into existence until 2021. However, by the year 2021, the Joburg CAP, which also includes the outcomes of GDS 2040, sets highly ambitious short, medium, and long-term expectations. These ideas and tactics are meant to become better over the years. In a few years, the city should hopefully be able to further increase its ambition by presenting plans and strategies that have been examined, reviewed, and updated.

Tool 2: Institutional framework in place

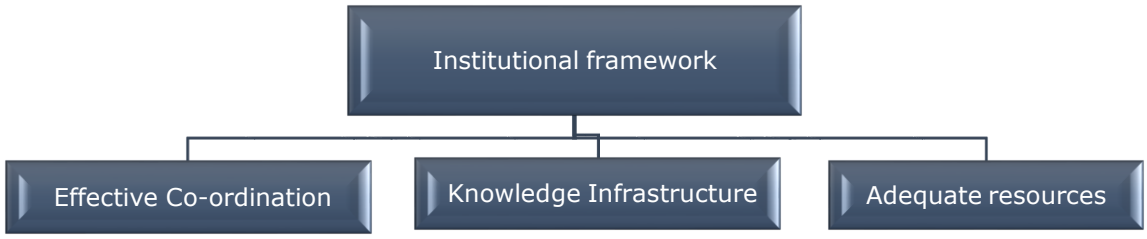

Figure 5: Outline of factors developed to assess the Institutional framework in place

Effective coordination across ministries, agencies, and subnational governments influences actors' capacity to align climate policy aim effectively and consistently. South Africa's vertical, horizontal, and mainstreaming coordinating structures may be better aligned with national goals. Cities' functions change as community needs and growth patterns change. Coordination, collaboration, and partnerships become crucial. DFFE utilizes the IGCCC to coordinate climate policy across the different tiers of government (national, provincial, and local). Provincial, municipal, and SALGA governments must align policies and finances with national climate policy. IGCCC supports vertical integration, although its influence is limited (Averchenkova et al., 2019). All provinces have climate change plans, but implementation varies. Big cities make advances but smaller towns struggle with implementation (Averchenkova et al., 2019). Intergovernmental relationships are key to successful city governance, particularly in Johannesburg. The above are guaranteed in the Long-Term Growth and Development Strategy (GDS 2040). In the future, the city will increase intergovernmental collaboration to assure delivery via strategic partnerships and changing planning and delivery scales beyond conventional borders. The city will build inter-city links and collaborations with all actors, with citizens, to co-create Johannesburg's future. The city plans to leverage intergovernmental ties to increase government capacity via cooperative planning and implementation. By 2030, the city wants to improve collaboration among the tiers of government to achieve strategic programs via strategic alliances and expand planning and delivery scales beyond local and provincial borders.

Climate policy development also needs adequate knowledge infrastructure to assist strategic planning and policy formulation. The research shows the South African government supports transition guidance but could embrace it more. The national government promotes transition-related guidance via DEFF, which sponsors climate-related research. Respectable academic, research and consulting organizations advocate a Just Transition to 2050, not net-zero. The government seldom utilizes genuine reports and recommendations. Locally, the city requires an autonomous research institution apart from national institutions. Independent local research speeds up and improves city research. The COJ may not be using technology effectively to transfer knowledge. The city's knowledge

transfer plan integrates technology, culture, measurement, and infrastructure. COJ has achieved significant smart city development (including the rollout of free Wi-Fi, the e-Health and e-Learning projects and expansion of the Johannesburg broadband network). Joburg has yet to establish the applicability and significance of Smart City based on its particular difficulties and needs. The COJ's Smart City Strategy leverages technology and innovation to improve service deliver, institutional efficiency, and public involvement. The COJ cannot disregard uneven access to information technology while pursuing its Smart City agenda. 21% of Johannesburg homes have internet, excluding mobile devices. This difference is even more severe when it comes to access to broadband networks, which have been a driver of global growth and development through enhancing community development, access to economic opportunities and information, and access to services. In Johannesburg, minors have access to domestic, high-speed corporate, domestic, and 3G networks. Broadband networks are concentrated in metropolitan centers, omitting townships, informal settlements, and rural regions. Through its Smart City plan, the city aims to "make choices and govern through digitally improved interaction with its residents who have universal access to services and information, where socioeconomic growth and efficient service delivery are at its center".

Adequate city resource allocation to address climate effects in the energy sector is also vital. Capital and resource restrictions have long hampered developing countries' climate governance (Bhave et al., 2016). Climate policy implementation requires enough resources and ability. Despite limited resources, the main agency for climate change action is increasing climate-oriented policy formulation. Johannesburg's mayor and municipal leaders created 'Diphetogo' in 2019 to allocate resources. Diphetogo tries to accelerate climate-related change. This method requires the city to make challenging resource allocation choices, and focus on economic growth, job creation, energy infrastructure, housing, and public safety. Its goal is to prioritize implementation and maximize limited resources. Diphetogo Revenue Enhancement Program aimed to help the city handle financial issues and achieve financial stability. This improves the City's revenue collection approach and credit control policy to support its capital and operating budgets. The Inner-

City Revitalization Programme ensured that budget prioritizing was matched with excellent housing, energy, and other infrastructure project delivery. Still, the city depends on federal funds for climate change efforts.

Tool 3: Stakeholders Engagement

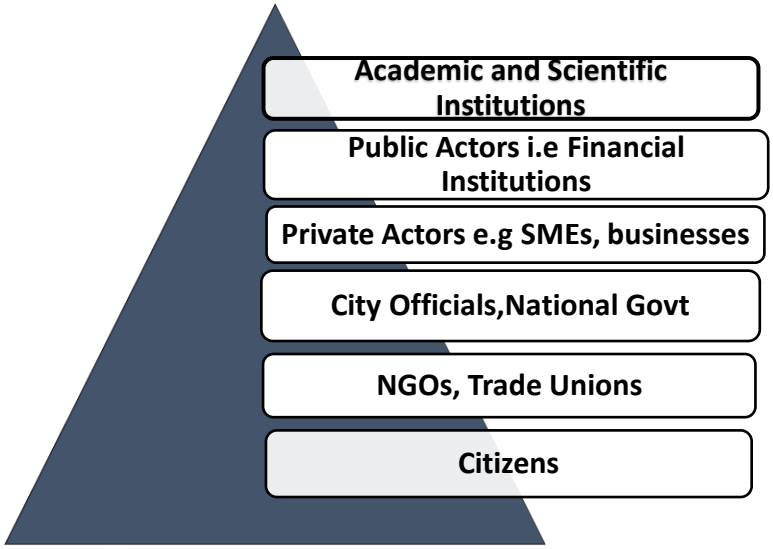

Figure 6: Relevant Stakeholders

The local government's degree and extent of engagement with stakeholders signifies its external knowledge and citizens' expectations. South Africa's political culture emphasizes consultative policymaking since democracy. Power is unequally dispersed among stakeholders, but awareness activities might remain enhanced, particularly locally. The COJ lacks a city-wide cross-sectoral strategy, which is needed to involve residents, local companies, and other key stakeholders in climate change awareness and policy implementation. Incorporating climate change concerns and measures into city structures requires stakeholder buy-in. The city must encourage companies and residents to fight climate change and modify climate-unfriendly behavior. The ambitious, creative, local solutions COJ wants to execute in the city can only be produced if the city collaborates closely with experts from the business community, private actors, financial institutions, the

research sphere, and people who live in, and travel through and utilize the city every day. Effective climate change planning, implementation, and verification need central coordination and support.

Over time, EISD has been primarily responsible for analyzing CAP's implications. To make CAP effective, it must be owned by the city, external partners, and local communities, and entrenched in strategic planning and service delivery. The EISD has engaged with City departments and organizations, as well as national and provincial governments, to inform the CAP. Many stakeholders outside the three realms of government must be engaged in the CAP's implementation. External stakeholder participation is vital. Figure 6 shows how many stakeholder groups were engaged in the CAP's creation. COVID-19 forced the cancellation of numerous discussions, however moving forward, all stakeholders should be engaged throughout CAP implementation and future changes.

An educated and engaged citizenry is vital to successful climate action. Youth activities can create an implementation for climate adaptation via citizen involvement. Regional dialogues and the City's IDP should stimulate public involvement. Citizen involvement is noticed through youth activities/projects like Youth Policy Committee, Policy participation, the Conscious Campaign, and social media activism. Johannesburg's youths made huge contributions to CAP. The process began with a workshop organized by Youth@SAIIA, the Global Change Institute at the University of the Witwatersrand, and City of Johannesburg. A youth drafting group created the final report with participation from students, researchers, universities, and organizations. The COJ government also hosts local stakeholder workshops for climate policy decision-making. They concentrate on adapting their communities to climate change. World Bank and OECD have also contributed to local energy initiatives. Sasol and other significant emitters have been involved in changing the energy market. Increasing energy costs, the cost competitiveness of renewables, and some other global trends have affected significant enterprises in South Africa (National Business Initiative, 2020) and may support the move to transition, especially decarbonizing the power industry. Sasol, a member of EIUG, is seeking 600 MW of renewable energy for its

businesses (Sasol, 2020). Civil society and unions favor renewable energy if coal miners' jobs are protected (EGSA, 2020).

