Municipal planning law for climate change mitigation in South African cities

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Isaiah 41 v 10

ABSTRACT

City inhabitants worldwide are vulnerable to the severe effects of climate change, such as floods and droughts. South African cities are no exception with the residents of cities such as the City of Tshwane and the City of Cape Town having experienced and continuing to be vulnerable to climate-related impacts such as prolonged floods and droughts. On the one hand, cities are perpetrators of climate change since globally they are accountable for approximately 77% of GHG emissions, which result from transportation, the built environment, and energy-use. However, cities do have the unique ability to assist countries (states) in mitigating climate change in as far as they regulate and oversee several sectors emitting GHG emissions. Cities, especially South African cities, also possess governance instruments and governing authority that they can employ to mitigate climate change, such as municipal planning powers and tools.

In the South African context, municipal planning is a function assigned to municipalities. Municipal planning includes spatial planning within the boundaries of municipalities. Also, in terms of section 155 of the Constitution, municipalities are empowered to manage their administrative and executive affairs. Consequently, in consideration of municipal spatial planning and the power to manage their affairs, municipalities have control and governing authority over land development, local parks and greenways as well as other activities and processes related to climate mitigation. It is argued in this study that through the use of the spatial planning legal instruments at the disposal of local government, it is possible for municipalities to constructively contribute to climate mitigation efforts in cities.

More specifically, this study explores if and how South African municipal planning law could assist municipalities in meeting their climate change mitigation targets. This is done with a specific focus on the metropolitan municipalities of Cape Town and Tshwane.

Key words:

Cities; climate change mitigation; municipal planning; spatial planning law; local government law; City of Cape Town; City of Tshwane; South Africa

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LIST OF ABBREVIATIONS

AFOLU	Agriculture, Forestry, and Other Land Use
BEA	Building Efficiency Accelerator
BRT	Bus Rapid Transit
CC Bill	Climate Change Bill 31 of 2021
CITP	Comprehensive Integrated Transport Plan
COGTA	Cooperative Governance and Traditional Affairs
CO_2	Carbon dioxide
DFFE	Department of Environment, Forestry and Fisheries
D'MOSS	Durban's Metropolitan Open Space System
DoT	Department of Transport
EIA	Environmental Impact Assessment
GHG	Greenhouse Gas
GTS	Green Transport Strategy
IDPs	Integrated Development Plans
Int J Environ Sci Nat Res	International Journal of Environmental Sciences and Natural Resources
IPCC	Intergovernmental Panel on Climate Change
IUDF	Integrated Urban Development Framework
IRPTN	Integrated Rapid Public Transportation Network
J Afr Law	Journal of African Law

LUCF	Land Use, Change and Forestry
LUS	Land-Use Scheme
MSA	Local Government: Municipal Systems Act 32 of 2000
MSDF	Municipal Spatial Development Framework
NDP	National Development Plan
NBRBS Act	National Building Regulations and Buildings Standards Act 103 of 1977
NCCRP	National Climate Change Response White Paper
NDCom	National Development Commission
NDCon	Nationally Determined Contribution
NEMA	National Environmental Management Act 107 of 1998
NEMAQA	National Environmental Management: Air Quality Act 39 of 2004
NMT	Non-Motorised Transportation
OECD	Organisation for Economic Co-operation and Development
PER	Potchefstroom Electronic Law Journal
PPD	Peak, Plateau and Decline
RT	Rail Transit
SADC	Southern African Development Community
SALGA	South African Local Government Association

SDF	Spatial Development Framework
SPLUMA	Spatial Planning and Land Use Management Act 16 of 2013
TNC	Third National Communication
TOD	Transit-Oriented Development
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UN-Habitat	United Nations Human Settlements Programme

CHAPTER 1 INTRODUCTION

1.1 Background

Climate change threatens human life due to its contribution to ecosystem degradation and vulnerability since it is marked by increased floods, droughts, food insecurity, uncontrolled fires, and water scarcity.[1] Climate change also threatens urban dwellers and cities.[2] The United Nations Human Settlements Programme (UN-Habitat) suggests that due to their high concentration of people, industries and infrastructure, urban areas are likely to face some of the most severe impacts of climate change.[3] Cities are susceptible to climate change effects such as heatwaves, extreme weather events, and rising sea levels which may cause coastal flooding, for example.[4] These climate change effects also occur in the African context. In recent years, cities such as Addis Ababa, Kampala, Cape Town, and Pretoria have experienced significant climate-related environmental pressures such as prolonged droughts and floods.[5]

Cities have also been identified as climate change perpetrators.[6] According to UN-Habitat, cities worldwide are responsible for approximately 77% of greenhouse gas emissions (GHGs).[7] These emissions stem from a combination of their common use of fossil fuels such as coal, their dependence on private vehicles, and their inefficient

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1 Scott, Davies and New *Mainstreaming Climate Change in Urban Development* 1; Wilbanks and Fernandez *Climate Change and Infrastructure, Urban Systems, and Vulnerabilities: Technical Report for the US Department of Energy in Support of the National Climate Assessment* 7; Van der Bank and Karsten 2020 *Air, Soil and Water Research* 1.

2 Bai *et al* 2018 *Nature* 23; Mi *et al* 2019 *Journal of Cleaner Production* 583.

3 UN-Habitat *World Report 2020: The Value of Sustainable Urbanization* 27-28.

4 Hobbie and Grimm 2020 *Philosophical Transactions of the Royal Society B* 2.

5 Bai *et al* 2018 *Nature* 23; Ndlazi and Matshili 2019 https://bit.ly/3dHZbYz; Namugwe 2020 https://bit.ly/3dkoujn; Tucker 2020 https://stanford.io/3fLWOql; Kareem *et al* 2020 *Environmental Research Letters* 1.

6 Sharif *Closing Remarks by Ms Maimunah Mohd Sharif, United Nations Under-Secretary-General and Executive Director, UN-Habitat* 1.

7 Arioli *et al* 2020 *Environmental Impact Assessment Review* 1; Bai *et al* 2018 *Nature* 23.

energy use in buildings.[8] In 2017, the City of Cape Town Metropolitan Municipality (City of Cape Town) produced 29% and 18% of carbon emissions from transport and residences respectively.[9] However, some argue that cities have the unique ability to help the governments of their countries (their national governments) respond to climate change because they offer more immediate and potentially more effective communication opportunities between the public and decision-makers at the local level.[10] Cooperation and communication between communities and city governments arguably increase climate change awareness and smaller-scale mitigation initiatives,[11] including the use of solar energy in the built environment.[12]

There are different ways in which city authorities (municipalities)[13] may help mitigate climate change. Furthermore, there are different urban governance instruments which municipalities may use to mitigate climate change.[14] Municipal planning is arguably one of the important powers and functions of local government.[15] In South Africa, municipal planning denotes local land development planning and management.[16] Municipal planning is a function assigned to municipalities in terms of section 156, read with schedule 4B, of the *Constitution of the Republic of South Africa*, 1996 (the Constitution).[17] Municipalities enjoy executive and administrative

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8 UN-Habitat *Planning for Climate Change: Strategic, Value-based Approach for Urban Planners* 4-5; Jones *Cities Responding to Climate Change* 29; Hoornweg, Sugar and Gómez "Cities and Greenhouse Gas Emissions: Moving Forward" 63.

9 City of Cape Town *Draft Climate Change Strategy for Public Comment* 9.

10 The World Bank *Cities and Climate Change: An Urgent Agenda* 1.

11 According to Johnson, recycling schemes, electricity from trash, internet networks, integrated public transportation systems, "smart" buildings, and bicycle networks are easy to understand and may garner widespread local support. These are arguably initiatives that may be introduced at the local government to mitigate climate change – see Johnson "Cities as Saviours? The Global Politics of Urban Climate Mitigation" 51.

12 City of Tshwane Metropolitan Municipality (City of Tshwane) *City of Tshwane Climate Response Strategy* 3; Local Governments for Sustainability 2018 *Mitigating Climate Change Through Renewable Energy Development: Cape Town, South Africa* 1; Owusu and Asumadu-Sarkodie 2016 *Cogent Engineering* 12; Fawzy *et al* 2020 *Environmental Chemistry Letters* 2075; Jodoin, Duyck and Lofts 2015 *RECIEL* 117.

13 For the purpose of this study, the terms municipalities, cities or city authorities will be interpreted to mean the same thing and will be used interchangeably.

14 National Treasury of the Republic of South Africa *Climate Mainstreaming in South African Cities: High Level Analysis of Key Strategic Planning Documents* 66; Lethoko 2016 *Jàmbá: Journal of Disaster Risk Studies* 2.

15 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 17.

16 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 113.

17 Section 156(1) of the Constitution.

powers to manage their affairs per section 155 of the Constitution.[18] Consequently, municipalities have control over land development, local parks and greenways through the use of a variety of legal instruments and the development of apposite policies.[19] Municipal planning involves strategic planning and spatial planning.[20] It will be shown that through spatial planning, policy and regulatory measures related to the use of space could be used to promote climate change mitigation at the local level. This could be done using land for renewable energy projects, for example.[21] Spatial planning measures may also be used to transition to energy-efficient buildings in specific zones and lower carbon transportation.[22] Furthermore, spatial planning measures may be used to effect integrated land-use for improved mobility and the establishment of carbon sinks in urban areas.[23] Overall, cities enjoy the executive and legislative powers to be able to help effect climate change mitigation through urban planning and land use control measures of different kinds.[24]

Owusu-Daaku and Diko[25] contend that climate change mitigation has not received

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18 Section 155(6)(a) and 7 of the Constitution.

19 Schedules 4B and 5B of the Constitution; Van der *Berg Municipal Planning Law and Policy for Sustainable Cities in South Africa* 9.

20 This study focusses on spatial planning. Spatial planning is defined as "the ability to plan, in a democratically accountable way, the activities of economic and service sectors such as housing, energy, transport, waste and water that have spatial consequences in their wider social and environmental context"- see Wilson and Piper *Spatial Planning and Climate Change* 10; Morphet *Effective Practice in Spatial Planning* 7; Koresawa and Konvitz *Towards a New Role for Spatial Planning* 11.

21 Wilson and Piper *Spatial Planning and Climate Change* 9; Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8; Wang, Huang and Huang 2018 *Landscape and Urban Planning* 23.

22 Wilson and Piper *Spatial Planning and Climate Change* 9; Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8; Wang, Huang and Huang 2018 *Landscape and Urban Planning* 23.

23 Wilson and Piper *Spatial Planning and Climate Change* 9; Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8; Wang, Huang and Huang 2018 *Landscape and Urban Planning* 23.

24 City of Cape Town *Low-Carbon Central City Strategy* 32; Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8.

25 Mitigation is often treated as an issue for developed countries, which hold the greatest responsibility for climate change, while adaptation is seen as a priority for the Global South, where mitigative capacity is lower and vulnerability is high. Owusu-Daaku and Diko argue that mitigation strategies have not been widely considered when it comes to climate resilience. Owusu-Daaku and Diko contend that climate change mitigation has not been given much attention in the global South, especially on resilience, but there is literature contradicting their argument. Authors like Hoppe, Van den Berg and Coenen contend that it is in fact mitigation that has generally dominated literature - see Ayers and Huq 2009 *Environmental Management*

the same attention as adaptation regarding climate resilience matters, especially in the Global South. This arguably necessitates its advancement at the local level. In this regard, the Intergovernmental Panel on Climate Change (IPCC) has made a global call for strengthened action against climate change and for climate change mitigation, which is a request aimed at international, regional, national, and sub-national governments.[26] Climate change mitigation is generally defined as any act of intervention by human beings to lessen the emissions from the sources that directly or indirectly contribute to climate change.[27] Mitigation in the broadest sense involves keeping global average temperatures below specific levels to avoid the severe impacts of global warming.[28] Thus, climate change mitigation requires taking steps to reduce GHG emissions, also in the city context.[29]

Local governments, particularly city authorities, are increasingly recognised as central players in mitigating climate change.[30] As explained in section 2.3 of this dissertation, cities host sectors that significantly emit GHG emissions and can potentially contribute to climate mitigation.[31] These sectors include transport, the built environment, infrastructure, and the energy sector.[32] The transport sector, which accounts for 75% of GHG emissions globally, is the largest sector emitting

754; Laukkonen *et al* 2009 *Habitat international* 289; Owusu-Daaku and Diko "Climate Change Mitigation and Adaptation Initiatives in Africa: The Case of the Climate and Development Knowledge Network "Working with Informality to Build Resilience in African Cities" Project" 53-55; Hoppe, Van den Berg and Coenen 2014 *Energy, Sustainability and Society Journal* 2.

26 In 2019, the High-Level Champions of the Marrakech Partnership moved to strengthen interactions between parties and non-party stakeholders, including cities, for further climate action, which included the global reduction of GHG emissions - see United Nations *Yearbook of Global Climate Action 2019: Marrakech Partnership for Global Climate Action* 1; Hale *The Role of Sub-State and Non-State Actors in International Climate Processes* 2; Jones *Cities Responding to Climate Change* 6.

27 Rungwe *South African Renewable Energy Law and the Mitigation of Climate Change* 2; Lethoko 2016 *Jàmbá: Journal of Disaster Risk Studies* 2; Althor, Watson and Fuller 2016 *Scientific Reports* 1; Du Plessis and Kotzé 2014 *J Afr Law* 152.

28 UN-Habitat *Cities and Climate Change* 9; Al-Ghussain 2019 *Environmental Progress & Sustainable Energy* 18-19.

29 Althor, Watson and Fuller 2016 *Scientific Reports* 1; Du Plessis and Kotzé 2014 *J Afr Law* 152.

30 Fuhr, Hickmann and Kern 2018 *Journal of Environmental Sustainability* 1-2.

31 Gouldson *et al* 2016 *Cities* 12; Fawzy *et al* 2020 *Environmental Chemistry Letters* 2073.

32 Allan, Jones and Thondoo *Cities and Climate Change: Climate Policy, Economic Resilience and Urban Sustainability* 17; Department of Forestry, Fisheries and the Environment (DFFE) *South Africa's Third National Communication under the United Nations Framework Convention on Climate Change* 230. Department of Environment, Forestry and Fisheries has been changed to DFFE.

GHGs worldwide[33] and is projected to remain like that by 2050.[34] Similarly, increased energy demand in the built environment[35] and the energy sector significantly increase emissions. The energy sector accounted globally for more than 31% of GHG emissions in 2018.[36]

Cities could help reduce the said emission types.[37] For instance, emissions from transport could be reduced by adopting energy-efficient modes of transport and encouraging public transportation such as Bus Rapid Transit (BRT) and Rail Transit (RT) systems.[38] Also, the use of cycling, the management of parking and the promotion of walking are crucial strategies for reducing GHG emissions.[39] One of the strategies that cities could use to reduce urban emissions within the built environment[40] is building efficiency via the imposition of building codes on new buildings and applying building energy retrofits[41] to old buildings.[42] In the energy sector, cities could adopt local policies that encourage switching from coal and oil to low or no-emission energy sources, such as combined heat, power and renewable energy for some municipal activities and processes.[43] Similarly, cities could mitigate

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33 Zawieska and Pieriegud 2018 *Transport Policy Journal* 39; Mi *et al* 2019 *Journal of Cleaner Production* 584; Caetano *et al* 2017 *Journal of Energy in Southern Africa* 11.

34 Zawieska and Pieriegud 2018 *Transport Policy Journal* 39.

35 In the built environment, the emissions released are from residential and construction industry buildings - see UN-Habitat 2020 *Global Report for Buildings and Construction* 4.

36 Ge, Friedrich and Vigna 2020 https://www.wri.org/insights/4-charts-explain-greenhouse-gas-emissions-countries-and-sectors.

37 Gouldson *et al* 2016 *Cities* 12; Fawzy *et al* 2020 *Environmental Chemistry Letters* 2073.

38 Notter, Weber and Füssler *Greenhouse Gas Emissions from the Transport Sector: Mitigation Options for Kenya* 5; Toledo and La Rovere 2018 *Sustainability* 9.

39 City of Cape Town *Low-Carbon Central City Strategy* 81; Allan, Jones and Thondoo *Cities and Climate Change: Climate Policy, Economic Resilience and Urban Sustainability* 62.

40 Bird *et al* 2018 *BMC Public Health* 3.

41 Building energy retrofitting mostly refers to the application of new technology or features to old systems. Building energy retrofitting inside existing envelopes or incorporating efficient technology into new enclosures may significantly reduce energy usage, waste, and GHG emissions. Research on a South African apartment complex included solar panel installation as a building retrofit measure, in addition to envelope retrofits. As a result, energy consumption reductions were accomplished – see Shaikh *et al* "An Overview of the Challenges for Cost-Effective and Energy-Efficient Retrofits of the Existing Building Stock" 263; Hirvonen *et al* 2020 *Buildings* 2.

42 City of Cape Town *Low-Carbon Central City Strategy* 34; Evans *et al* 2018 *Journal of Cleaner Production* 127.

43 Bartlett and Satterthwaite *Cities on a Finite Planet: Towards Transformative Responses to Climate Change* 128; Corfee-Morlot *et al Environment Working Paper No.14: Cities, Climate Change and Multilevel Governance* 22.

climate change through infrastructure development by encouraging and investing in the use of innovative waste management, carefully designed land-use regulations and the promotion of green infrastructure.[44]

South Africa cities have a comparatively high emissions intensity due to a large amount of energy usage and inefficient economy built primarily on emissions-intensive coal.[45] These cities have a high energy consumption,[46] which adds to the country's bad energy and carbon profile.[47] South Africa's electricity, produced mainly from coal, is extremely carbon emissive, contributing to city emissions.[48] Additionally, the transport sector accounts for the highest energy use in cities, owing to private transportation and urban sprawl, which require people and goods to be transported over long distances.[49] Cities can take steps that include adopting local policies, plans, and regulatory frameworks that focus on sectors that significantly produce GHG emissions, to mitigate climate change.[50] At the same time, planning regulations and policy at the municipal level are critical for reducing GHG emissions by ensuring that all new buildings are green and enhancing transportation networks.[51]

Against the above background, this study investigates how municipal (spatial) planning law, as a local governance instrument, could assist South African cities in

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44 Rungwe *South African Renewable Energy Law and the Mitigation of Climate Change* 2; Zulu *Energy Sector Reform and the Protection of the Rights contained in Section 24 of the South African Constitution* 38; DFFE *Mitigation Report: South African's Greenhouse Gas Mitigation Potential Analysis* 5.