Tool 4: Implementation challenges of Climate Change Litigation

Individuals, civil society, and climate change campaigners in the city of Johannesburg have realized that the government cannot tackle these challenges alone and have participated in the battle against activities that are destructive to the environment. Consequently, litigation has become one of the methods through which concerned local citizens implement climate change governance rather than only depending on government policies and plans.

1. *Earthlife Africa Johannesburg, v Department of Environmental Affairs & others* (*Thabametsi case*), *2017*

Summary

EarthLife Africa Johannesburg v Minister of Environmental Affairs and Others[11] laid a foundation that led to subsequent legal actions in the country against decisions of government authorities to permit company activities that are likely to harm the environment.[12]

The government approved a new coal-fired power plant, and finds the Minister committed a significant error of law in her judgment, but that the Minister rightly concluded that a climate change impact assessment is meant to be done. The Court struck aside part of the Minster's finding and remitted the question of climate change implications to her for to reconsider based on fresh information in climate change reports. The Court halted the environmental authorization awaiting the Minister's assessment of the decision.

- In their defense, the Minister stated that climate change assessment was not within the purview of the provisions of existing laws.

[11]Earth Life Africa Johannesburg v Minister of Environmental Affairs and Others 65662/16 (2017)"
[12] http://climatecasechart.com/non-us-case/4463/

- The Minister opined that although there would be significant greenhouse gas emissions likely to impact climate change, the benefits of the power plant construction far outweigh the effects.
- The court ruled the minister's review on climate change unlawful.
- The entirety of Section 24 of the Constitution has been considered by the courts as a legislative measure that the government must take to protect the environment.
- Therefore, even though the wording of the constitution is not clearly stated, the responsibility of the government in implementing adaptive and mitigation measures for dealing with climate change is implied.

2. *Groundwork v. Minister of Environmental Affairs, ACWA Power Khanyisa Thermal Power Station RF (Pty) Ltd & Others, 2017*

Summary

Groundwork & Another v. Minister of Environmental Affairs[13] is another landmark case where the court recognized the citizens' right to good health and environment while charging the defendants to take measures to ensure that activities of IPPS are regulated to minimize inordinate emissions that disrupt air quality in an environment[14].

Groundwork has challenged South Africa's High Court to throw down the authorization of the Department of Environmental Affairs to build a 600 MW coal-fired power plant, the "Khanyisa Project," without studying first the impacts of climate change on the facility. They also question the minister's rejection of Groundwork's appeal. Petitioners allege this dismissal breaches the Court's March 8, 2017, ruling in EarthLife Africa Johannesburg v. Minister of Environmental Affairs and Others. This lawsuit also included Thabametsi Project, a 1200 MW coal-fired facility. In EarthLife Africa Johannesburg, the Court determined that a proposed coal-fired power station's climate change effects must be examined before an authorization decision is made. Before issuing environmental

[13] More appropriately cited as Trustees for the Time Being of Groundwork Trust and Another v Minister of Environmental Affairs and Others (39724 of 2019) [2022] ZAGPPHC 2 (18 March 2022)
[14] https://lawlibrary.org.za/index.php/za/judgment/high-court-south-africa-north-gauteng-pretoria/2022/2

permission, the National Environmental Management Act demands an evaluation of consequences, mitigation methods, and domestic and international policy obligations. In EarthLife Africa Johannesburg, the Court acknowledged South Africa's Paris Agreement obligations as one reason climate change is significant for a coal-fired power plant's environmental examination. This seems similar to the case of EarthLife Africa Johannesburg and as well features the failure of the government to take adequate plans to safequard the environment.

3. *Hendrina Power Station: Groundwork, Earthlife Africa Johannesburg and Highveld Environmental Justice Network V Nkangala District Municipality and Eskom*, 2015 [15]

Summary

This Power Station case is an appeal against the Nkangala Municipality over the Atmospheric Emissions license given to Eskom Hendrina and Komati power plants owing to Eskom's request to extend the date for fulfilling Minimum Emission Standards (MES). Nkangala District Municipality (NDM) accepted the application and recommended it to the National Air Quality Officer, who approved it under the Local Government Systems Act 32 of 2000 and the National Air Quality Act (NAQA). Plaintiffs appealed to NDM Appeal Authority on grounds that Eskom did not meet standards of the National Environmental Management Act: Air Quality Assessment (NEMA: AQA), Minimum Emission Standards (MES), Section 62 of the Local Government Systems Act, and other environmental laws.

- In the aforesaid case, the local authority was allowed to use its limited powers. The local government was required to create Atmospheric Emissions License Systems; however, the National Air Quality Officer authorize the license. This shows some

[15] https://cer.org.za/programmes/pollution-climate-change/litigation/challenges-of-decisions-by-district-municipalities-to-grant-atmospheric-emission-licences-for-eskom-coal-fired-power-stations/hendrina-power-station-groundwork-earthlife-africa-johannesburg-and-highveld-environmental-justice-network-v-nkangala-district-municipality-and-eskom

level of non-autonomy to make decisions and ineffective coordination among the arms of government.

- Another issue is the absence of no clear measures or policies to determine how a company's emission initiatives are measured.
- Given how local government systems are designed and the examples are given, it's clear that governments provide permissions and licenses without assessing the application. These acts of government officials undermine environmental assessment policies, adaptation, and mitigation methods. The national government therefore ought to make sure there is rigorous adherence to environmental rules, particularly by local governments, which are closest to citizens.

4. *The City of Cape Town V Nersa and Minister of Energy, 2017.*[16]

Summary

This city opted to acquire from more independent power providers, some renewable energy to diversify its electricity usage and reduce its dependence on current sources of energy (IPPs). The Minister of Energy neglected to endorse for more than two years despite following all the necessary to get approval to acquire solar and wind electricity from an IPP. All applications have been put on hold indefinitely, according to the Minister. To make an IPP build a new power plant and deliver energy to the city without the approval of the Minister of Energy, the city requests an injunction from the court. Instead, the city is asking for an order declaring section 34 of the Electricity Regulations Act 4 of 2006 (ERA) unlawful and unenforceable because it unlawfully embeds on constitutional rights and responsibilities of local governments.

Unfortunately, because the court regarded the case as a dispute between tiers of government, that which ought to be resolved outside the court, it postponed the application

[16] https://cer.org.za/wp-content/uploads/2020/08/City-of-Cape-Town-v-National-Regulator-of-South-Africa-and-Minister-of-Energy.pdf

until August 11, 2020, and returned the dispute to the parties. Indefinitely, the application has been put on hold. This again shows the interdependence on ratification of an arm of the government to protect the environment. If such an arm negligently refuses to act to protect the environment, this will be to the detriment of the city.

5. *African Climate Alliance &Ors V The Minister of Mineral Resources and Energy &Ors (2021)*

Summary

Vukani Environmental Justice Movement in Action (VEM), the African Climate Alliance (ACA), and groundWork (gW) filed a constitutional action against South Africa's Minister of Mineral Resources and Energy and the National Energy Regulator of South Africa (NERSA) on November 10, 2021 (#CancelCoal case). According to the plaintiffs, buying 1500 MW of extra coal-fired power breaches South Africans' fundamental rights to life, dignity, and equality.

The groups questioned the Minister's plan to buy 1500 MW more coal, NERSA's support, and the 2019 Integrated Resource Plan (2019). The organization asked the government to withdraw its intention to buy additional coal-fired electricity on September 17, 2021. (Sabin Center for Climate Change Laws, 2022). The court action was taken when officials ignored letters. The plaintiffs rely on IPCC conclusions that decreasing greenhouse gas emissions is a national emergency and numerous well-detailed analyses on impacts of new coal-fired electricity in South Africa, (Sabin Center for Climate Change Laws, 2022).

The plaintiffs allege that South Africa is ranked among top 15 GHG emissions contributors owing to its dependence on coal for energy production (Giordano et al, 2011) and that renewable electricity is a superior alternative. The defendants haven't filed their defense yet. The president has said he won't intervene in the case and would accept the verdict.

It's hardly unexpected that the energy minister is considering buying additional coal-fired electricity despite climate change. If questioned, the government lacks the

financial and economic capacity to acquire other energy supplies, forgetting that prolonged usage of coal-fired electricity would produce more costly chaos in the long term. The present action against the minister may or may not succeed. Even if the plaintiffs win, other coal-fired power facilities may be bought before the case is finalized.