45 Sustainable Energy *South Africa City-Wide Mitigation Potential South Africa* 1.

46 South African Cities Network *State of South African Cities Report* 10; DFFE *South Africa's Third National Communication under the United Nations Framework Convention on Climate Change* 230.

47 Sustainable Energy Africa 2020 *State of Energy in South Africa Cities* 11.

48 Sustainable Energy South Africa *City-Wide Mitigation Potential South Africa* 9.

49 Sustainable Energy South Africa *City-Wide Mitigation Potential South Africa* 6; Wolpe and Reddy *The Contribution of Low-Carbon Cities to South Africa's Greenhouse Gas Emissions Reduction Goals* 2.

50 Tait and Euston-Brown 2017 *Journal of Energy in Southern Africa* 50.

51 UN-Habitat *Planning for Climate Change: Strategic, Value-based Approach for Urban Planners* 4-5; Van der Walt *Retrofitting South Africa's Cities with Green Roofs: Cost Benefit Analyses for Large Scale Green Roof Implementation* 19.

mitigating climate change with specific reference to the City of Cape Town and the City of Tshwane.

1.2 Research objectives

The main objective of this study is to explore if, and how, South African municipal planning law could assist municipalities in meeting their climate change mitigation targets. This will be done with a specific focus on City of Cape Town and the City of Tshwane.

The following subsidiary objectives are set:

(a) To determine the role of South African cities in reducing GHG emissions;

(b) To consider municipal planning law instruments relevant to climate change mitigation;

(c) To investigate the intersection between South Africa's climate mitigation and municipal planning law and policy;

(d) To evaluate local (municipal) planning law in relation to climate mitigation in the City of Cape Town and the City of Tshwane; and

(e) To make recommendations for the use of spatial planning law to advance climate change mitigation in South African cities.

1.3 Study outline

Chapter two provides a theoretical perspective on South African cities in reducing GHG emissions. Municipal planning law instruments for behavioural change towards climate change mitigation, in general, are considered in chapter three, which identifies, describes and investigates the intersection between South Africa's climate mitigation and municipal planning law and policy. Chapter four evaluates local (municipal) planning law concerning climate mitigation through a study of the City of Cape Town and the City of Tshwane. Finally, chapter five concludes the study and provides recommendations for using spatial planning law to advance climate

change mitigation in South African cities. This chapter also reflects on a future research agenda.

1.4 Research methodology

The research method entails a literature review, evaluating and studying relevant law and policies relating to climate change and spatial planning at the national and local government levels. These laws and policies include the Constitution, the *Climate Change Bill* 31 of 2021 (CC Bill),[52] the *Integrated Urban Development Framework* of 2016 (IUDF),[53] the *National Environmental Management Act* 107 of 1998 (NEMA),[54] the *National Environmental Management: Air Quality Act* 39 of 2004 (NEMAQA),[55] the *Local Government: Municipal Systems Act* 32 of 2000 (MSA),[56] the *Spatial Planning and Land Use Management Act* 16 of 2013 (SPLUMA),[57] and the National Climate Change Response Plan White Paper of 2011 (NCCRP).[58] Regulations, case law, and the national government's communications on climate change to the United Nations are also explored.

Chapter four is devoted to two of South Africa's metropolitan municipalities. This chapter focusses on the municipal planning law of the City of Cape Town and the City of Tshwane, particularly their spatial planning law, and on how it can assist both metropolitan municipalities with mitigating climate change. The fourth chapter focusses on municipal laws, policies and plans to determine the progress and authority of the two municipalities in using local planning law to mitigate the effects of climate change. These include the City of Tshwane's *Land-Use Management By-law* of 2016 and City of Cape Town's *Climate Change Policy* of 2017,[59] and other

52 GN 1026 in GG 45299 of 11 October 2021 (CC Bill).
53 Integrated Urban Development Framework of 2016 (IUDF).
54 *National Environmental Management Act* 107 of 1998 (NEMA).
55 *National Environmental Management: Air Quality Act* 39 of 2004 (NEMAQA).
56 *Local Government: Municipal Systems Act* 32 of 2000 (MSA).
57 *Spatial Planning and Land Use Management Act* 16 of 2013 (SPLUMA).
58 National Climate Change Response Plan White Paper of 2011 (NCCRP).
59 City of Tshwane's *Land-Use Management By-law* of 2016 and City of Cape Town's *Climate Change Policy* of 2017 are example of local laws and policies to be discussed in chapter four.

local laws, policies, and plans as provided under paragraphs 4.2.3 and 4.4.3 below. These municipalities have been selected based on the following criteria:

(a) Both are vulnerable to the effects of climate change, such as floods, droughts, and heatwaves;[60]

(b) There is a need in both cities to align their spatial form with climate change response action because of the continued local effect of climate change;[61] and

(c) Both municipalities are category A municipalities vested with executive and legislative authority to administer their affairs relevant to reducing GHG emissions in different sectors.

60 See section 1.1 above.
61 See the discussion sections 4.2 and 4.3. below.

CHAPTER 2 SOUTH AFRICAN CITIES AND GHG EMISSIONS REDUCTION

2.1 Introduction

Africa is the second-largest and most populous continent after Asia.[62] It contains fifty-five sovereign states with over one billion people.[63] The United Nations forecasts that the population increase in Africa will continue to grow, particularly in urban areas.[64] Urbanisation is one of the significant contributors to rising GHG emissions, especially CO_2.[65] Africa's CO_2 emissions were 1185 metric tons of CO_2 equivalent in 2017 and are predicted to increase by 30% by 2030 in a business-as-usual scenario.[66] Despite indications that there will be a relatively small rise in the discharge of CO_2 in Africa by 2030, South Africa will remain the biggest emitter on the continent.[67] Cities, in general, and African cities in particular, are sensitive to the effects of climate change, exposing them to economic, environmental and social risks.[68]

Conversely, African cities appear to be determined to change the narrative. From Pretoria to Accra and Dar es Salaam, African cities have undertaken to play their role in reducing GHG emissions to mitigate the effects of climate change.[69] Cities continue to pledge to reduce emissions from transport, buildings, energy

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62 World Population Review 2021 https://worldpopulationreview.com/continents.

63 World Population Review 2021 https://worldpopulationreview.com/continents; Pauleit *et al Urban Vulnerability and Climate Change in Africa* 3.

64 United Nations *Population 2030: Demographic challenges and Opportunities for Sustainable Development Planning* 2; Pauleit *et al Urban Vulnerability and Climate Change in Africa* 3-4.

65 Musah *et al* 2020 *Environment, Development and Sustainability* 2; Kwakwa and Alhassan 2018 *OPEC Energy Review* 317.

66 Ayompe *et al* 2020 *Environmental Research Letters* 6.

67 Ayompe *et al* 2020 *Environmental Research Letters* 6.

68 Kareem *et al* 2020 *Environmental Research Letters* 1-2; Von Czechowski *CDP Africa Report: Benchmarking Progress Towards Climate Safe Cities, States and Regions* 3; Abiodun *et al* 2017 *Climate Change* 400.

69 World Resource Institute 2019 https://bit.ly/3rZe0Li; Egbejule 2018 https://reut.rs/3fIXjkY; Tait and Euston-Brown 2017 *Journal of Energy in Southern Africa* 50; Lwasa *et al* 2018 *Current Opinion on Environmental Sustainability* 53.

generation, and waste management.[70] For example, the City of Tshwane has carried out an inventory of its emissions to understand better which areas need the most urgent work to reduce emissions.[71]

This chapter is contextual in nature and reviews literature on the role of South African cities in reducing GHG emissions. The chapter consists of four parts. The first offers a brief overview of urbanisation in the country – including its trends and forecasts. The second part comments on the contributors to and sources of GHG emissions in South African cities. The third part outlines the extent to which some South African cities have, to date, committed to GHG emission reductions. The chapter concludes on the role that cities, as decentralised or sub-national authorities, can play in helping to reduce GHG emissions in the South African context.

2.2 Urbanisation in South Africa

Urbanisation denotes the movement of people from regions such as villages to urban settings, as well as the rise in the number of people in urban communities.[72] According to the United Nations, urbanisation changes the built environment, transforming formerly rural areas into urban areas and shifting the demographic makeup of communities from rural to urban.[73] As a result, urbanisation has major effects on the number of people, the land area, the economy and the culture of the urban areas.[74] Urbanisation can be traced to the days of Britain's industrialisation.[75] This process of industrialisation and its effects spread to other parts of the world, including Africa.[76] Nevertheless, most African countries are still in the early stages

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70 Egbejule 2018 https://reut.rs/3fIXjkY; State of Cities Report *Cities As Life-Supporting Systems* 100; City of eThekwini Metropolitan Municipality *Durban: A Climate for Change – Transforming Africa's Future* 23; C40 Cities Climate Leadership Group (C40) *Working Together: Global Aggregation of City Climate Commitments* 4.

71 Egbejule 2018 https://reut.rs/3fIXjkY; Sustainable Energy Africa *Sustainable Energy Solutions for South African Local Government* 350.

72 Musah *et al* 2020 *Environment, Development and Sustainability* 2; Kuddus, Tynan and McBryde 2020 *Public Health Reviews* 1.

73 United Nations *World Urbanization Prospects: The 2018 Revision* 10.

74 United Nations *World Urbanization Prospects: The 2018 Revision* 10.

75 Collier 2017 *Oxford Review of Economic Policy* 406.

76 Collier 2017 *Oxford Review of Economic Policy* 406.

of urbanisation.[77] However, the urban population in Africa is growing rapidly, with millions of people projected to be living in African cities by 2050.[78]

According to the Organisation for Economic Co-operation and Development (OECD), Africa is experiencing the fastest urbanisation globally.[79] Presently, Africa's population stands over 1,3 billion, making up 16.72% of the global population.[80] The African Policy Circle (APC) contends that African cities are growing at a higher rate than other cities worldwide.[81] Also, between 2018 and 2050, the global urban population is expected to rise by 2.5 billion urban dwellers, with almost 90% of the growth concentrated in Asia and Africa.[82] Sub-Saharan Africa, which is currently 41.1% urban, is experiencing the fastest urbanisation in Africa and the world.[83] Sub-Saharan African cities with a large populace include Egypt's capital, Cairo, which had over 21 million people in 2021, and the Democratic Republic of Congo's Kinshasa City, with over 14 million people in 2021.[84] Cities like Dar es Salaam and Luanda are expected to reach a population of ten million by 2030.[85]

South Africa is the most urbanised country in sub-Saharan Africa, with more than 66% of its people living in urban areas in 2019.[86] The National Development

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77 Collier 2017 *Oxford Review of Economic Policy* 405-406.

78 Collier 2017 *Oxford Review of Economic Policy* 406; Tusting *et al* 2019 *Nature* 391; World Economic Forum 2017 *Africa Competitiveness Report 2017: Addressing Africa's Demographic Dividends* 53.

79 OECD/SWAC *Africa's Urbanisation Dynamics 2020: Africapolis, Mapping a New Urban Geography* 38; Pauleit *et al Urban Vulnerability and Climate Change in Africa* 2; Borel-Saladin 2017 *Development Southern Africa* 137; UN-Habitat *State of the African Cities: The Geography of African Investment* 29. According to the United Nations, urbanisation in Africa will continue to grow at a rate of 3% per year between 2030 and 2040, making it the fastest-growing continent - see United Nations *World Urbanization Prospects: The 2018 Revision* 23; UN-Habitat *World Report 2020: The Value of Sustainable Urbanization* 14.

80 Worldometer 2021 https://bit.ly/3cXynnV.

81 African Policy Circle *Addressing the Challenges of Urbanization in Africa: A Summary of the 2019 African Policy Circle Discussions* 5.

82 United Nations *World Urbanization Prospects: The 2018 Revision* 1; Kareem *et al* 2020 *Environmental Research Letters* 5; Güneralp *et al* 2017 *Environmental Research Letters* 1; Mbara and Pisa 2019 *WIT Transactions on The Built Environment* 245.

83 United Nations *Shaping our Trends, Urbanization* 11-12; UN-Habitat *World Report 2020: The Value of Sustainable Urbanization* 12; Saghir and Santoro *Urbanization in Sub-Saharan Africa: Meeting Challenges by Bridging Stakeholders* 1.

84 Microtrends 2021 https://www.macrotrends.net/cities/22812/cairo/population.

85 United Nations *World Urbanization Prospects: The 2018 Revision* 59; Bello-Schünemann and Aucoin *African Urban Futures* 9; Toesland 2019 https://bit.ly/3fR3io2.

86 Statista 2021 https://www.statista.com/statistics/455931/urbanization-in-south-africa/.

Commission (NDC) of South Africa predicts that the country's urban population of South Africa will rise to 70% by 2030 and to around 80% by 2050.[87] Even though the rate of urban population growth varies, urbanisation in the relatively small province of Gauteng is prevalent.[88] In 2019, the Gauteng province had a populace of more than 15 million people with two densely inhabited metropolitan areas, namely the City of Johannesburg and the City of Tshwane.[89] The City of Johannesburg is the largest metropolitan area in South Africa in terms of population, with more than five million people in 2021.[90] In 2018, the City of Johannesburg was home to more than 10% of the South African population.[91] The City of Tshwane is the fourth-largest metropolitan area in the country, with over three million people in 2017.[92]

The drive behind this urban growth is the natural population increase, rural-urban migration, international migration, and spatial expansion through cities' reclassification.[93] The rapid urbanisation in Africa is caused mainly by rural-urban migration,[94] which is driven by social, economic and environmental factors.[95] This drive for urbanisation is based on the notion that cities provide a variety of livelihoods, such as work, food security, access to education, and social capital, better than their rural counterparts.[96] However, recent urbanisation is characterised

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87 National Development Commission *National Development Plan: Our Future-Make it Work* 19; South African Cities Network *State of South African Cities Report* 20.

88 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 3.

89 South African Government 2021 https://bit.ly/3fLToUE.

90 Ministry of Cooperative Governance and Traditional Affairs (COGTA) *Profile: City of Johannesburg Metro* 10; World Population Review 2021 https://bit.ly/3Gew2AM.

91 COGTA *Profile: City of Johannesburg Metro* 10.

92 The recent population statistics about the City of Tshwane (including other surrounding towns governed by the City of Tshwane) is that of 2017, with 2021 population information only available for Pretoria - see COGTA *Profile: City of Tshwane* 5.

93 United Nations *Shaping our Trends, Urbanization* 11; UN-Habitat *World Report 2020: The Value of Sustainable Urbanization* 12; Güneralp *et al* 2017 *Environmental Research Letters* 1; Mlambo 2018 *Archives of Business Research* 65.

94 Rural to urban migration accounts for 60% of the urban growth. This is due to people moving from rural to urban areas looking for jobs - see Teye *Urbanisation and migration in Africa* 2; United Nations *World urbanisation prospects: The 2018 Revision* 1.

95 Teye *Urbanisation and migration in Africa* 2; United Nations *World urbanisation prospects: The 2018 Revision* 1.

96 African Policy Circle *Addressing the Challenges of Urbanization in Africa: A Summary of the 2019 African Policy Circle Discussions* 5; Conserve Energy Future 2021 https://bit.ly/332KFWo.

by high unemployment and unplanned expansion resulting in insufficient transportation, housing, and health care, particularly in Africa.[97] In addition, rapid urban growth has significant effects on the environment due to an increasing need for residential space in urban areas that consumes arable land and green spaces.[98]

Urbanisation, industrialisation and changing consumption patterns, in combination with the increased utilisation of the old landfill system, have resulted in a rise in municipal waste production.[99] Municipal solid waste landfills are the third-largest source of anthropogenic methane in cities[100] and their management faces major challenges such as plastic waste and GHG emissions.[101] Urban waste treatment systems, particularly landfill disposal, are responsible for a large portion of cities' carbon footprint.[102] Globally, urbanisation is also associated with increased energy consumption (particularly of electricity) and GHG emissions.[103] Coal-fired power plants are the largest contributors to increased GHG emissions.[104] South Africa is recognised across Africa as the largest coal-dependent energy producer in the continent and is associated with increased energy emissions.[105]

2.3 Sources of GHG emissions

Literature and statistics about African cities' GHG emissions, in general, are limited in the public domain and outdated. The literature that is freely available in the public domain dates as far back as a decade. As a result, only published information available will be used in this section. Africa's GHG emissions stood at 3.8% in

97 The Open University 2017 https://bit.ly/3vBwHqW; Güneralp *et al* 2017 *Environmental Research Letters* 2.

98 African Policy Circle *Addressing the Challenges of Urbanization in Africa: A Summary of the 2019 African Policy Circle Discussions* 6.

99 Addo *et al* 2020 *West African Journal of Applied Ecology* 118.

100 Caetano, Góis and Leitão 2020 *Energy Reports* 365.

101 Addo *et al* 2020 *West African Journal of Applied Ecology* 118.

102 Caetano, Góis and Leitão 2020 *Energy Reports* 365.

103 International Energy Agency *Global Energy and CO_2 Status Report: 2018* 7-8; Sheng, He and Guo 2017 *Energy & Environment* 673-674; Hoornweg, Sugar and Gómez "Cities and Greenhouse Gas Emissions: Moving Forward" 63.

104 International Energy Agency *Global Energy and CO_2 Status Report: 2018* 7-8.

105 Zulu *Energy Sector Reform and the Protection of the Rights contained in Section 24 of the South African Constitution* 1.

2019.[106] African cities also contribute to the increased GHG emissions.[107] Most of the GHG emissions in the cities, especially sub-Saharan African cities, come from sectors such as transport; agriculture, forestry and other land use (AFOLU); energy; waste, and the built environment.[108]

2.3.1 GHG emissions from the transport sector

All transport types, such as land, air and sea transport, contribute a specific portion of GHG emissions into the atmosphere.[109] However, road emissions are the most significant.[110] Globally, road transport contributed 45.1% of CO_2 emissions in 2018.[111] The excessive quantity of anthropogenic emissions is due to the high number of cars on the road.[112] For instance, the continuously rising demand for transport is mirrored in traffic congestion, such as in the City of Johannesburg, and higher energy usage and related emissions.[113] The City of eThekwini Metropolitan Municipality[114] (Durban) is one of South African metropolitan cities with significant transportation-related emissions, accounting for 40% of the overall GHG emissions in 2018.[115] Suburbs such as Morningside in the City of eThekwini Metropolitan

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106 See section 2.1 above.

107 Three African cities' emissions are used as examples. These include City of eThekwini Metropolitan Municipality, which had 95% of total emissions mainly deriving from transport. In addition, Lagos had approximately 23% emissions in 2015. The residence sector emitted 18% in 2017 in the City of Cape Town - see City of eThekwini Metropolitan Municipality *eThekwini Greenhouse Gas Emissions Inventory 2018* 14; Covenant of Mayors 2015 https://www.globalcovenantofmayors.org/cities/lagos/; City of Cape Town *Draft Climate Change Strategy for Public Comment* 9.

108 African Development Bank 2020 https://bit.ly/3fMLzOv; Agarana, Bishop and Agboola 2017 *Procedia Manufacturing* 597; Doumbia *et al* 2018 *Energies* 1-2.

109 Agarana, Bishop and Agboola 2017 *Procedia Manufacturing Procedia Manuf* 597. The transport sector accounts for approximately 75% of GHG emissions globally, making it the largest emitting sector of GHGs, and is projected to remain like that by 2050. Rail transport accounts for 1% of all global transport emissions - see Zawieska and Pieriegud 2018 *Transport Policy Journal* 39; Ritchie 2020 https://ourworldindata.org/ghg-emissions-by-sector.

110 For instance, in Lagos transport emissions were approximately 23% in 2015 – see Covenant of Mayors 2015 https://bit.ly/3eVyRux.

111 Statista 2020 https://www.statista.com/statistics/1185535/transport-carbon-dioxide-emissions-breakdown/.

112 Doumbia *et al* 2018 *Energies* 1-2.

113 Luke and Heyns 2020 *Transportation Research Procedia* 3563.

114 For the purpose of this study, eThekwini Metropolitan Municipality will be referred to as City of eThekwini Metropolitan Municipality.

115 City of eThekwini Metropolitan Municipality *eThekwini Greenhouse Gas Emissions Inventory 2018* 14. In African countries, South Africa in particular, road transportation's total CO_2 emission

Municipality are emission hotspots due to the vast number of privately owned petrol and diesel passenger vehicles in the area.[116]

Merk[117] notes that compared to road transport, emissions from the shipping sector are also considerable and measure at about 2-3% of overall CO_2 global emissions. Africa is among the continents likely to experience the most significant increases in emissions due to intense port traffic growth, such as the top shipping ports in Africa, like Durban and Coega.[118] Regarding the aviation industries, the flight route in the City of Johannesburg had the most substantial carbon footprint due among other factors to the number of flights on that route, as well as the influence of old aircraft, which are as old as 27 years.[119] Consequently, the transport sector remains a significant cause of emissions in African cities.

2.3.2 Emissions from agriculture, forestry and other land use

AFOLU emissions are not entirely consequential to cities. However, cities are drawn closer to AFOLU emissions because of the nexus between urbanisation, development, deforestation, and environmental degradation.[120] Deforestation and forest loss arguably affect carbon sequestration, leading to increased atmospheric emissions.[121] Deforestation around towns in central Africa is motivated mainly by the need for fuelwood.[122] For example, approximately five million cubic meters of wood are used by Kinshasa, affecting a ring of 300 km around the city.[123] In the Southern African City of Cape Town, 10.9k ha of native vegetation was lost in 2019, which is

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was 13% in 2018 - see Climate Transparency 2019 *Brown to Green: The G20 Transition towards a Net-Zero Emission Economy: South Africa* 1.

116 Jagarnath and Thambiran 2018 *Environment and Urbanization* 199-203.

117 Merk *Shipping Emissions in Ports* 5; United Nations *Review of Maritime Transport* 89.

118 Merk *Shipping Emissions in Ports* 5; United Nations *Review of Maritime Transport* 82.

119 Dube and Nhamo provide that aviation industries account for about 3% of the total global carbon emissions - see Dube and Nhamo 2019 *Environmental Development* 13.

120 Güneralp *et al* 2017 *Environmental Research Letters* 3-5; Yale University 2021 https://bit.ly/3f61NQT; IPCC *Climate Change and Land* 1-2; Arshad *et al* 2020 *Environmental Science and Pollution Research* 10066-10067.

121 Brack *Forests and Climate Change* 5-6. Deforestation and forest degradation, like transport, are perceived to be the most critical contributors to GHG emissions - see Pearson *et al* 2017 *Carbon Balance and Management* 1; Naidoo, Davis and Van Garderen *Forests, Rangelands and Climate Change in Southern Africa* 8.

122 Yale School of the Environment 2021 https://bit.ly/39NPWFe.

123 Yale School of the Environment 2021 https://bit.ly/39NPWFe.

equivalent to a 34% drop in forest cover.[124] Consequentially, Couth and Trois[125] argue that most of the observed rise in Earth's temperature since the mid-20th century was due to rising atmospheric concentrations of GHGs caused, among other things, by deforestation and the burning of fossil fuel.

2.3.3 GHG emissions from the energy sector

The energy sector, which in this context primarily has to do with the production of electricity, emits a great deal of GHG into the atmosphere, with 43% of CO_2 emissions globally in 2017.[126] The said electricity is produced from different energy sources, including burning fossil fuels such as coal, natural gas and oil.[127] The electricity production as a result of coal-fired power plants were the single biggest contributors to the increase in emissions seen in 2018.[128] South Africa is the most significant contributor of GHG emissions in the Southern African Development Community (SADC) with most emissions resulting from electricity generation due to reliance on coal.[129] In 2018, Carbon Brief ranked South Africa as the world's 14th largest emitter of GHGs, primarily due to CO_2 emissions from the coal industry.[130] Coal emissions are prevalent in eMalahleni City, a district contributing disproportionately to the release of GHG emissions due to coal mining.[131] Similarly, approximately 95% of electricity is supplied to the public by Eskom, the nation's

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124 Global Forest Watch 2021 https://bit.ly/3dDEGfy.

125 Couth and Trois 2011 *Waste Management* 131; Legora *A Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 1.

126 World Bank Group 2021 https://bit.ly/3a8XaDZ.

127 Mantey and Sakyi 2019 *OIDA International Journal of Sustainable Development* 42; Abdallah and El-Shennawy 2013 *Journal of Engineering* 1.

128 International Energy Agency *Global Energy and CO_2 Status Report: 2018* 8.

129 SADC Centre for Renewable Energy and Energy Efficiency 2018 *SADC Renewable Energy and Energy Efficiency Status Report* 32; Legora *A Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 32. According to the Integrated Resource Plan of 2019, the energy sector accounts for nearly 80% of its overall GHG emissions, with 50% coming from electricity and liquid fuel production alone - see Clause 1 of GN 652 in GG 42784 of 18 October 2019.

130 Carbon Brief 2018 https://www.carbonbrief.org/the-carbon-brief-profile-south-africa.

131 Zulu *Energy Sector Reform and the Protection of the Rights contained in Section 24 of the South African Constitution* 5; South African Cities Network *Emalahleni* 5.

public power utility.[132] South African cities, like the City of Johannesburg, primarily get electricity from coal-fired plants (e.g. Eskom), making them accountable also in the release of great quantities of GHG into the atmosphere.[133]

2.3.4 GHG emissions from waste

Waste emissions in Africa are expected to rise substantially to 76% in 2050, with landfill sites being the key contributor.[134] In general, African municipalities' waste collection rates remain poor, with rates below 50%, such as Chad's City of N'Djamena's waste collection rate, which is extremely low.[135] Arguably, the problem is that African cities are doing less to deal with the waste generated by their residents and businesses.[136] Friedrich and Trois[137] contend that uncollected waste is either self-disposed (properly or improperly), improperly discarded or recycled. South African municipalities are also struggling with solid waste management and disposal, especially in Gauteng.[138] This is mainly due to a lack of landfill space.[139] For example, the City of Johannesburg's increasing population leads to an illegal dumping problem due to limited landfill capacity and poor solid waste management.[140] Rasmeni and Madyira[141] argue that inappropriate solid waste management result in GHG emissions. The emissions from waste also have

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132 Modiba *The Potential Effects of the Carbon Emission Tax Imposition on South African Mining Companies' Profitability and Emission Reduction* 1-2; Udi and Alola 2020 *Environmental Science and Pollution Research* 17707.

133 Mantey and Sakyi 2019 *OIDA International Journal of Sustainable Development* 42-43.

134 Friedrich and Trois 2011 *Waste Management* 1586.

135 Friedrich and Trois 2011 *Waste Management* 1588; Gumbo 2014 *Consilience* 48.

136 White, Turpie and Letley *Greening Africa's Cities: Enhancing the Relationship between Urbanization, Environmental Assets and Ecosystem Services* 14; Tomita *et al* 2020 *The Lancet Planetary Health* 223-224.

137 Friedrich and Trois 2011 *Waste Management* 1588.

138 Friedrich and Trois 2011 *Waste Management* 1588.

139 Rasmeni and Madyira 2019 *Procedia Manufacturing* 1026.

140 Rasmeni and Madyira 2019 *Procedia Manufacturing* 1026.

141 Rasmeni and Madyira 2019 *Procedia Manufacturing* 1026.

environmental consequences in city environments,[142] such as in the City of Cape Town.[143]

2.3.5 GHG emissions from the built environment

Buildings make a relatively large contribution to GHG emissions. In 2019 residential and manufacturing buildings accounted for about 23% to 40% of GHG emissions in the world.[144] These emissions result from the construction, operation, and demolition of buildings, contributing to the highest volume of GHG emissions in the construction industry.[145] These emissions from building operations are typically caused by the energy used for heating and cooling, hot water supply, ventilation and air conditioning, and lighting, among other things.[146] Cities in South Africa account for around 25% of the energy used to fuel, heat, and run houses, and one of these cities, the City of eThekwini Metropolitan Municipality, emitted 4% GHG emissions from buildings in 2018.[147] Therefore, the operation of buildings has a significant impact on the release of GHG emissions.[148]

2.4 The commitment of South African cities to reduce GHG emission

Some cities are taking action in support of their national government's commitment to mitigate climate change. Certain African cities such as Addis Ababa, City of Johannesburg, City of Cape Town and City of Tshwane have voluntarily joined

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142 Kretzmann *et al* 2021 https://www.dailymaverick.co.za/article/2021-04-26-south-africas-rivers-of-sewage-more-than-half-of-sas-treatment-works-are-failing/.

143 The consequences are articulated by Friedrich and Trois – see Friedrich and Trois 2011 *Waste Management* 1589.

144 UN-Habitat 2020 *Global Report for Buildings and Construction* 4; Dean *et al Towards Zero-Emission Efficient and Resilient Buildings: Global Status Report, Global Alliance for Buildings and Construction (GABC)* 9.

145 Van der Walt *Retrofitting South Africa's Cities with Green Roofs: Cost Benefit Analyses for Large Scale Green Roof Implementation* 10; Hogarth, Haywood and Whitley *Low-Carbon Development in Sub-Saharan Africa* 53.

146 Röck *et al* 2020 *Applied Energy* 2; UN-Habitat 2020 *Global Report for Buildings and Construction* 4.

147 C40 2018 https://bit.ly/3tjuuPj; Jagarnath and Thambiran 2018 *Environment and Urbanization* 202; City of eThekwini Metropolitan Municipality *eThekwini Greenhouse Gas Emissions Inventory 2018* 5. In South Africa buildings accounted for 22% of CO2 emissions in 2018 - see Climate Transparency 2019 *Brown to Green: The G20 Transition towards a Net-Zero Emission Economy: South Africa* 1.

148 UN-Habitat 2020 *Global Report for Buildings and Construction* 4.

transnational municipal networks to make commitments, set targets and introduce programmes to reduce GHG emissions and climate risks.[149] One of the things that the transnational municipal networks do is connecting cities globally to encourage the use of GHG emissions inventories to measure and report urban GHG emissions.[150] Cities use the information gathered to create evidence-based climate change plans and policies for low-emission sustainable growth.[151] Further, local governments are often better positioned to use their local plans and policies to collaborate with communities and the business sector in an attempt to reduce GHG emissions.[152]

2.4.1 Commitment of cities to GHG emissions reduction

Even though cities are not required or legally empowered to partake in formal international inter-state negotiations, conferences, or conventions, they play an important role in assisting their countries in implementing and delivering their Nationally Determined Contributions (NDCs).[153] The examples of African cities in general and South African cities in particular, playing an important role assisting with the implementation of NDCs and thereby reducing emissions are provided below.

In May 2018, Addis Ababa and other African cities that are members of C40 made commitments to reduce their CO_2 emissions.[154] Different goals and obligations are covered in Ethiopia's NDCs, which includes emission sectors in Addis Ababa and

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149 The global city network includes the Global Covenant of Mayors for Climate and Energy, C40 and the Local Governments for Sustainability - see Nelson Mandela Bay Metropolitan Municipality *Built Environment Performance Plan 2020/21* 108; Hickmann and Stehle "Urban Climate Governance Experiments in South Africa: Insights from Johannesburg, Cape Town, and Durban" 15; Covenant of Mayors for Climate and Energy date unknown *Fact Sheet* 2; Heikkinen *et al* 2020 *Journal of Cleaner Production* 2-3; Sonqishe 2016 https://bit.ly/3hwha62; C40 2018 https://bit.ly/3tjuuPj.

150 United Nations Framework Convention on Climate Change (UNFCCC) *Urban Environment Related Mitigation Benefits and Co-benefits of Policies, Practices and Actions for Enhancing Mitigation Ambition and Options for Supporting their Implementation* 11.

151 UNFCCC *Urban Environment Related Mitigation Benefits and Co-benefits of Policies, Practices and Actions for Enhancing Mitigation Ambition and Options for Supporting their Implementation* 11.

152 Tait and Euston-Brown 2017 *Journal of Energy in Southern Africa* 50.

153 Hale *The Role of Sub-state and Non-state Actors in International Climate Processes* 4.

154 UNESCO 2019 https://bit.ly/3vzZ9t8.

demonstrate the government's determination to minimise the emissions from sectors such as transport.[155] Ethiopia's government pledged to improve Addis Ababa's transport system by adding urban electric rail and enabling fast and efficient bus transit, an action crucial for climate change mitigation at the local level.[156] Similarly, Nigeria developed policies and programmes that will drive its goal of a climate-resilient society.[157] For instance, Nigeria has an UN-REDD programme that aims to coordinate the nation's efforts to decrease deforestation and forest degradation emissions and promote forest conservation, sustainable management, and carbon stock improvement.[158] In assisting the national government to reduce GHG emissions, City of Lagos is planting millions of trees to reduce deforestation and forest degradation emissions.[159] City of Lagos is one of eight African cities that has pledged to be carbon-free by 2050.[160]

Additionally, Kenya has taken climate action to reduce emissions in the transport sector in the City of Nairobi by promoting public transportation (e.g. bus and rail systems).[161] In reducing emissions, Kenya vowed to use landfill waste for electricity generation.[162] In addition, Kenya will develop 2,405 MW of grid-connected

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155 World Bank Group *Ethiopia's (Intended) Nationally Determined Contributions-(I)NDC* 11-12. Ethiopia's Climate-Resilient Green Economy has important mitigation commitments and goals which are at the centre of high emitting sectors in the country and cities like Addis Abba - see Federal Democratic Republic of Ethiopia (Ethiopia) *Climate-Resilient Green Economy: Green Economy Strategy* 26.

156 Ethiopia *Climate-Resilient Green Economy: Green Economy Strategy* 26. Public transport (which includes busses) is crucial for reduction of GHG emissions. KCATA provides that by "eliminating one car transport and taking public transportation instead of driving, a saving of 30% of carbon dioxide emissions can be realised." This is arguably important for climate change mitigation - see KCATA 2021 https://bit.ly/38lL48Q.

157 Nigeria *Third National Communication (TNC) of the Federal Republic of Nigeria under the United Nations Framework Convention on Climate Change (UNFCCC)* 10.

158 Nigeria *Third National Communication (TNC) of the Federal Republic of Nigeria under the United Nations Framework Convention on Climate Change (UNFCCC)* 11.

159 Nigeria *Third National Communication (TNC) of the Federal Republic of Nigeria under the United Nations Framework Convention on Climate Change (UNFCCC)* 148-149.