Thus, from the above litigation cases, some implementation issues were identified, that are common to all cases. This, in a bit, to identify some challenges that come up in a bit to implement policies and laws to adapt to climate change impacts in the city.

	Implementation Issues			
Climate Litigation Cases	**Inordinate Co-ordination among the arms of the Government**	**Neglect of the government's responsibilities to protect the environment**	**Laws and Policy complexity/ ambiguity**	**Difficulty in the enforcement of existing and clear policies**
EarthLife Africa Johannesburg V Minister of Environmental Affairs and Others		✓	✓	✓
Groundwork & Anor. V. Minister of Environmental Affairs		✓	✓	✓
Hendrina Power Station: Groundwork, Earthlife Africa Johannesburg & Ors V Nkangala District Municipality, and Eskom	✓	✓	✓	

The City of Cape Town V Nersa and Minister of Energy	✓	✓	✓	
African Climate Alliance &Ors V The Minister of Mineral Resources and Energy &Ors	✓	✓		

Table 4: Review of Implementation issues common in Climate Litigation cases in Johannesburg

Tool 5: Case studies of Energy Transition projects

1. **Johannesburg's Landfill Gas Project**

Summary

Johannesburg has energy and load-shedding problems. In 2007, the city began a landfill gas-to-energy project. The project employs gas turbines to extract methane gas from landfills and create renewable energy for the municipal grid, offsetting primarily coal-derived power. The project was constructed under a 20-year PPP with EnerG Systems. The city signed a Power Purchase Agreement (PPA) with Eskom to sell landfill energy in November 2012.

In 2001, Johannesburg tried to build a landfill gas plant but lacked finances and knowledge. The city recognized the 5 landfills in 2005. In 2006, the City's Environmental, Infrastructure, and Services Department (EISD) decided to fund and operate the landfill gas-to-energy project through a Public-Private Partnership (PPP) and began seeking a private partner to design, build, and execute the system. Stakeholders were engaged. The City of Johannesburg's Environmental, Infrastructure, and Services Department (EISD) opted to finance the landfill gas to electricity project via a Public-Private Partnership (PPP) since it lacked technical competence and could not afford the project on its own (USD 765 million). PPPs divide duties and risks. In this proposal, the city owns the facilities while the private

sector builds and operates without demand risk (which remained with local and national electricity providers, City Power, and Eskom). The city expected that offering the project to a private company would help with community ownership by reducing theft and vandalism of state assets like city electricity and waste infrastructure, unlicensed trading with state assets by illegal businesses, and non-payment for municipal services.

It was also observed that the gases and their management are simple, but the laws, Kyoto Protocol 2002 regulations, and legal procedures make the "landfill gas to energy clean development mechanism project" difficult. The city's project managers and team members had to engage in intense due diligence to put in place the legal and budgetary conditions to get the project off the ground. PPPs, demand costly LFG knowledge and skills. The service provider contract permits a private contractor to cover capital and maintenance expenditures, but the municipality must pay for consultants and specialists to help with agreements and legal requirements. LFG financing and revenue sources are problematic. Without external finance, the service provider would have trouble completing the contract. Nedbank, EnerG Systems' bank, required the City and EnerG Systems to execute a Power Purchasing Agreement (PPA) before releasing funds for the third phase of the project.

2. Solar Rooftop PV Project

Summary

When it comes to energy generation in South Africa, rooftop PV is considered a win-win option as described by the WWF South Africa (2019)[17] since it is more cost-effective and environmentally friendly than Eskom's fossil-fuel-generated power. Eskom's active energy price is decreased by rooftop PV; however, the fixed costs are not reduced at the same pace, despite the municipality's savings. Installing rooftop solar power systems in Johannesburg reduces municipal electricity sales and generates more municipal revenue. WWF South Africa and CRSES [18] performed a survey which made it clear that the ability of South

[17] WWF. 2019. Residential investment in rooftop solar PV: What does it hold for the future? Energy Briefing Paper. wwf.org.za/ our research/publications/?30201/residential-investment-in solar-pv
[18] n19

African households to pay for the high upfront costs of solar rooftop PV depends on a variety of factors, which include falling technology costs, rising electricity costs, a growing awareness of the need to reduce electricity consumption resulting from the burning of fossil fuels, and the continuation of load-shedding in South Africa.[19] Despite consumers' reluctance to register PV installations, municipalities cannot express their plan, including the rationale for tariffs, clearly enough to consumers. Clear communication could assist municipal utilities and solar rooftop PV owners align their interests, but municipalities still confront the problem of managing a complex system. This complexity comes from switching from a linear to a multi-actor power purchasing and distribution system. Power customers, PV owners, communities, energy production, and distribution utilities, and politicians utilize the tool. Most agents just know the visible system.

Municipalities want the best electricity grid for all their users, yet solar rooftop PV installations have added complexity. It's tough to maintain a safe, financially sustainable electricity infrastructure that minimizes South Africa's fossil-fuel dependency. Municipal decision-makers and power users often see these difficulties and solutions differently. All actors need to have a common ground in an ideal society. If this is the case, it would be the most reliable, equitable, and sustainable power grid for everyone, not only PV homeowners. Municipalities must increase communication with electricity customers, especially those with rooftop PV systems. To have a deeper understanding, governments and consumers must discuss the system's feedback loops. One important feedback is the rise, in the fixed amount of electricity tariff which makes rooftop PV installations less financially feasible, resulting in more unregistered systems.

According to Sustainable Energy Africa (2019),[20] it is as well observed that there is a gap in expertise and research. Municipalities lack installation experiences and the ability to run a plant. Further research is needed on installed system pricing in South Africa and bulk-buying discounts. Maintenance and insurance expenses need further investigation, as

[19] For more information on household investment decision-making, see WWF, 2019 (n 19).
[20] This document was developed by Damian Conway on behalf of Sustainable Energy Africa NPC as part of the SAGEN Programme. https://www.sseg.org.za/wp-content/uploads/2019/10/Low-and-Mid-Income-Household-SSEG-Model-Report-FINAL-final.pdf

does group insurance. In South Africa, PV panels, Balance of System (grid-tied), and installation prices are predicted to decrease in the coming years. Future Eskom tariff escalation possibilities for South African cities require research. Due to the funding difficulty, additional study is needed on how to build financing products and procedures for low-income people that allow fast savings.

3. City Power Johannesburg Public lights projects

Summary

Public lighting is a crucial Joburg and City Energy service delivery strategy. It is not enough to have public or streetlights; they must also perform properly from nightfall to morning. This project ensures that public lights are working in all regions and are repaired within the specified timeframes. City Power maintains street lighting across the city. City Power is responsible for about 276,000 streetlights. Bulk Luminaire Replacement and New Public Lighting Infrastructure are two sub-programs of public lighting installation. Bulk Luminaire Replacement replaces streetlights with LEDs. Existing poles, wires, and conductors are reused, which decreases the cost compared to installing new streetlights. Per area, energy savings, simplicity of maintenance, uniformity of illumination, aesthetics, and customer experience will be maximized. The Installation of New Public Lighting Infrastructure project installs streetlights in places lacking them. Both Eskom and City Power implement the projects in the city. City Power has standardized the usage of overhead conductors to provide lighting due to theft, vandalism, and illegal energy connections. LED streetlights save energy while improving lighting and aesthetics. Since 2005, there have been few resources to maintain, renovate, improve, and extend the power infrastructure. City Power commits to work with the city and other partners to provide electricity to underserved areas. City Power has been available to communities and other stakeholders utilizing relevant and user-friendly platforms and channels. From the report of City Power, Limited financing may hinder the effectiveness of Stakeholder Engagement Initiatives. Delays in financing smart technology ventures threaten their continuing existence since certain technologies are restricted. Some issues in implementing city power projects include Capex budget

allocation, cost escalation, maintaining dependability and security of energy supply, revenue reduction, and overreliance on fossil fuels.

Poor financial management also exists. Cash earned from power sales has fallen from 3% to 5%. Revenue reduction and cash flow may prevent City Power from meeting its short-term financial commitments, threatening company operations, service delivery, and financial viability. According to the City Power Business plan (2019), weak revenue management systems and processes, aging and inadequate ICT infrastructure, ineffective stakeholder management and collaboration, security of supply, a dramatic increase in the cost of key resources (labor and materials), inadequate funding for renewable energy projects, restrictive regulatory and legislative framework, and politics are also some of the challenges faced.