160 Egbejule 2021 https://bit.ly/3eYlIki.

161 Notter, Weber and Füssler *Greenhouse Gas Emissions from the Transport Sector: Mitigation Options for Kenya* 5.

162 Republic of Kenya: Ministry of Environment and Forestry *National Climate Change Action Plan 2018-2022: Mitigation Technical Analysis Report* 5-6.

renewable power generation in 2022, retire three thermal facilities, and promote afforestation.[163]

The South African government has set goals and made commitments to mitigate climate change.[164] The country has pledged to contribute its fair share to global GHG reduction efforts to limit global temperature rises below 2°C.[165] In addition, South Africa is committed to achieving net-zero carbon emissions by 2050 as a long-term target.[166] In the National Development Plan (NDP) and South Africa's Low Emission Strategy of 2020, for example, the government stated that by 2030 it would have established an economy-wide carbon price and implemented zero-carbon buildings.[167]

South Africa's national government has also called on local governments to contribute to climate change mitigation and efficiency targets.[168] As a result, several cities set targets and made promises similar to those set by the national government to meet its global commitments. For instance, City of eThekwini Metropolitan Municipality vowed to achieve carbon neutrality by 2050.[169] It has pledged to use processes such as reuse, recycle and recovery, amongst other things, to divert waste disposed to landfill sites by 50% in 2023 and by 90% in the year 2050.[170] Furthermore, City of eThekwini Metropolitan Municipality has committed to examining Durban's Metropolitan Open Space System (D'MOSS) programme and reforestation projects, as well as to measuring the amount of CO_2 stored as a result of these activities, in order to offset the residual emissions partially.[171]

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163 Republic of Kenya: Ministry of Environment and Forestry *National Climate Change Action Plan 2018-2022: Mitigation Technical Analysis Report* 5-6.

164 DFFE *South Africa's Third Nationally Determined Communications under the United Nations Framework Convention of Climate Change* 194.

165 DFFE *South Africa's Third Nationally Determined Communications under the United Nations Framework Convention of Climate Change* 194.

166 DFFE *South Africa's Low Emission Strategy 2050* 21.

167 National Development Commission *National Development Plan: Our Future-Make it Work* 67; DFFE *South Africa's Low Emission Strategy 2050* 15.

168 SALGA *Local Government Energy Efficiency and Renewable Energy Strategy* 7.

169 World Resource Institute 2019 https://bit.ly/3rZe0Li; City of eThekwini Metropolitan Municipality *Durban Action Plan 2019* 4.

170 City of eThekwini Metropolitan Municipality *Durban Action Plan 2019* 44.

171 City of eThekwini Metropolitan Municipality *Durban Action Plan 2019* 21.

City of Cape Town undertook to reduce emissions from the transport sector by promoting and increasing the use of cycling from 1% to 8% by 2030.[172] City of Cape Town also pledged to reach zero carbon emissions from new buildings by 2030 and all existing buildings by 2050.[173] The City of Johannesburg is further committed to transitioning to a low carbon economy to achieve the goal of a healthy, sustainable environment.[174] Arguably, the agreements and targets offer substantial support to national governments' meeting their international obligations related to climate change mitigation. These commitments and targets are focussed on sectors[175] that contribute significantly to GHG emissions, such as transport, the built environment and energy, all of which are prominent city features.

2.5 Concluding remarks

This chapter's objective was to review the role of South African cities in reducing GHG emissions. The chapter began by investigating the trends and forecasts of urbanisation in Africa generally and South Africa in particular. Based on United Nations, OECD and municipal publications, it has been established that Africa is experiencing rapid urbanisation. South Africa has been identified as the most rapidly urbanising nation in the sub-Saharan region, with more than 66% of its population living in cities in 2019. However, as indicated under section 2.2 above, this urbanisation is unplanned and threatens the increase of GHG emissions in Africa.

The chapter has established that South African cities have a role to play in reducing GHG emissions. In paragraph 2.4.1 above it is stated that the national government has made a call for local government to contribute to climate change mitigation and efficiency targets. In doing so, South African cities have made commitments to assist the country in mitigating climate change. The City of Tshwane has carried out a GHG emissions inventory to understand where emissions can urgently be mitigated. Cities have influence in the sectors that release significant emissions, as stated in

172 City of Cape Town *Comprehensive Integrated Transport Plan of 2018-2023* 214.
173 City of Cape Town *Draft Climate Change Strategy for Public Comment* 11.
174 City of Johannesburg *Climate Change Strategic Framework: City of Johannesburg* 7.
175 See section 2.3 above.

section 2.3 above. Therefore, their role in reducing emissions is arguably great, and they are already making pledges to do so. As indicated under paragraph 2.4.1, cities including but not limited to City of Cape Town, the City of Johannesburg, and the City of eThekwini Metropolitan Municipality have made commitments to reduce emissions in transport, waste and the built environment. For instance, the City of eThekwini Metropolitan Municipality has pledged to measure emissions stored from projects such as reforestation and initiate processes such as the reuse, recycling, and recovery of waste, having a significant role in reducing GHG emissions. Considering this background, it is evident that cities do have a role to play in reducing the release of GHG emissions through their commitments in their instruments (e.g., policies). The next chapter considers municipal planning as a tool for climate change mitigation in cities.

CHAPTER 3 MUNICIPAL PLANNING AS A TOOL FOR CLIMATE CHANGE MITIGATION

3.1 Introduction

The United Nations has urged improved planning in the 21st century to address urbanisation, poverty, spatial injustice, and climate change.[176] As indicated in chapter two,[177] cities, especially those in developing regions such as Africa, are experiencing rapid urbanisation, leading to increased energy consumption and climate change, for example.[178] Therefore, it is important to bear in mind that urban or municipal planning seeks to control land use and indirectly manage activities in cities.[179] In addition, the management of open space, air, water, and the built environment, which includes buildings, transportation, economic, and social functions, are all part of the urban planning process.[180]

At a practical level, municipal planning[181] involves rules that govern development in an urban area.[182] It covers the laws and processes for subdividing land or modifying land use in terms of zoning.[183] The South African Local Government Association (SALGA) describes municipal planning as the management or organisation of the spatial environment, bringing order out of what would otherwise be chaos.[184] Wolfram[185] submits that municipal planning is future-oriented, normative, integrative, systematic and prepares for action in a city. These features, as

176 Forbes "An Introduction to Municipal Planning in South Africa" 2-3.
177 See section 2.2 above.
178 United Nations *World Urbanization Prospects: The 2018 Revision* 1; Kareem *et al* 2020 *Environmental Research Letters* 5; Güneralp *et al* 2017 *Environmental Research Letters* 1; Mbara and Pisa 2019 *WIT Transactions on The Built Environment* 245; World Bank 2021 https://bit.ly/3pGz2yK; Musah *et al* 2020 *Environment, Development and Sustainability* 2; Kwakwa and Alhassan 2018 *OPEC Energy Review* 317.
179 Hurlimann, Moosavi and Browne 2021 *Land Use Policy* 2.
180 Smith 2021 https://www.clearpointstrategy.com/types-of-urban-planning/.
181 For the purpose of this study, the terms municipal planning, urban planning or town planning will be used interchangeably.
182 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 9.
183 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 9.
184 Forbes "An Introduction to Municipal Planning in South Africa" 3.
185 Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 3.

described by Wolfram, show municipal planning as enshrined in the regulatory planning mode.[186]

As established in chapter one, municipal planning involves strategic and spatial planning.[187] This study focusses on spatial planning, which integrates policies for developing and using land with other policies and programmes that influence or affect the nature and manner in which places operate.[188] In addition, spatial planning affects a city's urban design, land use and the built environment, all of which affect GHG emissions.[189] For example, with land use management, spatial planning can make a major contribution to climate change mitigation by promoting more sustainable energy use and carbon sequestration and creating a more efficient urban form towards sustainable transport infrastructure and design, amongst other things.[190] Spatial planning *inter alia* hinges on regulatory instruments that can be used to control and promote climate change mitigation at the local level.[191] These spatial regulatory and policy instruments, as will be shown below, could be located in national law and policy applicable in municipalities across the country.[192]

This chapter examines municipal planning as a governance tool in law that may assist with climate change mitigation. First, the focus is on the nexus between physical space and climate change mitigation. Secondly, the chapter focusses on the dictates of South African national spatial planning law and policy. The chapter thus seeks to describe the intersection between what is needed for climate change mitigation in South African cities (i.e. emissions reduction as indicated in chapter

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186 Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 3.

187 See section 1.1 above for more clarity on spatial planning. Van der Berg argues that the term "strategic planning" is derived from corporate-based planning, which was first used in the private sector. Van der Berg further provides examples of strategic planning as including city development strategies, development or growth strategies, or municipal development strategies. For further discussion on strategic planning - see Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 134-137.

188 Morphet *Effective Practice in Spatial Planning* 7.

189 Wang, Huang and Huang 2018 *Landscape and Urban Planning* 23.

190 Nel *Can the South African Land Use Management System be an Effective Tool in Creating Low(er) Carbon Cities?* 3.

191 See section 1.1 above.

192 See section 3.5 below.

two), and municipal planning, and - the provisions in national spatial planning and environmental law as relevant to this nexus.

3.2 Historical development of municipal planning

The relevance of local planning in responding to challenges that have always been part of and continue to exist in the city environment may be seen in the history of municipal planning. Municipal planning originated in Britain to empower the local government to draft schemes for land that was likely to be developed, particularly in suburban areas.[193] Municipal planning then spread worldwide, including to Africa.[194] The terms municipal or town planning were formally recognised and used in the 19th century.[195] The shaping of the urban environment was subject to plans binding on those owning and operating the land.[196] The multiple socio-technical developments that fuelled industrialisation and urbanisation in the mid-19th century stimulated the increase of wealth, capital and societal challenges such as urban conflicts.[197] Early industrial cities were characterised by social and economic inequity, poor sanitation, and environmental degradation. [198] As a result, there was increased pressure for responses to ensure better urban areas for individuals and the government.[199]

When concerns about the status of urban circumstances and the need for sufficient planning began to arise among priests, physicians, democrats, and academics in the 19th century, the notion of modern urban and town planning was born.[200] Visions of

193 Bowie 2017 https://bit.ly/3z0fpWD; Forbes "An Introduction to Municipal Planning in South Africa" 2.
194 Bowie 2017 https://bit.ly/3z0fpWD; Forbes "An Introduction to Municipal Planning in South Africa" 2.
195 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 118.
196 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 118.
197 Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 1.
198 Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 1.
199 Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 1.
200 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 119.

a better urban future emerged.[201] The founding fathers of planning[202] aimed to manage urbanisation in a manner that resulted in disciplined and healthy urban environments that improved human well-being.[203] Gatarić *et al*[204] provides that Howard came up with the concept of a Garden City as a reaction to the uncontrolled growth of urban surroundings in the 19th century.[205] Creating garden cities would arguably allow for the creation of a pleasant environment through urban spatial design. The idea behind a Garden City was to reintroduce "green" into cities made up of meandering roads and cottage houses separated by stringent land use and control over the town's size and expansion.[206] Le Corbusier[207] advocated that slums and narrow streets be demolished and replaced with efficient transportation - and that residences be skyscrapers and land use separated into different zones. These visions of the city became the basis of modernist planning and have impacted on and influenced the objectives and forms of planning in many countries.[208]

Modernistic planning, primarily based on old British planning techniques, reached Africa and shaped the continent's theoretical planning foundations.[209] Forbes[210] argues that African planning is primarily concerned with physical planning and pays little attention to social, economic and environmental concerns. South African planning specifically is mainly based on the assumption that the government will

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201 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 119; Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 1.

202 The founding fathers of planning are named as follows, Howard from the United Kingdom, Le Corbusier from Europe, and Lloyd Wright from the United States of America. Van Der Berg further explains the visions of the founding fathers of planning - see Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 119-120.

203 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 119; Wolfram "Urban Planning and Transition Management: Rationalities, Instruments and Dialectics" 1.

204 Gatarić *et al* 2019 *Zbornik radova-Geografski fakultet Univerziteta u Beogradu* 34.

205 Gatarić *et al* 2019 *Zbornik radova-Geografski fakultet Univerziteta u Beogradu* 34.

206 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 119.

207 Le Corbusier *"Contemporary City" from The City of To-morrow and Its Planning (1929)* 367-375. See also the discussion about Le Corbusier's Garden City on Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 120-121.

208 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 120.

209 Forbes "An Introduction to Municipal Planning in South Africa" 2.

210 Forbes "An Introduction to Municipal Planning in South Africa" 2.

plan and direct all forms of spatial development.[211] This indicates that the government has been entrusted with planning and land use control in making decisions that impact the urban form.[212]

It is argued that city governments could use urban planning and land use regulation to address the pressing issues of rapid urbanisation and climate change.[213] Spatial planning may be particularly important at the local level to mitigate the causes and effects of climate change.[214] Through urban design, layout, building design, and policies promoting energy efficiency and low-carbon growth, spatial planning plays a role in setting the stage for development, including climate resilient development.[215] Therefore, city governments may typically make decisions about mixed-use, walkable communities, alternative transportation systems, district energy, green infrastructure, and various other issues to help advance climate change mitigation.[216] This idea is further discussed below.

3.3 Municipal planning and climate change

Municipal planning presents opportunities to address climate change adaptation and mitigation.[217] As suggested earlier, while mitigation focusses on slowing the rate of climate change, adaptation lessens the adverse effects of climate change.[218] The overarching goal of mitigation and adaptation is to reduce the long-term effects of climate change.[219] Cities have opportunities to influence these sectors[220] in a way that will help decrease GHG emissions.[221] In reducing GHG emissions, cities could

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211 Forbes "An Introduction to Municipal Planning in South Africa" 2.
212 Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8.
213 Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8; Forbes "An Introduction to Municipal Planning in South Africa" 23.
214 Nel *Can the South African Land Use Management System be an Effective Tool in Creating Low(er) Carbon Cities?* 3.
215 Wilson and Piper *Spatial Planning and Climate Change* 208.
216 Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8-9.
217 Mohammed, Hassan and Badamasi 2019 *International Journal of Urban Sustainable Development* 309.
218 Zhao *et al* 2018 *Ecosystem Health and Sustainability* 86.
219 Zhao *et al* 2018 *Ecosystem Health and Sustainability* 86.
220 See section 2.3 above.
221 Gouldson *et al* 2016 *Cities* 12; Fawzy *et al* 2020 *Environmental Chemistry Letters* 2073; Allan, Jones and Thondoo *Cities and Climate Change: Climate Policy, Economic Resilience and Urban*

use their urban planning authority to control land use and development and further regulate the city's spatial shape and activities.[222] For example, in the urban form, more efficiencies and low-carbon paths may be achieved by making buildings more energy-efficient or supplying renewable energy and making buildings denser.[223]

Urban form influences mass transportation.[224] Urban forms with high density, mixed land uses, and sufficient transit may stimulate non-vehicle mobility, resulting in considerable GHG emission reductions in the transport sector.[225] In a hot–dry climate, an urban form's ability to survive high temperatures during the summer season is determined by the proximity of buildings so that shadows may be thrown on each other to assist with decreases in temperature, for example.[226] This shows that several urban form characteristics, such as urban density, green space, impervious surface areas, and their forms and combinations substantially impact on the Urban Heat Island (UHI) effect.[227] Urban design not only aids in the mitigation of global warming by promoting mass public transportation and low-energy inputs for electrical cooling equipment, but it may also aid in the adaptation of cities to the threat of soaring high summer temperatures.[228]

Climate change mitigation requires behavioural change by human beings.[229] It has been said that human actions are regarded as "'behavioral wedges' of a larger pie

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Sustainability 17; DFFE *South Africa's Third Nationally Determined Communications under the United Nations Framework Convention of Climate Change* 230. Also see section 1.1 above.

222 Hurlimann, Moosavi and Browne 2021 *Land Use Policy* 2; Zawieska and Pieriegud 2018 *Transport Policy Journal* 39.

223 World Bank *A Review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation: Linking Land Use, Infrastructure Transition, Technology, and Behavioral Change* 5-6.

224 Davoudi, Crawford and Mehmood *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners* 35.

225 Xu *et al* 2019 *Environment International* 2; UNFCCC *Urban Environment Related Mitigation Benefits and Co-benefits of Policies, Practices and Actions for Enhancing Mitigation Ambition and Options for Supporting their Implementation* 23.

226 Davoudi, Crawford and Mehmood *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners* 35.

227 Xu *et al* 2019 *Environment International* 2.

228 Davoudi, Crawford and Mehmood *Planning for Climate Change: Strategies for Mitigation and Adaptation for Spatial Planners* 35.

229 Van de Ven, González-Eguino and Arto 2018 *Mitigation and Adaptation Strategies for Global Change* 854.

of necessary steps to reduce emissions."[230] Humans are a major source of GHG, especially in economic sectors like energy and transportation[231] - mitigation measures could be implemented in these sectors between 2020 and 2050.[232] However, several cities around the globe have been pushing for behavioural change in sectors such as building and transport to reduce GHG emissions.[233] For example, the Trademark East Africa began planning a project in 2017 to improve roads to the port and truck holding areas in Mombasa.[234] The project prioritises Non-Motorised Transportation (NMT), containing about 23 kilometres of NMT amenities.[235] NMT is a zero-emission form of transport central to an urban planning departments' strategic thinking in many parts of the world.[236]

Local government could enforce behavioural change for mitigating climate change by using regulatory tools and policies such as local plans, which generally include land-use zoning standards, and building standards and codes.[237] Climate change mitigative policies also have the power to navigate behavioural change by promoting, among other things, rooftop solar, using solar radiation to pre-heat or heat water for building use, and biking infrastructure in cities.[238] For example, Mexico City reconstructed around 300 kilometres of bicycle lanes, replaced all high emission

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230 Williamson *et al Climate Change Needs Behavior Change: Making the Case for Behavioral Solutions to Reduce Global Warming* 13.

231 Williamson *et al Climate Change Needs Behavior Change: Making the Case for Behavioral Solutions to Reduce Global Warming* 13.

232 Williamson *et al Climate Change Needs Behavior Change: Making the Case for Behavioral Solutions to Reduce Global Warming* 13.

233 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5133-5136.

234 Trademark East Africa is an East African none profit company established in 2010 to support the growth of trade both regional and international in East Africa – see United Nations *Investing on People Who Walk and Cycle: Share the Road Programme Annual Report 2017* 26.

235 United Nations *Investing on People Who Walk and Cycle: Share the Road Programme Annual Report 2017* 26.

236 Cooke, Koinange and Zuidgeest *Calculating the Potential Climate Value of Non Motorised Transport projects in African Cities* 4.

237 Silva and Acheampong *Developing an Inventory and Typology of Land-Use Planning Systems and Policy Instruments in OECD Countries* 19.