	Implementation Issues			
Energy Transition Projects	**Challenges of Stakeholder's Engagement**	**Low Access to Financial resources**	**Information and data gaps/ Knowledge transfer**	**The complexity of Legal Frameworks**
Johannesburg's Landfill Gas Project		✓	✓	✓
Solar Rooftop PV Project	✓	✓		✓
City Power Johannesburg Public lights projects	✓	✓	✓	✓

Table 5: Review of Implementation issues common in some Energy transition projects in Johannesburg

3.3 Interviews Data Collection

Data Collection

Semi-structured, one-on-one interviews were employed to gather and analyze qualitative data. In a semi-structured interview, a predetermined set of open-format questions relevant to research topics is utilized as an interview guide, rather than a standardized interview process (Saunders et al., 2019). It does, however, allow for the introduction of new questions if a new subject arises (Cachia and Millward, 2011). This study's methodological approach calls for a semi-structured interview since the rigidity of a structured interview and its confinement to the subjects listed in the interview guide would be inappropriate (Cachia and Millward, 2011; Walliman, 2006). Semi-structured interviews were conducted through Zoom, video conversations, and in-person, lasting anywhere from 30 to 60 minutes, depending on the research design. A two-way communication mechanism that facilitates the exchange of information in a discursive manner was selected as the instrument for this project (Braun and Clarke, 2006). Thus, both participants and researchers can go farther in their quest for important information while also allowing for the discovery of new and previously unknown information (Braun and Clarke, 2006). The questions used in the interview were drawn from previous research studies with similar aims and objectives.

Participants

The participants were chosen because they are considered relevant stakeholders in this context. The interviews are conducted with relevant stakeholders to further analyze and evaluate government’s readiness to address climate change’s impact on the energy sector and suggest further recommendations on how to better strengthen climate governance. The following participated in the interview:

• Two Private Actors of the Energy Sector in Johannesburg (Afterwards referred to as P1 and P2)

- Two Academics from Research Institutions (Afterwards referred to as P3 and P4)
- A Citizen of Johannesburg (Afterwards referred to as P5)
- An actor from a financial Institution (Afterwards referred to as P6)
- A city official at the Local Government Level, Johannesburg (Afterwards referred to as P7)
- A consultant firm with the Government on Energy projects (Afterwards referred to as P8)

By research ethics, consent was sought from prospective participants after they had been fully told about the study's aim, the interview's format and model, the intended use of the data, and an ethical statement. Participants are identified as Participant(P)1, P2, P3, P4, P5, P6, P7, and P8 to maintain their privacy. To facilitate transcription and analysis, each interview was videotaped with the participant's explicit agreement. As an added benefit, the researcher can focus her attention and questions on the interviewee while the video is being recorded (Saunders et al., 2019).

Data Analysis

Qualitative theme analysis was used to analyze the recorded data, which was then manually transcribed into Microsoft Word (Braun and Clarke, 2006). Theme analysis has numerous phases. As a first step, data transcribing is done to familiarize with the information being transcribed. Data-driven coding for raw data was also developed. This led to a division of key findings into themes. Afterward, the themes were evaluated and adjusted to achieve consistency. Finally, the headings of the themes were modified, and the data contained inside was analyzed.

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Findings

Thematic analysis (Braun and Clarke, 2006) of the five law and policy tools analyzed in Chapter Three, together with the interviews unveiled six themes of implementation challenges. Most of the implementation challenges discussed in the previous chapters are further confirmed by participants of the interviews, as major challenges confronted in implementing climate adaptation and energy transition policies. Thus, the implementation challenges are grouped as seen below into five major themes *(Figure 7)*. The analysis of each theme will be presented in the following section.

Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
Ineffective horizontal and vertical Co-ordination	Issues with Stakeholders' engagement	Policy Complexity/ Vagueness	Low Access to Financial Resources	Gaps in Knowledge transfer/Expertise

Figure 7: Themes representing the Research Findings

Theme 1: Ineffective Horizontal and Vertical Co-ordination

The lack of effective coordination horizontally among national, provincial, and local governments, and vertically between them and non-state actors was cited as a major implementation impediment by most participants interviewed in this research. Raising funds for the implementation of energy-related laws and policies is especially difficult in a silo-based culture that lacks effective coordination. *"Without instructions from the top on how to collaborate with other government departments and agencies like the Local Government Officials, Ministry of Mineral Resources and Energy, and Department of Environmental Affairs, on energy projects, Local Government Officials often find*

themselves in a "bottom-up process" which in turn do hurt our energy projects". (P1, Private Actor).

Several elements combine to create coordination problems. A lack of high-level direction and unclear institutional directives for execution; a politically weak agency assigned to lead; and a lack of resources and capacity deficiencies in the sectoral and sub-national authorities are among these issues. *"For instance, when the responsibility for developing a climate change strategy or approving a project sits solely with the DEA or minister, delays in approval or personal reasons are some of the factors that could hinder the implementation of these policies or projects. there needs to be an improvement on ambiguities in terms of the mandate for managing and coordinating the implementation of these projects"* (P8, from NGO).

It is extremely difficult to execute a cross-sectoral coordinating function when an environmental ministry has relative political weakness and lacks a defined mandate (neither of which are unique to only South Africa). Though several major pieces of Energy policies have already been amended to include climate change provisions, which, according to the participants, facilitates policy coordination and execution in various sectors. However, there are gaps in this regard for other sectors asides from Energy. Uncertainty about each sector's duties and responsibilities in climate change policy hinder communication and involvement. *"We depend heavily on our working relationships and persuasion to push the Energy sector to address climate change most of the time. We do not depend on laws and policies that can seem confusing even to the government"* (P1 2, Private Actor). P8 who has worked extensively with the government had a similar observation and emphasized the communication challenges: *"You never know who to talk with, what capacity they are acting, what interests they protect, and most importantly, if they are on board with the climate mission" (P8, Consultant).*

This coordination challenge can disrupt engagement with the rest stakeholders. In addition, participants emphasized the need for clear disclosure of the identities of the responsible people and focal points on climate change problems within each agency. P8 explained, *"The structure is simple to build. Getting everyone to engage is a whole other*

matter. Frequently absent are the skills, political power, and influence." P6 finally contributed by saying *"Coordination between agencies and departments would also communicate to the banking community that they can profit from climate financing"*

Theme 2: Distrust of Stakeholders' engagement

Some participants (e.g., P5, P1, P8) expressed distrust among stakeholders. According to one participant, distrust stems in part from the fact that major emitters dominate the private sector (P8, Consultant). From research, these challenges are not exclusive to climate policy; they are common throughout South Africa's political discussion and economic system. However, positive engagement between the public and private sectors is especially vital for the development of climate policy.

Most private greenhouse gas emitters are owned by the government or recently privatized. Eskom, the greatest emitter, opposes policies that might undermine its greenhouse gas-intensive economic model. Government and private sector involvement in climate policy are caught in a circle. This makes it hard to evaluate private sector bids based on merit. *"The government believes business is blocking development, while the private sector defends its interests by questioning the validity of policy initiatives* (P1, Private Actor). Coordination of climate dialogues affects stakeholder engagement, participants indicated. Communication during policy discussions is relevant. Initiatives that influence major stakeholders are often offered in public without previous consultation. This causes considerable resistance and sometimes open rejection, restricting conversation and negotiation with the private sector (P1, Private Actor). Low transparency and lack of stakeholder feedback can hinder successful engagement.

Both P8 (Consultant) and P1 (Private sector) were unsure whether their suggestions during the engagement are heard and evaluated, and follow-up takes a long time, limiting enthusiasm to participate. P5 (Citizen) also highlighted that occasionally, decisions are already made even before the engagement sessions, without a good explanation. The discussion then develops into an interrogation about why the government

didn't consider opinions before taking the decision. P5(Citizen) claimed public forums and gatherings sometimes might end unpleasant and defensive.

Theme 3: Policy Complexity/Vagueness

Participants cited a lack of policy clarity as another implementation challenge. *"The laws aren't worded clearly, therefore it's impossible to know whether you're complying"* (Participant 2, Private Actor). P7 (City Official) agreed: *"The great majority [of regulations and frameworks] are overly ambiguous"* This, according to participants, confuses stakeholders who lack climate change knowledge, time, or resources to comprehend what it means for them and their industry.

Other problems include a perceived lack of policy stability and consistency in key sectors important to South Africa's emission reduction route, which has been extremely serious in recent years owing to political and economic concerns. Private sector players want policy clarity to guide their investments. Recent political changes and declarations from the present government, as well as the reopening of the REIPPPP, offer a more favorable prognosis for renewables and policy simplification and consistency in this sector, according to P7 (City official).

Theme 4: Low Access to Financial Resources

It is critical to have sufficient financial resources so that the government can do its duties and so that policy implementation and the underlying investments in the energy and climate-resilient transition can be financed effectively. Almost uniformly, participants pointed to a lack of financial resources as a major impediment to South Africa's cities' ability to govern effectively or execute climate measures. According to participants, a lack of a comprehensive climate finance strategy is one of the most crucial gaps in financing climate change activity and developing a strategy for attracting international funds and investment. (e.g., P8, P6). *"At the provincial level, money is reliant on national government appropriations, therefore it may be more difficult for cities to pay for their climate activities*

via local residency taxes. As a result, provinces are unable to participate in climate change vertical coordination meetings because of a lack of financial resources" (P7, City Official). Government agencies, regional governments, and commercial entities lack the expertise and capacity to produce financially feasible project proposals. The absence of high-quality proposals, according to P6 (Financial Institution), has more of an impact on funding climate investments than the availability of funds. Since this finding supports the findings of previous research on international climate financing limitations (Averchenkova, 2014; 2017), which implies the country has less access to international climate funding.

Theme 5: Gaps in Knowledge Transfer/Expertise

All participants indicated a perceived lack of competence to deal with climate change policies as a key governance concern. It is caused by a scarcity of human and financial resources, as well as a scarcity of adequate expertise and competencies. Several essential agencies are understaffed in general. Some participants (P3, P4) confirmed that most teams addressing these policies' implementation were too small for the difficult job of creating and coordinating climate action. The increased complexity of the labor needed in planning and executing transition and resilience strategies further strains limited human resources. According to P3 (Research Institution), *"if you don't catch up and gain the greater technical competency, you will fall behind."* Responding successfully to increased complexity necessitates the capacity to collaborate across a greater variety of disciplines and players, which is becoming more difficult for already overburdened government actors and other stakeholders. Several participants identified over-reliance on external consultants as a significant impediment to policy creation and implementation. *"A consultant completes a project and then departs. You need entrenched capability in government to have a more successful implementation,"* (P4, Research Institution). *"Technical skills and the competence to act on climate change are much more scarce in municipalities than in central government agencies"* (e.g., P7, City Official).

4.2 Discussion

This paper discusses elements that contribute in ensuring effective implementation of climate adaptation and energy transition policies in South Africa, specifically the city of Johannesburg. Following policy development, the most essential step is policy implementation. To address the research question of this paper, "How effective is the use of Law and Governance in implementing climate change adaptation and energy transition policies in South Africa?", this study has the objectives to (i) to examine the effects of climate change on the energy sector (ii) to assess the implementation approaches of Johannesburg using the Law and Policy tools, to achieve climate adaptation in the city (iii) to identify the missing links and challenges inherent so far in using these tools to implement climate adaptation strategies and further provide recommendations.

For the methodology, it is a two-fold process. (1) Some Law and Policy tools were divided into variables to measure how effective policy implementation is, in Johannesburg. These variables are the Institutional framework tool, Local policy development tool, Relevant stakeholders' engagement tool, Climate Litigation tool, and Energy Transition projects. (2) A qualitative study done through semi-structured interviews with eight participants on a one-on-one basis. Each interview's translation was subjected to a thematic analysis. Five main themes emerged from the analysis of the two-fold process, these are Ineffective horizontal and vertical Coordination, Issues with Stakeholders' engagement, Policy Complexity/Vagueness, Low Access to Financial Resources, and Gaps in Knowledge transfer/Expertise. These themes describe the missing gaps or challenges faced in implementing adaptation and energy transition policies in Johannesburg. The challenges were discussed and recommendations that can further strengthen the implementation strategies in Johannesburg were made.

4.3 Recommendations

Theme 1: Reinvigorate high-level commitment and empower government agencies with explicit directives.

Adaptation and energy transition policies need increased political dedication and leadership at the highest level and a coordinated government strategy to be successfully implemented. Each of these agencies should have the authority to assign employees and resources and put in place policies based on their work and the lessons gained from previous implementations. This necessitates the establishment of a well-coordinated process that is open to the public and guided by a government agency with a strong mandate from the highest levels of government. Implementation coordination might be improved by an iterative learning approach that incorporates the findings of the learning process into planning and monitoring indicators. All the governments of both provinces and cities should be involved.

Theme 2: Strengthen engagement and consultation forums

Engaging key sectors more frequently and requiring their participation in primary fora might improve existing stakeholder engagement methods. Changing the form and tone of involvement and emphasizing openness will help communication with stakeholders. Senior professionals with commercial knowledge should lead the government's participation. Strengthen stakeholder connections and engagement procedures.

Providing chances for all stakeholders to participate in non-governmental fora is crucial for public-private interaction. All parties need spaces to interact outside bureaucratic systems without becoming entrenched in constituency seats. A trustworthy impartial intermediary should help this approach. It should build on earlier experiences and address implementation issues. National and local governments should find and promote 'climate champions' Investing in strengthening interaction processes, building personal ties that move away from 'political lines,'

should be part of climate change governance measures. This helps horizontal and vertical synchronization. Participatory training or pilot programs might also help collaborations between sectors and stakeholder groups.

Theme 3: Strengthening delivery of clear policies and implementation mechanisms

Several participants agreed that South Africa has some solid policies, and it's important to implement them properly before adopting new ones. Strengthening implementation requires a clear driver with a top mandate to control and organize the effort. In the city, a good mechanism might be utilized to combine working with other departments and cities. A forum on implementing the climate adaptation policies is also proposed so that each flagship program has a lead department that assembles and manages implementation teams. Government officials at all levels should have more frequent interaction with city authorities as part of a unified national agenda. A climate change policy implementation plan with explicit timetables and assigned duties linked to all relevant frameworks, from the national development plan downwards, might increase implementation effectiveness and produce positive momentum. Improving policy coherence helps stakeholders, notably the commercial sector, follow strategy.

Theme 4: Create a comprehensive financial plan

Climate-resilient development needs reliable finance. The possibility lies in enhancing its utilization and priority, for as by including climate change in budget discussions. Some experts advised developing a climate adaptation finance coordinating organization. Funding for project development and implementation should be given by the national government to the local and provincial government. Without government funding, cities may not be able to prioritize these initiatives says some participants

Improving access to international climate is another important area. As a result, donors must ensure that the initiatives they fund are in line with and supportive of existing national climate plans. International Investments can assist national climate strategy and procedures. Also, it is important to build new skills and capabilities and provide competent assistance to ensure sectors, provinces, and municipalities have new and well-trained staff, ready to work on climate change projects. It may also be possible to help capacity-building

through extended public works programs that concentrate on inclusive growth, i.e., using a multiple benefits approach.

Theme 5: Improve knowledge quality, information, and public awareness

Improving knowledge and information base is necessary to successfully develop and implement adaptation and energy transition strategies on a broader scale. Alongside the support of climate activism, continuing to promote public involvement to raise awareness of climate change policies should constitute an essential component of the implementation plan. Consideration must be given to enhancing the way expert knowledge and research pertinent to the transition toward climate resilience may be shared, to make this information more available to the public sector and other stakeholders.

CONCLUSION

Legal and policy implementation of climate adaptation and energy transition policies were summarized in the previous chapters. The implementation in African cities is in desperate need of improvement. For the sake of successful energy transition and adaptation, it is imperative that the social dynamics of cities, comprising a broad range of stakeholders and partners, be taken into consideration, and addressed with concern. According to research, laws, and policies have a crucial role in energy transition and climate change adaptation. It is true, however, that in countries like South Africa, the implementation of climate change and energy transition laws and regulations can be difficult. This might be seen as a sign that the governance structure is falling behind. Many African cities' energy sectors are plagued by ineffective horizontal and vertical coordination, skepticism of Stakeholders' participation, policy ambiguity, and limited access to financial resources. Strengthening public participation and consultation forums, delivering clear policies and implementation methods, thorough financial plans, etc. may help solve these issues.

Climate change adaptation and energy transition laws and policies in Johannesburg, South Africa, have been examined in this research. Although this research targets the South African context, many of the challenges it uncovers are common across many other African countries.

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APPENDIX A (INTERVIEW QUESTIONS)

A STAKEHOLDER FROM A FINANCIAL INSTITUTION

- I am aware that World Bank works to unlock this climate financing investment in South Africa, can you give a little more detail about some concrete energy transition project(s) in South Africa? Can you also talk about the success of some of your popular huge projects?
- Did your projects include any type of partnership involving the government, civil society, and private sector? Were other actors, such as universities, schools, and non-profits, involved?
- How well are the principles of engagement, involvement, collaboration, and teamwork incorporated throughout these programs?
- Do you envisage any roadblocks to the achievement of these programs or future projects in Africa? And if yes, are there ways you will try to solve them?

STAKEHOLDERS FROM RESEARCH INSTITUTION

- Considering your scholarly and research contributions to the topic of environment, human rights, climate change law and policy, and sustainable development goals, what do you think are the roles of academics, universities, and research institutions in achieving climate-resilient cities and sectors? Practically speaking, in your opinion has there been enough contribution so far from this field.
- I often hear that most environmental and climate laws and policies made by governments just exist on paper. Do you think the law has been effective enough to address climate impacts? In your opinion, has there been an actual global approach(es) to environmental protection?
- Do you think lack of competent expertise or low knowledge transfer has been a major challenge in achieving climate resiliency?
- Do you think the law (like national and local laws in South Africa) has been effective enough to address climate impacts?