238 Williamson *et al Climate Change Needs Behavior Change: Making the Case for Behavioral Solutions to Reduce Global Warming* 14-15.

cars with low-emission cars, and required private schools to implement bus-riding programmes.[239] Additionally, Mexico City has green roofs on public buildings.[240]

Buildings in São Paulo are required to have solar water heating systems.[241] São Paulo has further provided for efficient public transportation and has built bicycle lanes to reduce carbon emissions.[242] All new projects must bear energy efficiency badges.[243] In South Africa, the City of eThekwini Metropolitan Municipality has implemented programmes and policies which mitigate climate change through energy efficiency.[244] These include the Shisa Solar Programme and the National Solar Water Heater Programme for homes.[245] All the cities' actions mentioned above show the potential value of using the regulatory and policy aspects of municipal planning to advance the behavioural change necessary for climate change mitigation.

3.4 Municipal spatial planning for climate mitigation

3.4.1 Introduction

The rationale behind cities (and city planning) addressing climate change is their continued expansion, which requires infrastructural investment, a key contributor to increased GHG emissions.[246] Spatial planning can enhance efficiencies such as mixed development that reduces distance commuting, the promotion of cycling and walking, and efficient energy use in buildings.[247] In addition, the regulatory instruments for spatial planning could be used to reduce emissions in built-up areas and direct urban and infrastructural development to limit the growth of GHG emissions.[248] Spatial planning goes beyond land-use planning by integrating policies

239 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5136.
240 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5136.
241 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5136.
242 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5136.
243 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5136.
244 City of eThekwini Metropolitan Municipality *Durban Action Plan 2019* 35.
245 City of eThekwini Metropolitan Municipality *Durban Action Plan 2019* 35.
246 Hurlimann, Moosavi and Browne 2021 *Land Use Policy* 2.
247 Seto *et al Human Settlements, Infrastructure, and Spatial Planning* 949.
248 The instruments include building codes and parking regulations - see Seto *et al Human Settlements, Infrastructure, and Spatial Planning* 962-962.

for the development and use of land with other policies and programmes that influence the nature of places and how they operate.[249]

As suggested so far, spatial planning concerns the regulation of the location, timing and form of developments.[250] Land zoning and construction laws and regulations are tools used in spatial planning.[251] These 'rules' establish the standards for built items in the city, such as buildings and other physical structures, and are critical to climate change mitigation.[252] Zoning also allows for the subdivision and consolidation of land, which may be necessary for establishing or expanding towns, constructing highways, and housing and other development projects.[253] The practice of efficient energy use in old and new buildings is required for the mitigation of climate change.[254] The zoning of land or land use schemes, which is critical to spatial planning, concerns land development and land-use regulation.[255]

3.4.2 Local transport

Nel[256] contends that in conjunction with land use management, spatial planning may significantly contribute to climate change mitigation by creating a more efficient urban form that allows for sustainable transportation. For example, higher densities in urban areas could typically be promoted along (possible) public transportation lines that could be turned into 'high streets' with retail and social amenities.[257] As a

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249 Morphet *Effective Practice in Spatial Planning* 7.

250 Silva and Acheampong *Developing an Inventory and Typology of Land-Use Planning Systems and Policy Instruments in OECD Countries* 5.

251 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 133; Boshoff and Mey 2020 *Acta Structilia* 158-159.

252 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 133; Boshoff and Mey 2020 *Acta Structilia* 158-159.

253 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 133-134.

254 Boshoff and Mey 2020 *Acta Structilia* 158-159.

255 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 133-134.

256 Nel *Can the South African Land Use Management System be an Effective Tool in Creating Low(er) Carbon Cities?* 4-5.

257 Nel *Can the South African Land Use Management System be an Effective Tool in Creating Low(er) Carbon Cities?* 5.

result, the use of private cars might be reduced, and cycling and walking for local trips and public transportation for more extensive travels could be encouraged.[258]

South Africa's Department of Transport (DoT) pledged to reduce GHG emissions from transport.[259] The DoT envisions reducing these emissions through taking steps including shifting passengers from private transport to public transport and freight from road to rail[260] and switching to cleaner fuels and adopting new technologies such as alternative energy vehicles while making cities and towns friendlier places for cyclists and pedestrians.[261] The South African government has also implemented mandatory safety regulations and a user-support programme to replace outdated and dangerous taxis with newer and more efficient vehicles.[262]

Over the years, several cities in South Africa have implemented BRT systems to connect outlying areas with the inner centre and other key nodes in the transport sector.[263] A BRT system is a high-quality, customer-oriented public transportation system that provides speedy, comfortable, and low-cost urban mobility to public transportation customers with a modernised, efficient, and comfortable service.[264] Several major South African cities have BRT systems, including City of Johannesburg, City of Cape Town, Rustenburg, Ekurhuleni, and the City of Tshwane.[265] In 2011, City of Cape Town started a 60-route BRT service that is reliable and affordable.[266] The DoT's Green Transport Strategy (GTS) for 2018 to 2050 was established in 2018.[267] The GTS sets the strategic direction for the transportation industry in reducing GHG emissions, contributing to the green

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258 Nel *Can the South African Land Use Management System be an Effective Tool in Creating Low(wer) Carbon Cities?* 5.

259 Department of Transport (DoT) *Green Transport Strategy for South Africa: (2018-2050)* 3.

260 DoT *Green Transport Strategy for South Africa: (2018-2050)* 3.

261 DoT *Green Transport Strategy for South Africa: (2018-2050)* 3.

262 DoT *Green Transport Strategy for South Africa: (2018-2050)* 18.

263 World Bank Group *A Review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation: Linking Land Use, Infrastructure Transition, Technology, and Behavioral Change* 455-456.

264 Arrive Alive 2021 https://bit.ly/2VioECe.

265 World Bank Group *A Review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation: Linking Land Use, Infrastructure Transition, Technology, and Behavioral Change* 455-456.

266 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5133.

267 World Bank Group *A Review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation: Linking Land Use, Infrastructure Transition, Technology, and Behavioral Change* 32-33.

economy, and promoting sustainable mobility.[268] These transport initiatives are also seen in the Nelson Mandela Metropolitan Municipality, which has engaged in a wide range of low-carbon development efforts, including the expansion of its BRT system and NMT.[269] NMT is important because it complements and strengthens current public transportation networks by giving safe access to public transportation via walking or cycling.[270] The availability of NMT infrastructure is seen as a necessary condition for encouraging individuals in South Africa to ride bicycles or walk.[271] If this is successful, the NMT initiatives might eventually help enhance air quality and reduce emissions in South African cities.[272] Most cities encourage NMT by establishing bicycle lanes, cycle tracks, side roads, or cycling trails[273] that are not connected to existing roadways.[274] Experience in city planning from cities such as Beijing and Portland and similar cities in the US illustrates that streets make walking, cycling, and the use of rickshaws (i.e. human-powered vehicles) safer and more enjoyable.[275]

3.4.3 Built environment

The built environment refers to spaces and places created by humans, such as buildings, parks, and transit networks.[276] Furthermore, the built environment includes a material, spatial, and cultural product of human labour that incorporates

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268 World Bank Group *A Review of Integrated Urban Planning Tools for Greenhouse Gas Mitigation: Linking Land Use, Infrastructure Transition, Technology, and Behavioral Change* 32-33.

269 National Treasury of the Republic of South Africa *Climate Mainstreaming in South African Cities: High Level Analysis of Key Strategic Planning Documents* 90.

270 DFFE date unknown https://bit.ly/31tJnGz.

271 DFFE date unknown https://bit.ly/31tJnGz.

272 DFFE date unknown https://bit.ly/31tJnGz.

273 Bicycle lanes are generally found between driving traffic and parking or the sidewalk, and they go in the same direction as the traffic. They are generally identified by painted lines and a bicycle symbol. The phrase "cycle track" can refer to a segregated bicycle lane, but it can also refer to off-street tracks that are either raised to be vertically separated or follow non-vehicular paths. A side road is a road which leads off a busier, more important road – see Reliance Foundry 2021 https://bit.ly/3t1NcfB; Collins Dictionary date unknown https://bit.ly/2WtO2Gn.

274 Selala and Musakwa *The Potential of Strava Data to Contribute in Non-Motorised Transport (NMT) Planning in Johannesburg* 588.

275 Selala and Musakwa *The Potential of Strava Data to Contribute in Non-Motorised Transport (NMT) Planning in Johannesburg* 588.

276 Wilson and Piper *Spatial Planning and Climate Change* 206; Kaklauskas and Gudauskas 2016 https://www.sciencedirect.com/topics/engineering/built-environment.

physical materials and energy into life, work, and play.[277] The built environment contributes to GHG emissions, with buildings accounting for a substantial amount of it. [278] These emissions could arguably be reduced through the use of legal and policy instruments. For instance, building laws and regulations and zoning support spatial planning in the sense that they are controlling tools for regulating the built environment.[279] Zoning, in particular, controls by separating the land that makes up a local authority's statutory area into sections and allowing certain land uses on specific sites to shape the form of towns and cities and allows for various sorts of development.[280] A building code or regulation establishes the standards for built items in the city, such as buildings and other physical structures.[281] The South African government has set energy efficiency and energy consumption regulations under the *National Building Regulations and Buildings Standards Act* 103 of 1977 (NBRBS Act) to help reduce energy consumption and the related GHG emissions in new business and residential buildings.[282] Cities such as City of Cape Town and the City of Tshwane seem to be following the national government's lead by creating green building bylaws.[283]

The City of Tshwane's *Green Building Development Bylaw* of 2013 requires all new buildings, refurbishments, and retrofits to ensure that at least 10% of energy consumption is generated from renewable energy.[284] The City of Tshwane's Green Development Policy of 2009 says that plans should be created to illustrate how energy will be generated from renewable sources in order to achieve a carbon-neutral building.[285] City of Cape Town has been implementing low-carbon urban planning initiatives such as retrofitting low-cost buildings with insulating materials

277 Kaklauskas and Gudauskas 2016 https://www.sciencedirect.com/topics/engineering/built-environment.
278 See para 2.3.5 above.
279 Wilson and Piper *Spatial Planning and Climate Change* 35; World Bank Group 2015 https://urban-regeneration.worldbank.org/node/39.
280 World Bank Group 2015 https://urban-regeneration.worldbank.org/node/39.
281 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 133.
282 DFFE *South Africa's Low Emission Development Strategy 2050* 31-32.
283 Nel 2011 *Town and Regional Planning Journal* 3.
284 Section 8 of the City of Tshwane's *Green Building Development Bylaw* of 2013.
285 City of Tshwane 2009 *City of Tshwane Green Building Development Policy* 7.

and solar water heaters.[286] In responding to climate change, the City of Johannesburg has been pushing energy-efficient lighting in existing municipal buildings, creating waste-to-energy solutions for the city, using outside traffic and road lights, and tree planting and greening programmes.[287]

3.4.4 New housing development and expansion of the urban edge

Rapid urbanisation, coupled with uncontrolled urban expansion in ill-prepared urban areas, leads to urban sprawl.[288] On the periphery of cities, property values tend to be cheaper, resulting in sprawling communities.[289] Most people choose to live in suburbs and exurban regions since they are less expensive.[290] All South African cities have one key characteristic - urban expansion has taken the form of scattered residential growth at the city's edge.[291] Some of this growth is the result of market forces, in which higher-income families seek privacy and amenities in suburban environments.[292] Further, much of the growth is caused by spontaneous and often unauthorised settlement by those seeking proximity to employment.[293] Consequently, there is an inefficient use of urban infrastructure, low-density housing, and higher commute times.[294]

Van Rensburg and Campbell[295] argue that cities and towns with urban management structures in place, such as urban edges, are better off in terms of compactness as well as the sustainable use of land and infrastructure. Cities and towns are transformed as a result of spatial, environmental, and transportation challenges,

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286 Abubakar and Dano 2019 *Environment, Development and Sustainability* 5133; City of Cape Town 2011 *Cape Town Action Plan for Energy and Climate Change* 18-21.

287 National Treasury of the Republic of South Africa *Climate Mainstreaming in South African Cities: High Level Analysis of Key Strategic Planning Documents* 77.

288 Van Rensburg and Campbell 2012 *Urban Forum* 2.

289 Brody 2013 https://www.nature.com/scitable/knowledge/library/the-characteristics-causes-and-consequences-of-sprawling-103014747/.

290 Brody 2013 https://www.nature.com/scitable/knowledge/library/the-characteristics-causes-and-consequences-of-sprawling-103014747/.

291 Behrens and Watson *Inward Development: Solutions to Urban Sprawl* 51.

292 Behrens and Watson *Inward Development: Solutions to Urban Sprawl* 51.

293 Behrens and Watson *Inward Development: Solutions to Urban Sprawl* 51.

294 Van Rensburg and Campbell 2012 *Urban Forum* 3.

295 Van Rensburg and Campbell 2012 *Urban Forum* 3.

resulting in compactness or urban sprawl.[296] Compactness denotes a well-planned urban area and the combination of compactness and sprawl in the urban area aids in the development of a long-term urban form.[297] Compactness in cities is critical for lowering GHG emissions.[298] Therefore, policies that encourage compactness are essential.[299] Dense settlements, for example, give opportunities for public transportation investment, which has significant GHG reduction benefits.[300] Compact development may help lower emissions linked with land-use change in the built environment.[301]

The CO_2 emissions, energy usage, and water demand may all be minimised by using improved technology and promoting environmentally friendly alternative materials, among other things.[302] As suggested earlier, shorter commutes and more dependence on public and non-motorised modes, such as cycling, are desirable since the longer the average journey distance, the higher the environmental impact related to the transportation infrastructure, the resources consumed, and the emissions produced.[303] Housing development directly influences the ability of most city dwellers to access appropriate services and opportunities, and has large environmental and resource consumption consequences.[304] Culwick and Patel[305] argue that government initiatives that seek to solve housing issues without proper planning worsen existing inequalities, unsustainable resource use, and environmental degradation. In South Africa, housing or property developments are subject to environmental authorisations.[306] Specific conditions may be included in

296 Van Rensburg and Campbell 2012 *Urban Forum* 6.
297 Van Rensburg and Campbell 2012 *Urban Forum* 6.
298 Brittlebank 2014 https://bit.ly/3lyRwRg.
299 Brittlebank 2014 https://bit.ly/3lyRwRg.
300 Brittlebank 2014 https://bit.ly/3lyRwRg.
301 Cities absorb neighbouring green fields as they spread horizontally, and formerly vegetated regions (one type of "carbon sink") are removed for built environments. Compact development, therefore, may reduce the GHG emissions associated with land-use change as compared with urban sprawl – see Brittlebank 2014 https://bit.ly/3lyRwRg.
302 Ncube and Cloete *Compliance with Environmental Approvals in Housing Developments in Gauteng, South Africa* 11.
303 Culwick and Patel 2020 *Environment & Urbanization* 139-140.
304 Culwick and Patel 2020 *Environment & Urbanization* 134.
305 Culwick and Patel 2020 *Environment & Urbanization* 134.
306 Ncube and Cloete *Compliance with Environmental Approvals in Housing Developments in Gauteng, South Africa* 11.

these approvals to reduce the possible environmental consequences of such developments.[307] For example, determining a priority housing development area requires ascertaining whether the proposed area is not located inside an area that is protected by law for the preservation of biodiversity, natural habitat, or any other purpose.[308]

3.5 The dictates of South African national spatial planning law and environmental law

3.5.1 The Constitution

In South Africa planning functions in a legal framework to ensure that municipalities deliver on their development-oriented planning goals under sections 152 and 153 of the Constitution.[309] These two constitutional provisions impose a duty on all organs of state to provide a safe and healthy environment for all,[310] and they grant municipalities the power to administer their affairs,[311] including municipal planning. Municipal planning, as previously stated, falls under section 156 of the Constitution, read with schedule 4B, which grants municipalities legislative and administrative powers to govern their affairs.[312] A municipality has executive responsibility and the right to manage the local government subjects specified in Part B of Schedule 4 and Part B of Schedule 5; and any other matter allocated to it by national or provincial law, according to section 156(1) of the Constitution.[313] Section 156(2) of the Constitution states that a municipality may establish and enforce bylaws for the proper administration of its jurisdiction.[314]

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307 Ncube and Cloete *Compliance with Environmental Approvals in Housing Developments in Gauteng, South Africa* 11.

308 Section 13(2)(e)(iii) of the *Housing Development Agency Act* 23 of 2008.

309 Forbes "An Introduction to Municipal Planning in South Africa" 2.

310 Section 152(1)(c) of the Constitution; South African Local Government Association (SALGA) and DFFE *Defining the role of Local Government in Environmental Management and Establishing the Costs of Performing Environmental Management Functions* 3.

311 Section 153(a) of the Constitution.

312 See section 1.1 above.

313 Section 156(1) of the Constitution; Freedman 2014 *PER* 568; Lentsoane *Inconsistencies in National and Provincial Legislation and their Impact on Municipal Planning Processes and Service Delivery* 56.

314 Section 156(2) of the Constitution; Freedman 2014 *PER* 568.

As mentioned in section 1.1 above, climate change threatens the environment and urban dwellers, arguably necessitating action to mitigate it.[315] As per section 156(2) of the Constitution, municipalities may effect their mandate to provide a safe and healthy environment through their legislative powers as bestowed by the Constitution.[316] Furthermore, municipalities are empowered to use municipal planning measures to mitigate climate change, particularly those relevant to spatial planning.[317] These measures include the efficient use of land, the management of buildings, and influencing mobility through land use regulations and infrastructure planning.[318] Municipalities, therefore, have the authority to use their spatial planning instruments to mitigate adverse climate effects as a way of fulfilling their objects per section 156(2) of the Constitution.[319] The spatial planning instruments that the municipalities may use include Integrated Development Plans (IDPs), Spatial Development Frameworks (SDFs), and Land-Use Schemes (LUSs), amongst others.[320] In addition, municipalities have the power to pass bylaws, which may be used to regulate the built environment in favour of reduced energy consumption, for example.[321] The municipalities further enjoy the power to legislate environmental matters such as air quality control and waste management through their bylaws, giving effect to section 24 of the Constitution.[322]

In *Le Sueur v Ethekwini Municipality*[323](*RA Le Sueur* case), the KwaZulu-Natal High Court confirmed that municipalities have powers to legislate environmental matters in the light of section 24 of the Constitution.[324] The court confirmed that

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315 See section 1.1 above. As stated under paragraph 3.5.4 below, action against environmental degradation should be avoided, and if not avoidable, then minimised. This may arguably include action against climatic phenomena which have severe effects on the environment. Therefore, minimising environmental degradation may include taking action to reduce GHG emissions – see the discussion under para 3.5.4 of the NEMA below.