- Do you find it hard to build a dialogue with the public actors and Government to participate (co-design sessions, participatory procedures)
- How do your research contributions represent a viable tool in fighting environment/climate impact?

A CITY OFFICIAL AT THE LOCAL GOVERNMENT LEVEL, JOHANNESBURG

- What degree of participation or collective decision-making is involved in setting public priorities in your city? Do you often interact with other stakeholders to build energy transition projects in your city?
- How does the local government support energy transition projects in this city? Do you think technology helped to improve community development and engagement in these projects?
- How are some of these energy projects beneficial to other cities?
- What are some challenges that local officials often encounter in participating in building energy transition projects in this city?
- What is the future vision of the energy sector in your city, how do you imagine the sector to be in twenty years?

PRIVATE ACTORS FROM THE ENERGY SECTOR, AND A CONSULTANT FIRM WITH THE GOVERNMENT

- Can you give details about some recent energy transition projects, that you have been involved in, in Africa if any?
- What is the time horizon for your recent projects and how sustainable are they in the long term?
- How does your project envisage a form of an inclusive and collaborative approach with other stakeholders? Are there any other key actors, such as universities, and research? Is the government support, and recognition always needed and received to achieve these projects?

- What are some practical energy just transition approaches you have taken to make sure you are aligning in supporting the move towards climate-resilience cities?
- Do you rely on some digital online tool to design, implement, or promote your projects? If yes, do you believe that technology played a big role in promoting community building and participatory governance for the projects? How do these projects deal with privacy and ownership of data issues?
- Based on your experience so far, what is the role of government in your project(s). Can you point to some specific government supports you've received while handling some projects? Do you find it hard to build a dialogue with the government to participate (co-design sessions, participatory procedures)

A CITIZEN OF JOHANNESBURG

- Do you know of any clean energy projects in your city?
- Would you say the government is making a good effort to ensure the citizens get good access to electricity?
- Does the local government often organize seminars, conferences, or local gatherings to work with the citizens on projects in the city? Do you believe citizens are sufficiently engaged in the decision-making procedures for these projects?
- • Do you feel that technology, such as the usage of social media, can help to increase citizen engagement in these projects?
- Why do you believe there are so few sustainable energy initiatives in your city, in your opinion?

APPENDIX B (INFORMED CONSENT FORM)

This is a research project that is dedicated to developing a theoretical and analytical framework based on a large dataset of secondary and primary data. The results of these research efforts will be collected and analyzed accordingly. The findings in this research reflect collection efforts by a researcher who found information online, in scientific literature, or through first-hand interviews with representatives involved in the project. Additionally, the material could be later included in scientific articles, doctoral dissertations, and master theses by Luiss University, students, or the public. The answers of the interviewer will not be published entirely. The research outcomes will be made available in both digital format and books/articles. The research outcomes will be made available, when possible, in open access format.

1. I, ……., hereby certify that I accept to participate in this interview
2. I (tick the one that applies)

a. prefers to be known as ‘anonymous.

c. prefers to that my name is termed as ‘anonymous’ and my position described as …… (description of position).

3. I understand that the researcher might necessarily use data anonymously for privacy regulation.
4. I am conversant with the aims and nature of the research project and having being told of my contribution. I was sent a copy of this consent form, with a summary of the research aims.
5. I understand that the content of the interview is subject to the analysis of the researcher analysis and interpretations.
6. I agree that some parts of them are made public through quotations in the files that will be put online.

7. I acknowledge that I gave my approval to the file based on one interview before they were made public in the open-access database. I was made aware of the content of such a file.

8. I accept that the data might be further processed for scientific purposes, in line with the Italian law on privacy (https://www.garanteprivacy.it/home_en/italianlegislation on the protection of privacy regarding the processing of personal data. Users of database contents are requested to refer to the database.

9. I accept that the results of the research will be used for scientific purposes, in compliance with the ethical standards of the scientific community.

Location: ……

Date: …… Signature:

SUMMARY OF THE THESIS

CHAPTER 1

INTRODUCTION

Title

The Role of Law and Governance in addressing Climate Change Impact on the Energy Sector in Africa: The case of South Africa

Research Problem

The study agrees with The Consultancy Africa Intelligence (2008) that the African continent may be in danger due to a lack of systemic implementation mechanisms. This paper focuses on the energy sector because it supports Davidson & Winkler's (2003) argument that access to energy is a major challenge for developing African countries as they seek to enhance and expand industrial production and output, as well as economic expansion when they should be focusing on minimizing CO2 emissions and mitigating climate change. Now, why is this research important? To assess the government's capacity and readiness to facilitate the transition to climate-resilient economic growth. It compares how nations approach climate governance globally. After this review, more suggestions will be offered on insufficiencies and challenges observed in employing Law and policy instruments to address climate change, and methods to better execute suitable transformational policies to allow the essential transition into a climate-resilient city. Therefore, within this approach, this thesis will answer specifically this question:

Research Question

How effective is the use of Law and Governance in implementing climate change adaptation and energy transition policies in South Africa?

Background of the Study

This research will investigate the implementation strategies for climate adaptation in South Africa. This article examines the efficacy of laws and policies to promote climate resilience and energy transition in South Africa. It aims to provide a theoretical and practical framework for evaluating a government's legal and policy preparedness to ratchet up climate policy, notably in the energy sector. A case study of Johannesburg will be used to evaluate the local government's preparedness to adopt climate change legislation and policies in the energy sector.

Why the Energy Sector? Clean energy availability is a key problem in most developing countries, as noted in the introduction. Climate change presents various threats to the energy industry. Improved adaptation to climate change will be crucial to the energy sector's technical viability and capacity to meet growing energy needs driven by global economic and population development. Regulators, financial institutions like banks, energy firms, and government will all need to establish and adequately implement adaptation measures.

Why South Africa? South Africa is one of the Africa's main coal-producing and its per capital emissions are part of the highest in the developing world. By ratifying the Paris Climate Agreement, South Africa has made a commendable contribution to the fight against global warming. South Africa has been developing and implementing national and municipal climate change policies and leading international climate discussions. In such a political environment, the legal and policy response to climate change puts more emphasis on how effective law and policy tools have been, to address climate change implications in Africa. Findings, problems, and lessons from the methodological approach will serve as a landmark for other emerging countries in Africa as they confront and execute climate change concerns.

Why the city of Johannesburg? The study will apply its methodology in the city of Johannesburg, South Africa. Thus, climate change implications are more pronounced in cities like Johannesburg characterized by the high urbanization and carbon-intensive nature

of its energy system. The city relies predominantly on the use of fossil fuels for energy sources, thereby causing air pollution. This presents a dichotomy of emergencies that have presented Johannesburg with an opportunity to build greener and sustainable energy, capable of addressing climate change impacts.

Research Method

Contributions to the analytic discussion of this paper are made with empirical qualitative investigations, using narrative analysis. The empirical analysis is based on qualitative data gathered through a twofold process: (1) Law and Policy document analysis and (2) Interviews with relevant stakeholders. The research method also employs the use of literature review from relevant articles in peer-reviewed journals, textbooks, and other sources, to give a better understanding of the topic. The paper makes use of both primary data (Interviews), and secondary data (Case laws, journals, treaties, national reports, government policies, articles, textbooks, news, and websites). This paper believes the use of primary data will provide a first-hand experience and information from the interviewees while using secondary data i.e., national and government published documents are quality-assured, with a great level of accuracy in analyzing law and policy issues in the country. Thematic coding procedure is also used to analyze the interview by closely examining the data to identify common themes and ideas that came up repeatedly during the interviews. To analyze the data collected from the interviews, the process involves getting familiar with the data, as well as coding, generating themes from data collected, reviewing themes, defining, and naming themes, and writing some findings. Thus, empirical findings will be analyzed using the following methodology approach:

- Use of primary data collected through interviews with relevant stakeholders to examine the readiness of the government to implement climate change Laws and policies for the energy sector.
- Use of secondary data i.e. Law and Policy documents to analyze the following implementation of Law and policy tools; Institutional framework tool, Local policy

development tool, Relevant stakeholders' engagement tool, Climate Litigation tool, Energy Transition projects

Aim / Objectives of the Study

The general objective intends to recommend a standardized and imitable approach to implementing laws and policies that will contribute to efficient, clean, safe, and cost-effective energy and renewable energy use within the city of Johannesburg. The paper works toward three specific objectives: (1) to examine the consequences of climate change activities on the energy sector. (2) to assess the implementation approaches of Johannesburg using the Law and Policy tools listed above, to achieve climate adaptation in the city. (3) to identify the missing links and challenges inherent so far in using these tools to implement climate adaptation strategies and further provide recommendations.

In the end, the paper provides some good recommendations for policymakers and stakeholders on better approaches to implementing climate adaptation strategies in Johannesburg, to achieve more efficient climate adaptation results. Likewise, the paper will be able to provide an analytical way to assess the effectiveness of already made implementation plans, not only in Johannesburg but a replica approach for other cities. Also, it is believed that this study can be used later as guidance and references for academic and research purposes

CHAPTER 2

LITERATURE REVIEW

2.1: Climate Change in South Africa

Salvador et al. (2020), Nyahunda & Tirivangasi (2019), and Mahapatra et al. (2018) in their various articles comment that climate change is among the greatest crises affecting humanity in this era. In both poor and affluent countries, climate change has an influence. Hurricanes, floods, and droughts are negative climate change consequences. Salvador et al. (2020) agree with Ncube & Tawodzera (2019) that these implications cause mortality from infections, storms, heatwaves, and other health impacts. South Africa signed the Rio Declaration of 1992 to tackle climate change in South Africa. In the article of Midgley et al. (2002), they postulate that South Africa's climate has been witnessing a steady, consistent change in climate, particularly considerable rising temperatures well over the previous 60 years. With these constant trends, Madzwamuse (2010) believes there will also be high records of air pollution issues together with an alarming rate of floods and droughts in South Africa.

2.2: Law and Climate Change in South Africa.

To achieve this, South Africa's government has implemented strict regulations, procedures, and pollution legislation (Tim De Wet, 2005). This method will make the country's development more sustainable and move towards climate resiliency.

Key Laws and Regulations	Description
Draft Climate Change Bill, 2018	The measure would create an organized, and collaborative response to the climate crisis. The legislation specifies carbon neutrality, sector-based emissions goals, and a federal emissions commitment. The legislative draft is still being undertaken for 2 years.

Carbon Tax Act, 2019	The first phase of the tax will be in place from June 2019 through 2022, when the second phase will begin. CO2 and greenhouse gases are regulated by the Act.
Carbon budgets	DEA's carbon budgets will offer a GHG emissions fee that intends to monitor a company's physical emissions.
National Greenhouse Gas Emission Reporting Regulations, 2017	A company or procedure that produces more than 0.1 megatonnes per year must report activity and emissions activity to DEFF by 31st March
National Pollution Prevention Plans Regulations, 2017	A company that produces above 0.1 Megatonnes per year must present pollution prevention plans to reduce emissions and yearly progress reports to assess their PPPs.
The National Environmental Management: Air Quality Act 34 of 2004	This Act aims to manage air quality while also safeguarding the environment. It makes provision for the laws that developed GHG reporting regulations and PPPs.
Electricity Regulation Act: Licensing exemption and registration 2021	Raise the small-scale power generating license barrier from 1MW to 10MW
South Africa Budget 2021/22	Increased fuel taxes are 27 cents per liter. Carbon taxes will rise.

Table 1: Overview of general key legislations to address climate change in South Africa at the national level

2.3 Energy Sector in South Africa

South Africa relies substantially on power production and energy consumption, with coal responsible for seventy-five percent of fossil fuel usage and ninety-one percent of energy output, according to Davidson & Winkler (2003). According to Eskom (2019), South Africa's power sector supplies forty percent of Africa's electricity. Coal generated eighty-three percent of the nation's electricity in 2018, making it a key element of the energy mix (Energy Department, 2019). Since 1994, South Africa has established various rules, legislation, and policies to combat climate change, mainly from coal use.

Energy Sector in Johannesburg

Johannesburg's economy is based on coal. The electricity sector in Johannesburg is responsible for 66.7 percent of GHG emissions. Eskom provides 80 percent of Johannesburg's electricity. Despite current bulk supply concerns, Johannesburg should diversify its electricity source with renewables. Electricity fosters economic development and progress. Reliable, low-cost power might promote employment and attract private-sector businesses.[21] Access to power has risen from 2011 (90.8%) to 2018 (100%). (95 percent).[22] Nevertheless, population expansion has increased total energy use. Although the city's electricity availability is high (>90 percent), it has not met its target of 97 percent. In informal housing and informal communities, power outages are more prevalent. Not usually do these households have access local electricity or Eskom. Incentives for the usage of renewable energy are being implemented as a result of local policies and laws. With this opportunity, the city of Johannesburg may put in place more effective methods for generating and using energy. the world's energy consumption will double by the year 2060.[23] A diverse, reliable, and secure energy source for 10 billion people has been envisioned from a variety of viewpoints and objectives. In 2014, solar and wind energy accounted for 4% of global electricity production. By 2060, however, they might contribute 20% to 39%. This entails replacing oil and coal with renewable energy sources by 2040. The city's actions include diversifying energy sources and limiting loss (e.g., using smart technologies, preventing easy access to cables, and securing sub-stations). Future technological improvements might aid with energy management.

Relationship of Research to Existing Literature and some Identified Gaps

Much of the existing literature is put forward by energy, economists, and environmental academic, with little legal analysis. There is a significant gap in the body of literature. Even

[21] Menyah & Wolde-Rufael. 2010. Energy consumption, pollutant emissions and economic growth in South Africa. Energy Economics. 32
[22] StatsSA. 2018. General Household Survey 2017. Data portal: Quantec.
[23] World Energy Council. 2016. World Energy Scenarios 2016 - The Grand Transition.

from the above, there is a scarce legal analysis that fully critiques the international characteristics, rules, and processes, of the domestic climate regime. In-depth legal analysis of any aspect of climate change regulation, and the commitment to legally enforcing it, is rare and is basically confined to certain areas of law and policy in this jurisdiction. Furthermore, the regulation of climate change is evolving, and most of the published literature, depicts an inaccurate assessment of some present international and domestic legal frameworks. Likewise, the literature sometimes fails to put into consideration the implementation and relationship of the international and domestic framework, from the global to the local. Additionally, most of the already written South African legal climate change literature addresses only certain angles of climate change regulation from a singular jurisdictional perspective. There is a need for a comprehensive, published, evaluation of both international and domestic legal frameworks required in South Africa to monitor greenhouse gas emissions and address the implications of climate change effectively

CHAPTER 3

METHODOLOGY

Assessment analysis of Local-level readiness in the Energy Sector of Johannesburg

This local-level research focuses on Johannesburg's preparedness to transition to a clean energy society, identifying good trends and opportunities for improvement. To do this, we examined certain potential indicators.

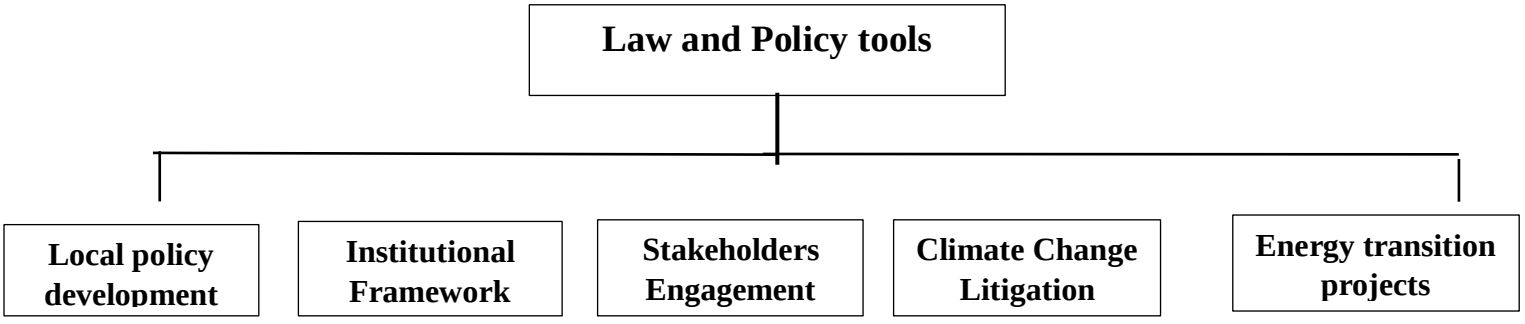

Figure 3: Outline of some Law and policy tools used for the implementation of climate adaptation and energy transition

Tool 1: Local policy development: Local policy development instruments are assessed based on Paris-compatible decarbonization, transparency framework, and ratchet mechanism. Net-zero emissions will help Johannesburg meet Paris Agreement and environmental goals. CAP will make the city climate-resilient. Meanwhile, some stakeholders have opinions on most strategies and initiatives. Some say the proposals don't emphasize climate change's urgency as five years is "too ambitious" Regarding openness, Johannesburg's performance management system includes a Monitoring and Evaluation method. This strategy boosts accountability, learning, and improvement and alerts leaders and managers to Integrated Development Plan risks.