316 Section 156(2) of the Constitution; Freedman 2014 *PER* 585; See section 1.1 above.

317 See 156, read with schedule 4B of the Constitution; Freedman 2014 *PER* 585; Wilson and Piper *Spatial Planning and Climate Change* 9.

318 Wilson and Piper *Spatial Planning and Climate Change* 9.

319 See section 1.1 above.

320 The purpose of the SDFs, IDPs, and LUSs is elaborated under 3.5.2 below.

321 See para 3.5.3 below.

322 Freedman 2014 *PER* 585.

323 *RA Le Sueur v eThekwini Municipality* 2013 JDR 0178 para 4 (*RA Le Sueur case*).

324 *RA Le Sueur* case para 19.

municipalities have historically exercised their executive and legislative responsibilities involving environmental affairs in their areas under the umbrella of municipal planning.[325] Section 24 of the Constitution, which forms part of the Bill of Rights, provides everyone with the right to an environment that is not detrimental to their health and well-being.[326] Section 24 mandates all levels of government, including local governments, to protect the environment for the benefit of current and future generations by enacting reasonable legislative and other measures that ensure ecologically sustainable development and the use of natural resources while promoting justifiable economic and social development.[327] Section 24 refers to "appropriate legislative and other actions," which might be legal, extra-legal or both, and can include municipal planning legislation and policy instruments. As will be shown in chapter four, municipal planning legislation and policy are crucial for the management of land and could be used to reduce GHG emissions.[328]

Section 7(2) of the Constitution obliges the state to respect, preserve, promote, and implement the Bill of Rights.[329] Chapter 7 of the Constitution puts a duty on the government to protect the environment and directly applies to municipal planning.[330] Based on the above, municipalities are considered to have policy and regulatory powers to determine land use in their areas while considering the need to protect the environment.[331] Municipalities have a primary authority over land use and development, buildings, city parks, streets and roads, recycling, and waste disposal, all of which are critical climate change mitigative measures and form part of spatial planning.[332] Furthermore, these areas of management could arguably be regulated

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325 *RA Le Sueur case* para 21; Minister of Local Government, *Environmental Affairs and Development Planning, Western Cape v The Habitat Council* 2014 4 SA 437 para 5; De Visser and Poshwa 2019 *PER* 6; Du Plessis and Van der Berg 2014 *Stellenbosch Law Review* 587.

326 Section 24 of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 12.

327 Section 24 of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 12.

328 See chapter 4 below.

329 Section 7(2) of the Constitution; Van Wyk *Planning Law* 74.

330 Chapter 7 of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 12-13.

331 *RA Le Sueur* case para 33; Humby 2014 *PER* 1669.

332 See section 1.1 above.

and strategised by municipal planning laws, policies, plans, frameworks, and programmes to mitigate climate change.[333]

3.5.2 The Local Government: Municipal Systems Act

The MSA gives municipalities the authority to develop and adopt policies, plans and strategies, and imposes on them the duty to promote a safe and healthy environment.[334] The plans include IDPs, SDFs, and LUSs.[335] Sections 25 and 26 of the MSA not only mandate the adoption of IDPs by municipalities but also state that every IDP should provide a framework for spatial planning that must "contain a strategic environmental impact assessment."[336] Section 23(1)(c) of the MSA deals with integrated development planning at a municipal level.[337] It acknowledges that municipalities, along with other state organs, have a responsibility to contribute to the progressive realisation of the fundamental right enshrined in section 24 of the Constitution and that this was clearly a legislative mandate from the national legislature on environmental matters.[338]

The IDP is a municipality's most important, most inclusive, and most strategic planning tool.[339] This is because the IDP directs and informs all planning and development and all municipal planning, management, and development choices.[340] The IDP is one of the most important planning instruments that municipalities can use when planning and budgeting for climate change.[341] Therefore, climate change mitigation could be enhanced in municipal IDPs, especially in high-emitting sectors

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333 Section 152 of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 9; *UN-Habitat Planning for Climate Change: Strategic, Value-based Approach for Urban Planners* 24-25.

334 The mandate to promote a safe and a healthy environment stems from section 24 of the Constitution, and all spheres and organs of state, including municipalities, must contribute towards the realisation of the latter right - see section 24 of the Constitution; section 11(3) of MSA.

335 Forbes "An Introduction to Municipal Planning in South Africa" 5; Aurelie and Von Kalm 2015 *Sustainable Energy and Climate Change in Municipal IDPs* 2. See full names of IDPs, SDFs, and LUSs under paragraph 3.5.1 above.

336 Sections 25 and 26 of MSA; Freedman 2014 *PER* 585-586.

337 Section 23(1)(c) of the MSA.

338 Section 23(1)(c) of MSA; Freedman 2014 *PER* 585.

339 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 158.

340 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 158.

341 Lethoko 2016 *Jàmbá: Journal of Disaster Risk Studies* 3.

like transport and the built environment.[342] In its IDP, for example, the City of Johannesburg has committed to monitoring, reporting, raising public awareness, and taking action to reduce GHG emissions and improve air quality.[343] The City of Johannesburg also promises to maintain biodiversity and protected areas,[344] which is arguably important action for climate change mitigation. In addition, the City of Johannesburg states in its SDF that it aims to reduce inefficient residential density and increase land-use diversification.[345] In cognisance of the above background, SDFs and IDPs, which municipalities have the authority to develop and adopt, remain planning instruments that could be used for climate change mitigation.

3.5.3 The Spatial Planning and Land Use Management Act

SPLUMA is the key planning statute in South Africa. It provides a framework for spatial and land use management and specifies the relationship between planning and land use.[346] SPLUMA promotes strategic urban and spatial planning and provides municipalities with comprehensive planning powers regarding land control and regulation in their specific areas.[347] Furthermore, SPLUMA points out several planning principles linked to climate change, such as spatial justice, spatial sustainability, and spatial resilience.[348] These principles call for LUSs, measures, procedures, policies and plans that take into consideration the minimisation of any environmental impact which may result from climate change, amongst other things.[349] Driven by these principles, SPLUMA requires local authorities to prepare SDFs, which provide direction for strategic, planned, and resilient land development.[350]

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342 Lethoko 2016 *Jàmbá: Journal of Disaster Risk Studies* 3.
343 City of Johannesburg *IDP 2021-2026* 32.
344 City of Johannesburg *IDP 2021-2026* 32.
345 City of Johannesburg *IDP 2021-2026* 76.
346 Preamble of SPLUMA.
347 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 11.
348 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 11; City of Cape Town 2017 *City of Cape Town Climate Change Policy* 8.
349 Padarath *SPLUMA as a Tool for Spatial Transformation* 28-29.
350 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 8.

SPLUMA mandates municipalities to adopt single land-use plans, which must be cautious of any environmental management instrument and comply with environmental legislation.[351] Section 25 of SPLUMA provides that LUSs must give effect to and be consistent with municipal SDFs to determine the use and development of land to promote a minimal impact on the environment.[352] Also, section 32 of SPLUMA provides that municipalities may pass bylaws to enforce their schemes which will be applicable as the law that binds all landowners and land users.[353]

Through these SPLUMA-informed municipal bylaws, policies and LUSs, it is apparent that municipalities in principle have the power to plan and regulate around the sources of GHG emissions in their areas.[354] Bylaws and policies could, for instance, regulate and encourage the greening of the city, for example the retrofitting of green walls and roofs, which reduce energy consumption in buildings.[355] Additionally, LUSs and SDFs are essential land-use tools at the disposal of municipalities.[356] With both LUSs and zoning regulations, municipalities must consider the impact of climate change on local communities.[357] Municipalities can use these LUSs and SDFs to protect green infrastructure, reserve land for efficient land-use practices and resource use, and reduce CO_2 emissions, thereby mitigating climate change.[358]

In its IDP, the City of eThekwini Metropolitan Municipality outlines its LUSs.[359] The City of eThekwini Metropolitan Municipality places considerable emphasis on spatial

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351 Section 10(3) of SPLUMA.
352 Section 25 of SPLUMA.
353 Section 32 of SPLUMA.
354 Section 32 of SPLUMA; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 246.
355 Van der Walt *Retrofitting South Africa's Cities with Green Roofs: Cost benefit analyses for large scale Green Roof Implementation* 19.
356 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 160.
357 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 191.
358 Wilson and Piper *Spatial Planning and Climate Change* 9; Condon, Canvens and Miller *Urban Planning Tools for Climate Mitigation* 8; Wang, Huang and Huang 2018 *Landscape and Urban Planning* 23; Schedules 4B and 5B of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 9; Van der Walt *Retrofitting South Africa's Cities with Green Roofs: Cost Benefit Analyses for Large Scale Green Roof Implementation* 19.
359 City of eThekwini Metropolitan Municipality *IDP 2022-2022* 74.

justice and confronts historical imbalances, environmental concerns, infrastructure capacity, and the impact of climate change on development.[360] It further stresses that these issues should be addressed in the LUSs.[361] The components of the LUS included in the discussion that are vital for climate mitigation are reserving land for efficient land-use practices and the protection of the ecosystem.[362] As indicated below under paragraph 4.2.3.1, efficient land-use practices and ecosystems are important mitigative measures concerning carbon sinks.[363] Similarly, the SDF of the City of eThekwini Metropolitan Municipality is concerned with climate change mitigation measures.[364] The strategic priorities of the SDF include the density and intensity of land-uses along with the Integrated Rapid Public Transportation Network (IRPTN).[365] This will be done inside existing nodes and corridors to avoid sprawl and the need to drive long distances to receive services.[366]

Additionally, the IUDF is a government policy that seeks to direct future growth and management of urban areas.[367] The IUDF says that mitigation interventions in the planning and management of urban areas are crucial for building prosperous and liveable cities.[368] The IUDF provides that effective urban planning is essential for the success of cities.[369] Urban planning is deemed central to controlling and using land and the urban form as necessary for the resilience of cities to climate change.[370]

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360 City of eThekwini Metropolitan Municipality *IDP 2022-2022* 74.
361 City of eThekwini Metropolitan Municipality *IDP 2022-2022* 75.
362 City of eThekwini Metropolitan Municipality *IDP 2022-2022* 75.
363 See para 4.2.3.1 below. The United Nations suggests that ecosystems may function as carbon sinks, absorbing GHG emissions – see United Nations *Climate Change and Water: UN-Water Policy Brief* 13.
364 City of eThekwini Metropolitan Municipality *SDF 2021-2022* 404.
365 City of eThekwini Metropolitan Municipality *SDF 2021-2022* 404.
366 City of eThekwini Metropolitan Municipality *SDF 2021-2022* 404.
367 COGTA 2015 *Integrated Urban Development Framework: A New Deal for South African Cities and Towns* 7-8.
368 COGTA 2016 *Integrated Urban Development Framework: A New Deal for South African Cities and Towns* 10.
369 COGTA 2015 *Integrated Urban Development Framework: A New Deal for South African Cities and Towns* 43.
370 COGTA 2015 *Integrated Urban Dvelopment Framework: A New Deal for South African Cities and Town* 43.

3.5.4 The National Environmental Management Act

NEMA is not explicit on planning and how municipalities and organs of state should respond to climate change. However, NEMA contains several national environmental principles that can be compatible with what is necessary for climate change mitigation at the local level.[371] Principle 4 of NEMA, in particular, provides that environmental degradation should be avoided and minimised when avoidance is not possible.[372] Principle 4 further states that ecosystem disruption and biological diversity loss should be avoided or, if not entirely prevented, limited and remedied.[373] NEMA provides that negative impacts on the environment and people should be prevented when they are anticipated and reduced when inevitable.[374]

Mponwana and Mphethi connect one of the SPLUMA development principles (spatial sustainability) with NEMA.[375] They stipulate that, in order to protect valuable agricultural land, environmental management mechanisms like NEMA must be used.[376] Mponwana and Mphethi further argue that land development should be spatially limited to prevent unsustainable settlement and infrastructure patterns.[377] As mentioned above, municipalities have the power to legislate environmental matters - and have a duty to respect, protect, promote and fulfil the environmental right in section 24 of the Constitution.[378] This means that municipalities, per the Constitution and NEMA, are in a position to legislate to protect the environment,

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371 Section 2 of NEMA; Du Plessis 2015 *PER* 1859; Van der Bank and Karsten 2020 *Air, Soil and Water Research* 8-9.

372 Section 2(4)(a)(ii) of NEMA.

373 Section 2 (4)(a) (i) of NEMA.

374 Section 2(4)(a)(viii) of NEMA.

375 Spatial sustainability refers to the promotion of land use management that is based on principles of socioeconomic and environmentally sustainable development – see Mponwana and Mphethi *A Guide to Spatial Planning and Land Use Management Act (SPLUMA)* 5.

376 Mponwana and Mphethi *A Guide to Spatial Planning and Land Use Management Act (SPLUMA)* 5.

377 Mponwana and Mphethi *A Guide to Spatial Planning and Land Use Management Act (SPLUMA)* 5.

378 Preamble of NEMA; Section 24 of the Constitution; South African Local Government Association (SALGA) and DFFE *Defining the role of Local Government in Environmental Management and Establishing the Costs of Performing Environmental Management Functions* 14.

promote conservation and secure ecologically sustainable development through municipal planning.[379]

3.5.5 The National Environmental Management: Air Quality Act and Regulations

NEMAQA does not explicitly address the use of spatial planning by municipalities for climate change mitigation. NEMAQA nevertheless provides that municipalities have a role to play in addressing GHG emissions that cause climate change by adopting Air Quality Management Plans (AQMPs) as part of their five-year IDPs.[380] These AQMPs have to meet the national ambient air quality standards pertaining to the reduced use of fossil fuels in municipal areas.[381] In addition, sections 16 and 17 of NEMAQA require municipalities to give effect to their AQMPs; report on, amongst other things, reduced emissions from industries; and address the residential use of fossil fuels, which causes climate change.[382] NEMAQA gives metropolitan and district municipalities the authority to issue atmospheric licences for activities that have a high emission rate.[383] The municipalities may therefore reduce emissions with the use of AQMPs and the issuing of atmospheric licenses.[384] These mechanisms, as Legora[385] puts it, are used to regulate GHG emissions into the atmosphere.

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379 Preamble of NEMA; South African Local Government Association (SALGA) and DFFE *Defining the role of Local Government in Environmental Management and Establishing the Costs of Performing Environmental Management Functions* 10-14. There are several ways in which climate change measures could be linked to national and global sustainable development objectives. These ways include, amongst others; encouraging the development of energy and industrial technologies that would lead to long-term environmental improvements and restoring the productivity of degraded, salinised or arid lands through reforestation and other ecosystem enhancements and biodiversity conservation – see Kosloff *Climate Change Mitigation and Sustainable Development* 95. Therefore, as stated, it is arguable that protecting the environment, promoting conservation and sustainable development practices may lead to climate change benefits.

380 Section 15(2) of NEMAQA. See also Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 184; Kidd and Couzens "Climate Change Responses in South Africa" 622; Van der Bank and Karsten 2020 *Air, Soil and Water Research* 7.

381 Section 16(1)(a)(iv) and (v) of NEMAQA; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 184.

382 Sections 15 and 17 of NAMAQA.

383 Section 36 of NEMAQA. See also footnote 227 in Legora *A Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 42.

384 Section 15(2) and 36 of NEMAQA; Legora A *Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 42.

385 Legora A *Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 42.

Therefore, the AQMPs and atmospheric licences are arguably important tools at the disposal of municipalities to mitigate climate change.