Tool 2: Institutional framework in place: Also, further divided into three factors; Effective coordination, knowledge infrastructure, and enough resources. Effective coordination across ministries, agencies, and subnational governments influences actors' capacity to align climate policy aim effectively and consistently. South Africa's vertical, horizontal, and mainstreaming coordinating structures may be better aligned with national goals. The city needs an independent research institute because COJ may not be transferring knowledge properly. City strategy combines technology, culture, measurement, and infrastructure. COJ has achieved significant smart city development (the rollout of free Wi-Fi, the e-Health and e-Learning projects, and the expansion of the Johannesburg broadband network). Smart City's relevance to Joburg's needs is unknown. Capital and resource restrictions also hinder developing country climate governance (Bhave et al., 2016). Climate policy implementation requires time and money.

Tool 3: Stakeholders Engagement

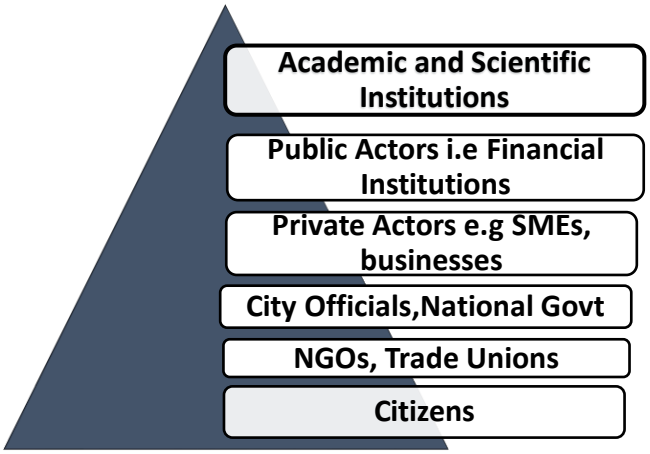

Figure 6: Relevant Stakeholders

The local government's degree, as well as extent of engagement with stakeholders signifies its external knowledge and citizens' expectations. South Africa's political culture emphasizes consultative policymaking since democracy, making it important for stakeholders to engage in making policies for climate change. Power is unequally dispersed among stakeholders, but awareness-raising activities might remain enhanced, particularly locally. The COJ lacks a city-wide cross-sectoral strategy, which is needed to involve residents, local companies, and other key stakeholders in climate change awareness and policy implementation.

Tool 4: Implementation challenges of Climate Change Litigation

Individuals, civil society, and climate change campaigners in the city of Johannesburg have realized that the government cannot tackle these challenges alone and have participated in the battle against activities that are destructive to the environment. Consequently, litigation has become one of the methods through which concerned local citizens implement climate change governance rather than only depending on government policies and plans.

		Implementation Issues		
Climate Litigation Cases	**Inordinate Co-ordination among the arms of the Government**	**Neglect of the government's responsibilities to protect the environment**	**Laws and Policy complexity/ ambiguity**	**Difficulty in the enforcement of existing and clear policies**
EarthLife Africa Johannesburg V Minister of Environmental Affairs and Others		✓	✓	✓
Groundwork & Anor. V. Minister of Environmental Affairs		✓	✓	✓
Hendrina Power Station: Groundwork, Earthlife Africa Johannesburg & Ors V Nkangala District Municipality, and Eskom	✓	✓	✓	
The City of Cape Town V Nersa and Minister of Energy	✓	✓	✓	
African Climate Alliance &Ors V The Minister of Mineral Resources and Energy & Ors	✓	✓		

Table 4: Review of Implementation issues common in Climate Litigation cases in Johannesburg

Tool 5: Energy Transition Projects

	Implementation Issues			
Energy Transition Projects	**Challenges of Stakeholder's Engagement**	**Low Access to Financial resources**	**Information and data gaps/ Knowledge transfer**	**The complexity of Legal Frameworks**
Johannesburg's Landfill Gas Project		✓	✓	✓
Solar Rooftop PV Project	✓	✓		✓
City Power Johannesburg Public lights projects	✓	✓	✓	✓

Table 5: Review of Implementation issues common in some Energy transition projects in Johannesburg

3.2 Interview Data Collection

Data Collection

Semi-structured, one-on-one interviews were employed to gather and analyze qualitative data. In a semi-structured interview, a predetermined set of open-format questions relevant to research topics is utilized as an interview guide, rather than a standardized interview process (Saunders et al., 2019). It does, however, allow for the introduction of new questions if a new subject arises (Cachia and Millward, 2011). Semi-structured interviews were conducted through Zoom, video conversations, and in-person, lasting anywhere from 30 to 60 minutes, depending on the research design. The participants were chosen because they

are considered relevant stakeholders in this context. The interviews are conducted with relevant stakeholders to further analyze and evaluate government's readiness to address climate change's impact on the energy sector and suggest further recommendations on how to better strengthen climate governance. The following participated in the interview: Two Private Actors of the Energy Sector in Johannesburg (Afterwards referred to as P1 and P2)• Two Academics from Research Institutions (Afterwards referred to as P3 and P4)• A Citizen of Johannesburg (Afterwards referred to as P5)• An actor from a financial Institution (Afterwards referred to as P6)• A city official at the Local Government Level, Johannesburg (Afterwards referred to as P7)• A consultant firm with the Government on Energy projects (Afterwards referred to as P8)

Data Analysis

Qualitative theme analysis was used to analyze the recorded data, which was then manually transcribed into Microsoft Word (Braun and Clarke, 2006). There are several steps involved in doing a theme analysis. As a first step, data transcribing is done to familiarize with the information being transcribed. Data-driven coding for raw data was also developed. This led to a division of key findings into themes. Afterward, the themes were evaluated and adjusted to achieve consistency. Finally, the headings of the themes were modified, and the data contained inside was analyzed

CHAPTER FOUR

RESEARCH FINDINGS AND DISCUSSION

4.1 Findings

Thematic analysis (Braun and Clarke, 2006) of the five law and policy tools analyzed in Chapter Three, together with the interviews unveiled six themes of implementation challenges. Most of the implementation challenges discussed in the previous chapters are further confirmed by participants of the interviews, as major challenges confronted in implementing climate adaptation and energy transition policies. Thus, the implementation

challenges are grouped as seen below into five major themes *(Figure 7)*. The analysis of each theme will be presented in the following section.

Theme 1	Theme 2	Theme 3	Theme 4	Theme 5
Ineffective horizontal and vertical Co-ordination	Issues with Stakeholders' engagement	Policy Complexity/ Vagueness	Low Access to Financial Resources	Gaps in Knowledge transfer/Expertise

Figure 7 : Themes representing the Research Findings

4.2 Discussion

This paper discusses elements that contribute in ensuring effective implementation of climate adaptation and energy transition policies in South Africa, specifically the city of Johannesburg. Following policy development, the most essential step is policy implementation. To address the research question of this paper, "How effective is the use of Law and Governance in implementing climate change adaptation and energy transition policies in South Africa?", this study has the objectives to (i) to examine the effects of climate change on the energy sector (ii) to assess the implementation approaches of Johannesburg using the Law and Policy tools, to achieve climate adaptation in the city (iii) to identify the missing links and challenges inherent so far in using these tools to implement climate adaptation strategies and further provide recommendations.

For the methodology, it is a two-fold process. (1) Some Law and Policy tools were divided into variables to measure how effective policy implementation is, in Johannesburg. These variables are the Institutional framework tool, Local policy development tool, Relevant stakeholders' engagement tool, Climate Litigation tool, and Energy Transition projects. (2) A qualitative study done through semi-structured interviews with eight participants on a one-on-one basis. The transcribed interviews were each thematically examined. Five main themes emerged from the analysis of the two-fold process, these are Ineffective horizontal and vertical Coordination, Issues with Stakeholders' engagement, Policy Complexity/Vagueness, Low Access to Financial Resources, and Gaps in Knowledge transfer/Expertise. These themes describe the missing gaps or challenges faced in

implementing adaptation and energy transition policies in Johannesburg. The challenges were discussed and recommendations that can further strengthen the implementation strategies in Johannesburg were made.

4.3 Recommendations

Theme 1: Reinvigorate high-level commitment and empower government agencies with explicit directives.

Theme 2: Strengthen engagement and consultation forums

Theme 3: Strengthening delivery of clear policies and implementation mechanisms

Theme 4: Create a comprehensive financial plan

Theme 5: Improve knowledge quality, information, and public awareness

Conclusion

Laws and policies are key to energy transition and climate change adaptation, according to this research. In South Africa, implementing climate change and energy transition policies may be complicated. This might indicate a lagging governance system. The challenges identified afflict many African cities' energy sectors as well. Strengthening public engagement and consultation forums, establishing clear policies and execution techniques, and detailed budget planning can improve the implementation challenges. Though this paper examines Johannesburg's climate change adaptation and energy transition policies. the findings from this research reveal numerous difficulties like other African nations.