The Minister is required under section 21(1) of NEMAQA to "publish a list of activities that may result in atmospheric emissions" and those that have the potential to harm the environment.[386] The Act stipulates that anybody wishing to engage in the specified activity must first acquire an atmospheric emission licence from the appropriate authorities.[387] The Minister has issued the National Greenhouse Gas Emission Reporting Regulations 2017 (Emission Regulations).[388] The Emission Regulations define the types of emission sources and data providers who must disclose their GHG emissions.[389] Annexure 1 of the Emission Regulations contains a list of emission sources that need GHG reporting, and covers, among other things, activities in the energy, waste, and industrial sectors.[390] As stated in chapter two, municipalities are encouraged to use GHG emissions inventories to measure and report urban GHG emissions – this uses the information gathered to create evidence-based climate change plans and policies for low-emission sustainable growth.[391] The action of reporting on reduced emissions may arguably contribute to municipalities' realising the commitments made, as illustrated in chapter two.[392]

3.5.6 National Building Regulations Act

The NBRBS Act provides for and promotes consistency in the law governing the construction of buildings.[393] It also seeks to establish building standards, as well as matters related therewith.[394] The NBRBS Act provides that no person shall erect any building for which plans and specifications must be produced and submitted under

386 Section 21(1) of NEMAQA.
387 Section 22(1) of NEMAQA; Legora A *Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 42.
388 See GN 275 in GG 40762 03 April 2017 (Emission Regulations).
389 Reg 4(4)(1) and (2) of Emission Regulations.
390 Annexure 1 of Emission Regulations.
391 See section 2.4 above.
392 See section 2.5 above.
393 Long title of the NBRBS Act.
394 Long title of the NBRBS Act.

this Act without first receiving written consent from the local authority in question.[395] According to the NBRBS Act, anybody who erects a building in violation of the requirements is guilty of an offence and susceptible to penalties.[396]

Building construction and operation are a major source of emissions, accounting for 36% of global energy consumption and 39% of CO_2 emissions in 2017.[397] These emissions may be reduced by improving building efficiency, which city leaders can do through a variety of measures.[398] These measures may include building efficiency codes and standards and efficiency improvement targets.[399] According to Boshoff and Mey, the NBRBS Act was amended in September 2011 to include a section on energy efficiency, dubbed "Part XA - Energy Usage in Buildings".[400] This section mandates that all new buildings or substantial renovations be planned and built so that their passive design (orientation, shading, services, and the building envelope) assures energy efficiency.[401]

3.5.7 National Climate Change Policy

The NCCRP embodies climate change mitigation as one of its central objectives[402] and requires a response from and the participation of local government in mitigating climate change.[403] Furthermore, local government is bound to introduce cost-effective and beneficial plans, policies and measures to ensure that the country

395 Section 4 (1) of the NBRBS Act.
396 Section 4 (4) of the NBRBS Act.
397 Boshoff and Mey 2020 *Acta Structilia* 156.
398 Boshoff and Mey 2020 *Acta Structilia* 158.
399 Boshoff and Mey 2020 *Acta Structilia* 158.
400 Boshoff and Mey 2020 *Acta Structilia* 159.
401 Boshoff and Mey 2020 *Acta Structilia* 159.
402 The NCCRP puts an obligation on the government to make a fair contribution to the global effort to stabilise GHG concentrations in the atmosphere at a level that avoids dangerous anthropogenic interference with the climate system in a timeframe that enables economic, social and environmental development to proceed in a sustainable manner - see DFFE *National Climate Change Response White Paper* 11; Legora *A Legal Analysis of South Africa's International Climate Change Mitigation Obligations in the Renewable Energy Sector* 45; Van der Bank and Karsten 2020 *Air, Soil and Water Research* 7.
403 DFFE *National Climate Change Response White Paper* 40; Van der Bank and Karsten 2020 *Air, Soil and Water Research* 6; Khatibi *et al* 2021 *Discover Sustainability* 1-2.

reaches emission Peak, Plateau and Decline (PPD) by 2035.[404] The NCCRP provides several principles in response to climate change that also extends to local government's involvement in mitigation.[405] One such principle is the informed participation principle, which encourages public awareness and participation of communities at all levels of government, including the municipal level, about the causes, effects and responses to climate change.[406] Public awareness and participation is crucial as human beings are central to increased GHG emissions and must be included in a response to climate change mitigation.[407] This is because public awareness and participation about responses to climate change may arguably stimulate behavioural change in favour of climate change mitigation.[408] As stated above, people may be influenced to use renewable energies and embark on NMT, and these are measures crucial for climate change mitigation.[409]

3.5.8 Climate Change Bill

Although it is not legally binding, the CC Bill provides insight into South Africa's stance concerning climate change mitigation. Clause 2 of the CC Bill seeks to bind all spheres of government, particularly the local sphere, to provide for a coordinated and integrated response to climate change and its impacts, making a fair contribution to stabilising GHG emissions.[410] Additionally, the CC Bill provides that monitoring and assessment programmes at the local level would make a significant contribution to the country's response to climate change.[411] The CC Bill provides that municipalities must have Municipal Climate Change Response Implementation Plans (MCCRIPs), which must be integrated and inform their municipal development

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404 DFFE *National Climate Change Response White Paper* 14; DFFE *South Africa's Third Nationally Determined Communications under the United Nations Framework Convention of Climate Change* 130.

405 DFFE *National Climate Change Response White Paper* 12.

406 DFFE *National Climate Change Response White Paper* 12.

407 DFFE *National Climate Change Response White Paper* 8-10; See section 3.3 above.

408 DFFE *National Climate Change Response White Paper* 41.

409 DFFE *National Climate Change Response White Paper* 41; see section 3.3 above.

410 Clause 2 of the CC Bill.

411 Clause 2 of the CC Bill; New Climate Institute *Global Climate Action from Cities, Regions and Businesses* 75.

planning processes and instruments.[412] Similarly, the CC Bill obliges municipalities to ensure that their climate change implementation plans include measures that relate to climate mitigation, amongst other matters.[413]

3.6 Concluding remarks

This chapter deliberated municipal planning as a governance tool for climate change mitigation. The chapter began by dealing with the historical development of municipal planning to better understand the term's origin and its relevance to the challenges faced by cities today. The history shows that municipal planning was intended to address challenges that cities were facing, as provided in section 3.2 above. It illustrated that municipal planning had been historically used to respond to the pressing issues they were facing, such as city expansion that led to environmental degradation. The importance of municipal planning responding to the current global issues such as climate change was also discussed. Section 3.2 showed that municipal planning, from history times to date, is useful to controlling urbanisation and the high consumption of energy, thereby mitigating climate change. As history illustrates, municipal planning is crucial for responses to climate change, including climate mitigation.

The importance of municipal planning to climate change mitigation was further illustrated in section 3.3 above. It was found that with urban planning cities are able to influence the sectors that are significantly emitting GHG emissions. Cities are empowered to control the use and development of land in their jurisdictions. Further, the chapter illustrated that cities are able to achieve lower carbon paths and more efficient use of energy in the built environment. This can be done by making the built environment dense and promoting the use of renewable energy. Spatial measures which include NMT have also been discussed as crucial to the reduction of emissions in the transport sector. Behavioural change, driven through legislative and policy instruments, has been shown to be important to mitigating

412 Clause 9 of the CC Bill.
413 Clause 9 of the CC Bill.

climate change, since human beings are at the centre of the increase in GHG emissions, as stated in section 3.3 above.

The last part of the chapter discussed South African planning law and climate change mitigation. It perused the Constitution, which gives municipalities the authority to manage their administrative and legislative affairs. The chapter showed that municipal planning as a function belongs to the municipalities, which is confirmed by case law. National law and policy such as SPLUMA, MSA, NCCRP, and the IUDF all talk to the local government's having the authority and means to use planning to mitigate climate change. From the legislation and policy discussed above, it transpired that local government is empowered to use its legislative and policy powers to mitigate change in their respective jurisdictions. Section 3.5 of the chapter linked national planning law and policy as well as environmental law with climate change mitigation at the local level. The national legislation and policy discussed above under section 3.5 indicate that local authorities have the power to pass bylaws, policies and other instruments in responding to the need to mitigate climate change, and as a result, various South African cities have embarked on this process. The next chapter discusses local-level planning law and policy in the City of Cape Town and the City of Tshwane.

CHAPTER 4 LOCAL-LEVEL PLANNING LAW IN THE CITY OF CAPE TOWN AND THE TSHWANE METROPOLITAN MUNICIPALITY

4.1 Introduction

Local government forms part of the three distinct yet interdependent and interrelated spheres of government in South Africa.[414] Local government includes metropolitan municipalities (i.e. cities, such as City of Cape Town), district municipalities and local municipalities.[415] A municipality generally consists of an elected council, the administrative individuals appointed and elected by the council, and local communities.[416] Municipalities are bestowed with administrative and legislative powers in administering their affairs.[417] As established in chapter three, municipalities are empowered by national law and policy to pass and adopt spatial legal and policy instruments which may be used to mitigate climate change.[418]

This chapter evaluates local planning in relation to climate mitigation by way of a study of the City of Cape Town and the City of Tshwane. The regulatory and policy instruments (i.e. spatial laws and policy) of these metropolitan municipalities are reviewed in order to make it possible to comment on the cities' progress in recent years. The chapter also provides an overview of some climate change and urbanisation trends, including emissions profiles in both cities, to create some context.

414 Chapter 7 of the Constitution; Corruption Watch 2021 https://bit.ly/3cTJHla.
415 Section 155 of the Constitution; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 36; South African Government 2021 https://bit.ly/3fLToUE.
416 Section 151 of the Constitution; Section 2 (a)-(d) of the MSA; Corruption Watch 2021 https://bit.ly/3cTJHla.
417 Sections 151 and 156 of the Constitution; Corruption Watch 2021 https://bit.ly/3cTJHla.
418 See section 3.5 above.

4.2 City of Cape Town

4.2.1 Climate change and urbanisation trends

City of Cape Town[419] is the provincial capital of the Western Cape Province and the seat of the parliament of South Africa.[420] The City is home to about 4.4 million people, making it the second-biggest metropolitan municipality by population size in the country.[421] City of Cape Town has seen substantial urbanisation in the last two decades.[422] Additionally, the City's population in 2017 was expected to be over 4.04 million people, with a projected increase to around 4.5 million in the early 2030s.[423] As City of Cape Town's population grows, so does the number of people who possess cars, resulting in increased traffic congestion and dependency on private transportation.[424]

Additionally, the spatial development in City of Cape Town remains segregated by land uses in areas long distances from one another.[425] The long distances render non-motorised alternatives ineffective for most trips and produce one-way tidal flows of traffic during peak hours.[426] The time and resources spent on the typical daily commute is a luxury the City's people cannot afford.[427] This is because long distances are frustrating to many city residents. [428] Furthermore, commuting in the City produces harmful emissions that contribute to local air pollution and climate change.[429] City of Cape Town is highly vulnerable to climate change and is already experiencing its effects, such as the droughts and water shortages experienced in 2015 and early 2018.[430] Considering its coastal location, the City is actually one of

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419 In this section, references to the City of Cape Town as a geographical space and as a municipality include "the City " and "Cape Town".
420 COGTA *Profile: City of Cape Town* 8.
421 COGTA *Profile: City of Cape Town* 6.
422 City of Cape Town *Comprehensive Integrated Transport Plan of 2018-2023* 23.
423 City of Cape Town *Comprehensive Integrated Transport Plan of 2018-2023* 23.
424 City of Cape Town *Travel Demand Management Strategy* 3.
425 City of Cape Town *Travel Demand Management Strategy* 3.
426 City of Cape Town *Travel Demand Management Strategy* 3.
427 City of Cape Town *Travel Demand Management Strategy* 1.
428 City of Cape Town *Travel Demand Management Strategy* 1.
429 City of Cape Town *Travel Demand Management Strategy* 1.
430 Enqvist and Ziervogel 2019 *Wiley Interdisciplinary Reviews: Water* 1-2; City of Cape Town 2018 *Building Resilience to Urban Challenges: Mayor's Portfolio of Urban Sustainability* 99.

the most fragile places in South Africa, with diverse biodiversity and indigenous vegetation that grows nowhere else in the world.[431]

4.2.2 Emission levels

Like most other cities in South Africa, City of Cape Town is a disproportionately large emitter of GHG emissions that contribute to global climate change in relation to its size.[432] As explained earlier,[433] City of Cape Town's past inherited spatial imbalances also contribute to high energy consumption in the transport sector due to the long distances that people need to travel and their dependence on private transportation.[434] As stated earlier, City of Cape Town had 29% of carbon emissions from transport and 18% from residences in 2017.[435] However, the built environment in City of Cape Town accounted for 55% of GHG emissions.[436] Cooking, lighting, and space heating activities account for most of the residential energy consumption in the City.[437] The lighting, heating, and ventilation in office buildings account for the majority of the business power use.[438] Road and rail transportation also accounted for a significant percentage of GHG emissions in 2018.[439] In 2019, City of Cape Town emitted 128305 tonnes of CO_2 equivalent.[440] However, as will be shown below, the municipality has adopted several instruments in an attempt to combat climate change.

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431 City of Cape Town *Low-Carbon Central City Strategy* 17.
432 Western Cape Governance: Environmental Affairs and Planning *Energy Consumption and CO2e Emissions Database for Western Cape* 22; City of Cape Town 2021 *Climate Change Strategy* 12.
433 Para 4.2.1 above.
434 City of Cape Town *Low-Carbon Central City Strategy* 19.
435 City of Cape Town *Draft Climate Change Strategy for Public Comment* 9.
436 Ren21 2021 https://bit.ly/3rFNSc9.
437 Ren21 2021 https://bit.ly/3rFNSc9.
438 Ren21 2021 https://bit.ly/3rFNSc9.
439 City of Cape Town 2021 *Climate Change Strategy* 13.
440 City of Cape Town 2021 https://bit.ly/3iyjR8T.

4.2.3 Relevant laws and policies

4.2.3.1 Municipal Planning Bylaw

City of Cape Town adopted and enacted the City of Cape Town *Municipal Planning Bylaw* of 2015 (*Municipal Planning Bylaw*) to regulate land use and development.[441] The *Municipal Planning Bylaw* governs all land in the City's geographical area, including state-owned land and private-owned land.[442] It is argued that there is a number of provisions in the *Municipal Planning Bylaw* which City of Cape Town could use to mitigate climate change.

Part 1 of Chapter 4 of the *Municipal Planning Bylaw* focusses on the City's zoning schemes. The development management scheme is designed to make land use more efficient, cost-effective and sustainable.[443] Efficient land use can help mitigate climate change by preserving or expanding forest carbon stores, for example.[444] As mentioned above,[445] it is argued that land use, in conjunction with spatial planning, may contribute to climate change by creating an urban form that allows for sustainable transportation.[446]

The goal of the scheme is to protect places where development might significantly negatively impact the environment.[447] In terms of section 35(2) of the *Municipal Planning Bylaw*, people cannot use or develop land without first obtaining a development permit under the zoning scheme or permission under the bylaw.[448] This means that the City cannot give a permit if the development will have a negative impact on the environment, by threatening biodiversity, for instance. The denial of a permit might be argued to be related to biodiversity conservation as a key

441 Section 2(1) of City of Cape Town *Municipal Planning Bylaw* of 2015.
442 Section 2(2) of City of Cape Town *Municipal Planning Bylaw* of 2015.
443 Section 26(1)(c) of City of Cape Town *Municipal Planning Bylaw* of 2015.
444 Section 26 of City of Cape Town *Municipal Planning Bylaw* of 2015; Harper *et al* 2018 *Nature* 2.
445 See para 3.4.2 above.
446 Para 3.4.2 above.
447 Section 26(1)(d) of City of Cape Town *Municipal Planning Bylaw* of 2015.
448 Section 35(2) of City of Cape Town *Municipal Planning Bylaw* of 2015.

component of carbon sequestration.[449] City of Cape Town may use its *Municipal Planning Bylaw* to zone an area that is protected by law for the preservation of biodiversity and natural habitat, for example.[450]

Chapter 3 of the *Municipal Planning Bylaw* focusses on spatial planning and implements City of Cape Town's several SDFs.[451] The goal of the SDFs is to provide principles of land use management for development and to contribute to spatial coordination.[452] According to the *Municipal Planning Bylaw*, City of Cape Town must implement a public participation process to develop a municipal spatial development framework (MSDF) that complies with the MSA and any other relevant law.[453]

4.2.3.1.1 City of Cape Town's Municipal Spatial Development Framework

City of Cape Town adopted the MSDF for 2017-2022 that was approved by the council in 2018 (Cape Town MSDF). The Cape Town MSDF contains three spatial strategies included in the City of Cape Town Five-Year IDP 2017-2022.[454] One of the strategies is the following:

> Managing urban growth and creating a balance between urban development and environmental protection[455]

In terms of this strategy, City of Cape Town actively supports an urban form with increased densities and mixed land-use patterns inside an urban inner core, supported by a comprehensive and efficient BRT and rail network.[456] City of Cape Town hopes to accomplish developmental goals such as more sustainable land and

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449 Development management scheme may be used to protect areas that could be adversely acted by the development – see section 26(1)(d) of City of Cape Town *Municipal Planning Bylaw* of 2015. Daba and Dejene conclude that increased biodiversity may lead to more ecological services being provided. Furthermore, they provide that biodiversity and its ecosystem services play an important role in carbon sequestration and GHG reduction, thereby mitigating climate change - see Daba and Dejene 2018 *Int J Environ Sci Nat Res* 59.

450 Section 26 of City of Cape Town *Municipal Planning Bylaw* of 2015; Section 13(2)(e)(iii) of the *Housing Development Agency Act* 23 of 2008.

451 Chapter 3 of City of Cape Town *Municipal Planning Bylaw* of 2015.

452 See para 3.4.4 above; Section 3(3) (a) of City of Cape Town *Municipal Planning Bylaw* of 2015.

453 Section 4 (1) of City of Cape Town *Municipal Planning Bylaw* of 2015.

454 City of Cape Town 2018 *Cape Town MSDF* 47.

455 City of Cape Town 2018 *Cape Town MSDF* 47.

456 City of Cape Town 2018 *Cape Town MSDF* 47.

natural resource use, reduced carbon emissions, more use of efficient infrastructure, effective and efficient public transportation systems, and social amenities, through realising the envisaged urban form.[457]

The imperatives of the above spatial strategy include using more efficient non-renewable resources, such as land, water, and biodiversity.[458] The natural environment is included to support spatial justice by improving access for all citizens to a high-quality open space network that provides community, recreational, NMT, and economic opportunities.[459] City of Cape Town also seeks to achieve spatial transformation.[460] This objective is a prerequisite for realising all other spatial development goals, such as social mobility, improving spatial equity and accessibility, reducing carbon emissions and improving environmental protection and resource efficiency.[461]

4.2.3.2 City of Cape Town's Integrated Development Plan

City of Cape Town has a five-year IDP for the period 2017 to 2022. The IDP is the City's principal strategic framework.[462] It indicates that the City is working hard to enhance its resource efficiency and security and to address climate change-related issues.[463] This includes climate change mitigation measures such as improving air quality and diversifying the country's energy mix.[464] The climate-related issues are addressed through adaptation measures that also relate to mitigation, such as biodiversity conservation, waste reduction, and recycling.[465] The IDP shows City of Cape Town's mitigation strategies, such as transit-oriented development, which are intended to create a more pleasant and more efficient urban form while mitigating

457 City of Cape Town 2018 *Cape Town MSDF* 47.
458 City of Cape Town 2018 *Cape Town MSDF* 47.
459 City of Cape Town 2018 *Cape Town MSDF* 47.
460 City of Cape Town 2018 *Cape Town MSDF* 50.
461 City of Cape Town 2018 *Cape Town MSDF* 50.
462 City of Cape Town *IDP 2017-2022* 20.
463 City of Cape Town *IDP 2017-2022* 20.
464 City of Cape Town *IDP 2017-2022* 20.
465 City of Cape Town *IDP 2017-2022* 20.

the adverse consequences of climate change.[466] This is achieved through planning for commuters to take shorter trips and for more efficient transportation.[467]

City of Cape Town seeks to create a more inclusive, integrated, and prosperous city that addresses apartheid's-built environment legacy.[468] Furthermore, apartheid-era spatial planning in City of Cape Town has resulted in inefficient transportation, with many inhabitants residing far from their business and recreation areas.[469] The most important measures for achieving the spatial transformation that City of Cape Town desires are transit-oriented development (TOD) and the related densification.[470] TOD and densification may be accomplished by prioritising an efficient, integrated transportation system.[471] City of Cape Town aims to reform the transportation system so that it becomes more integrated across modes and leads development transformation through TOD.[472] It intends to keep expanding MyCiTi as an integrated system that incorporates BRT, scheduled buses, and minibus taxis.[473] City of Cape Town has committed resources and effort to spatial transformation through programmes that support integrated communities with a consolidated built form, and diversified land uses.[474] This has been accomplished by adopting inclusive land use and housing policies, the revision of the SDF, and the application of TOD in integrated transportation and urban development.[475]

The IDP indicates that City of Cape Town is attempting to shape its urban form through resource efficiency, maintaining and conserving green infrastructure, and restoring essential ecosystem functions.[476] The City has already made significant

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466 City of Cape Town *IDP 2017-2022* 28.
467 City of Cape Town *IDP 2017-2022* 28.
468 City of Cape Town *IDP 2017-2022* 30.
469 City of Cape Town *IDP 2017-2022* 41-41.
470 Densification aids TOD by strategically situating new development near public transportation and maintaining an appropriate balance of intensity and land use to increase the efficiency of the public transport network and service provision while also positively impacting City of Cape Town's urban form – see City of Cape Town *IDP 2017-2022* 30.
471 City of Cape Town *IDP 2017-2022* 41-42.
472 City of Cape Town *IDP 2017-2022* 42.
473 City of Cape Town *IDP 2017-2022* 42.
474 City of Cape Town *IDP 2017-2022* 42.
475 City of Cape Town *IDP 2017-2022* 42.
476 City of Cape Town *IDP 2017-2022* 37.

progress in a number of these sectors.[477] This comprises energy-saving measures for street and traffic lights, building energy retrofits, and behavioural change and training of City managers on energy conservation.[478] These measures, which are found in the boundaries of spatial planning, are crucial for climate change mitigation.[479] City of Cape Town has committed to providing resources and promoting spatial transformation through programmes that support integrated communities with a consolidated built form, and diversified land uses.[480] Furthermore, the City intends to achieve spatial transformation by adopting inclusive land use and housing policies, the revision of the SDF, and the application of TOD in integrated transportation and urban development.[481]

4.2.3.3 Climate Change Policy

City of Cape Town's Climate Change Policy of 2017 (Climate Change Policy) is an acknowledgement that climate change continues to present a serious danger to the City,[482] which recognises the need to respond to climate change. Its Climate Change Policy helps residents understand how the City's GHG emissions may be lessened to help slow global climate change, for example.[483] The main goal of the Climate Change Policy is to create and use City of Cape Town's major levers and processes to actively promote, influence, and facilitate change. Examples of these mechanisms include bylaw formulation and enforcement.[484] City of Cape Town will effect change by increasing awareness, protecting, maintaining, rehabilitating and restoring natural systems and resources, and designing and developing integrated human settlements.[485] The City is transforming the transportation sector and land use

477 City of Cape Town *IDP 2017-2022* 37.
478 City of Cape Town *IDP 2017-2022* 37.
479 See para 3.4.1 above.
480 City of Cape Town *IDP 2017-2022* 42.
481 City of Cape Town *IDP 2017-2022* 42.
482 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 6-7.
483 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 7.
484 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 18.
485 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 18.

patterns to reduce GHG emissions, *inter alia*, by implementing a Comprehensive Integrated Transport Plan (CITP) and a Transport Development Authority Bylaw.[486]

The Climate Change Policy recognises that the transport sector will be a major driver of future energy consumption increase.[487] The Climate Change Policy further recognises that reducing emissions from the transport sector is critical.[488] Emissions reduction could be done through TOD, increased vehicle occupancy, travel demand management, and improved public transportation, having the benefit of making it much more accessible, user-friendly, affordable, and safe.[489] The Climate Change Policy stresses that long travel distances in City of Cape Town are perpetuated by the City's physical structure (i.e. - its low density and the separation of uses and societies), resulting in a large carbon footprint.[490] Furthermore, it is stated that transportation-related carbon emissions must be minimised through the use of new technologies that promote the green economy.[491]

City of Cape Town has pledged to promote energy conservation and efficient practices, technologies, and infrastructure in the residential, economic, and public sectors.[492] City of Cape Town has further pledged to allow development in areas that promote a compact city.[493] It has vowed to encourage energy-efficient design and construction of all new buildings, renovations, and operations of existing buildings in the public and private sectors.[494]

4.2.3.4 Building Development Management

City of Cape Town does not have a bylaw regulating buildings in its area. However, it has a Building Development Management Branch (BDMB), which controls or

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486 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 18.
487 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 20-21.
488 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 20-21.
489 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 20-21.
490 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 20-21.
491 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 20-21.
492 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 21.
493 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 21.
494 City of Cape Town 2017 *City of Cape Town Climate Change Policy* 21.

regulates the construction and demolition of buildings.[495] This function stems from duties found in the NBRBS Act, key legislation that local authorities need to comply with in managing building development in their jurisdictions.[496] The BDMB is responsible for certifying standard building plans, extending the validity of approved building plans, granting demolition permits and enforcing building rules in general.[497] The BDMB cannot accept or process a building plan application unless all required permissions have been acquired.[498] These approvals may include deviations from the Development Management Scheme and environmental impact assessment (EIA) authorisations, amongst others.[499]

City of Cape Town has Green Building Guidelines which entail an environmentally conscious approach to the design and development of the built environment to conserve natural resources and ecosystems.[500] City of Cape Town argues that the value of the local ecosystems should be recognised since City of Cape Town has a wealthy score of biodiversity.[501] Providing natural green spaces on a site, even on roofs, could contribute to green corridors in the City's open space system and could help fauna and plants to adapt to climate change.[502]

City of Cape Town's Green Building Standards document calls for careful site planning to guarantee that planned structures have nominal negative environmental consequences while maximising efficiency.[503] The first step in site planning should be to assess how a site interacts with its surroundings and the larger environment.[504] Secondly, there has to be an investigation involving the development and guidelines already in place, including recommended building densities for the area.[505] It is argued in the Green Building Standard document that good site planning maximises

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495 City of Cape Town date unknown *City of Cape Town Building Management Booklet* 4-5.
496 City of Cape Town date unknown *City of Cape Town Building Management Booklet* 4-5.
497 City of Cape Town date unknown *City of Cape Town Building Management Booklet* 6.
498 City of Cape Town date unknown *City of Cape Town Building Management Booklet* 10.
499 City of Cape Town date unknown *City of Cape Town Building Management Booklet* 10.
500 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 4
501 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 4.
502 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 4.
503 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 8.
504 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 8.
505 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 8.

natural features and open regions while enhancing biodiversity and meeting building requirements.[506] It is further stipulated that, if at all feasible, the site should contribute to the creation of green corridors.[507]

4.2.4 Assessment

In the context of the laws and policies discussed under section 4.3.2 above, it is safe to conclude that City of Cape Town has the regulatory and policy instruments vital to assisting the City in mitigating climate change. The perusal of the *Municipal Planning Bylaw* has shown that City of Cape Town has the power to zone land in its area and control development, for instance.[508] Therefore, City of Cape Town can arguably promote the efficient use of land, which can be used to expand forests and other green areas - important for carbon sequestration, for example.[509] It has been established under section 3.3 above that mixed land use and sufficient bus transit contribute considerably to GHG emissions reduction by stimulating non-vehicle mobility.[510] In consideration of City of Cape Town's spatial inequality, that results in emissions as discussed under 4.2.2, City of Cape Town enjoys the power given by the *Municipal Planning Bylaw* and SDF to transform its urban inner core by increasing densities and mixed land-use patterns.

The IDP, MSDF, and Cape Town Climate Change policy provide climate change mitigation measures in spatial planning. The said measures speak to climate change mitigation mostly in the transport sector and the built environment. For instance, the City of Cape Town has to prioritise an efficient, integrated transportation system to achieve TOD and densification. City of Cape Town is able to prioritise integrated transportation and increase the use of MyCiti buses to reduce emissions from transportation. This is addressed under Cape Town's IDP, MSDF and Climate Change Policy.

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506 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 8.
507 City of Cape Town date unknown *City of Cape Town Green Building Guidelines Draft* 8.
508 See para 4.2.3.1 above.
509 See section 3.1 above.
510 See section 3.3 above.

In consideration of the above local laws and policies as stated under 2.3.2, City of Cape Town is empowered to realise the mitigative pledges and objectives in the national legislation and policy, as illustrated in sections 2.5 and 3.5 above.[511] For example, City of Cape Town has pledged to reach zero emissions by 2050 in all existing buildings.[512] As indicated in section 2.4 of this study, City of Cape Town has also pledged to reduce emissions from transportation.[513] The City is empowered by its laws and policies to regulate the sectors responsible for GHG emissions (as mentioned under section 2.3 above) and to promote measures critical for climate change mitigation, as discussed in its IDP, MSDF and Climate Change Policy. These measures include using land for renewable energy projects, transitioning to energy-efficient buildings, a lower carbon transportation system, and integrated land use for improved mobility.[514]

Despite all the regulations and policies empowering City of Cape Town to take action against climate change, the problem lies with implementation as is so often the case. The laws and policies arguably fall short with regard to implementation by the executive and others, affecting the City's chances of meeting its climate change mitigation pledges as mentioned under paragraph 2.4.1 above. City of Cape Town has MyCiti busses and mini taxis operating as public transportation. The concern raised is the safety of the passengers due to the attacks on them reported in the media.[515] The majority of the people may not use public transport due to their safety concerns, which may render public transport ineffective in the City.[516] Even using the NMT may arguably be rendered ineffective due to safety concerns in the streets of City of Cape Town, as in other cities in the world.[517]

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511 See the discussion of national and local law and policy under sections 3.5, 4.2.3 and 4.3.3.
512 See para 2.4.1 above.
513 See para 2.4.1 above.
514 See section 1.1 above.
515 Staltz 2021 https://mg.co.za/news/2021-02-11-concern-for-safety-of-cape-towns-bus-commuters-intensifies/.
516 Nkalane 2021 https://www.newframe.com/western-cape-taxi-violence-brings-lives-to-a-halt/.
517 Baufeldt *Investigation into the Effects of Non-Motorised Transport Facility Implementations and Upgrades in Urban South Africa* 3-4.

4.3 City of Tshwane

4.3.1 Climate change and urbanisation trends

The City of Tshwane[518] is the fourth largest metropolitan municipality in South Africa.[519] It is one of the three metros in the Gauteng province.[520] Furthermore, the City of Tshwane contains the administrative seat of South Africa, Pretoria.[521] In 2017, the population was above 3.5 million people, having increased by 2,92% annually since 2007.[522] The City of Tshwane witnessed urbanisation as a result of people migrating to the political capital in search of better living circumstances, education, and jobs.[523] Like most South African metropolitan municipalities, the City of Tshwane suffers from urban expansion and inequality, created primarily by apartheid.[524] In addition, it is battling to meet its housing demands and its new infrastructure and service delivery needs.[525] Many City inhabitants live in squatter settlements outside of the city centre, far from economic opportunities.[526]

The City of Tshwane has also experienced some effects of climate change, such as the floods that took place in 2019, destroying close to 700 shacks in Mamelodi.[527] The City also has a spatial challenge where people live in areas highly prone to the effects of climate change such as floods.[528] The City of Tshwane contributes to climate change by emitting GHGs from sectors such as transportation and the built environment.[529] Impoverished households in the City of Tshwane rely on coal for

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518 In this section, references to the City of Tshwane as a geographical space and as a municipality include "the City " and "City of Tshwane".

519 GOGTA 2020 *Profile: City of Tshwane* 5.

520 COGTA 2020 *Profile: City of Tshwane* 5.

521 Magidi and Ahmed 2019 *The Egyptian Journal of Remote Sensing and Space Science* 336.

522 COGTA 2020 *Profile: City of Tshwane* 5.

523 Magidi and Ahmed 2019 *The Egyptian Journal of Remote Sensing and Space Science* 336.

524 Sustainable Energy Africa 2018 *Exploring the Challenges and Niche Innovations of Energy Service Delivery in Urban South Africa - An Overview of Seven Cities* 18.

525 Magidi and Ahmed 2019 *The Egyptian Journal of Remote Sensing and Space Science* 336.

526 Sustainable Energy Africa 2018 *Exploring the Challenges and Niche Innovations of Energy Service Delivery in Urban South Africa - An Overview of Seven Cities* 18.

527 Alfreds 2018 https://bit.ly/3po2KJj; Ndlazi and Matshili 2019 https://bit.ly/3dHZbYz; Namugwe 2020 https://bit.ly/3dkoujn.

528 Gerland *et al City of Tshwane Climate Change Risk and Vulnerability Assessment* 5.

529 City of Tshwane *City of Tshwane Climate Response Strategy* 15; Immink *Greenhouse Gas Forecasting and Target Setting Using an Ex-Post Analysis* 167.

cooking and space heating, and this inefficient use of energy contributes to climate change.[530] Furthermore, as with every other town and city in the country, the national coal-fired power facilities provide its electricity.[531] It follows that the City of Tshwane's immediate processes and activities as well as the other processes on which it depends (e.g. transport demand and commercial and industry burning coal for energy-use) result in a considerable release of GHG emissions.[532]

4.3.2 Emission levels

The emissions per capita in the City of Tshwane stood at 9.1% of GHG emissions 2014/2015, largely from the waste sector.[533] Transport accounts for 36% of the energy demand in Pretoria. As a result of its reliance on fossil fuels (e.g. coal), more GHG emissions are produced.[534] According to Sustainable Energy Africa, the average length of car journeys in the City of Tshwane is twice as long as in cities like London and three times longer for those taking public transportation.[535] This is primarily due to the City of Tshwane's density and spatial shape.[536] The majority of businesses and commercial buildings in Tshwane use coal for boilers and other energy-use.[537] The use of coal results in the emission of CO_2 into the atmosphere.[538] Many impoverished households, especially in the winter, rely on coal for cooking and space heating.[539] The majority of homes are still not designed with energy efficiency in mind.[540]

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530 City of Tshwane 2015 https://bit.ly/39QLSnk.
531 City of Tshwane 2015 https://bit.ly/39QLSnk.
532 City of Tshwane 2015 https://bit.ly/39QLSnk.
533 City of Tshwane *City of Tshwane Climate Response Strategy* 15. The City of Tshwane's GHG emissions information available in the public domain at the time of writing are old as 6 years. Even on the website the GHG emissions statistics are old. The 2014-2015 GHG statistics is only what is available in public at the time of writing.
534 City of Tshwane 2015 https://bit.ly/3D3ggrD.
535 City of Tshwane 2015 https://bit.ly/39QLSnk.
536 Sustainable Energy Africa 2018 *Exploring the Challenges and Niche Innovations of Energy Service Delivery in Urban South Africa - An Overview of Seven Cities* 18.
537 City of Tshwane 2015 https://bit.ly/39QLSnk.
538 City of Tshwane 2015 https://bit.ly/39QLSnk.
539 City of Tshwane 2015 https://bit.ly/39QLSnk.
540 City of Tshwane 2015 https://bit.ly/39QLSnk.

4.3.3 Relevant laws and policies

4.3.3.1 Climate Response Strategy

The City of Tshwane's Climate Response Strategy of 2018 (Tshwane's Climate Response Strategy) intends to pave the way for climate action based on its existing emissions profile and climate hazards and risks.[541] The Tshwane Climate Response Strategy aims to determine what emissions will need to be cut if the municipality wants to stay below the set 2014/15 baseline.[542] Tshwane's Climate Response Strategy addresses climate change mitigation and adaptation.[543] It aims to increase city-wide climate response commitments.[544] Tshwane's Climate Response Strategy is reviewed every year as part of an ongoing development and refining process.

The City of Tshwane's mitigation programme is introduced in Chapter 2 of the Tshwane Climate Response Strategy and talks about sustainable energy, green buildings, greener mobility, and waste management.[545] The primary area of attention is the diversification of the energy mix, as most of the City of Tshwane's electricity comes from fossil fuels, leaving it with a huge carbon impact.[546] Large-scale renewable energy generation is possible here due to wheeling agreements[547] and third-party offtake agreements.[548] Embedded generation is the second area,

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541 City of Tshwane *City of Tshwane Climate Response Strategy* 3.
542 City of Tshwane *City of Tshwane Climate Response Strategy* 3.
543 City of Tshwane *City of Tshwane Climate Response Strategy* 3.
544 City of Tshwane *City of Tshwane Climate Response Strategy* 3.
545 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
546 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
547 Wheeling is the transmission of energy generated by a private operator in one place via a third-party network to a buyer or off-taker in another site (Eskom or municipality). Wheeling agreements define the conditions under which electricity can be moved across a distribution network or networks. The rationale for municipal wheeling is that a lot of the bigger metropolitans, including City of Tshwane have pledged to be carbon neutral by 2050, which will very definitely need enabling or encouraging alternative renewable energy sources – see Sustainable Energy Africa *Wheeling Discussion Paper: A guide for municipal electricity distributors* 1; Moeketsi 2020 https://bit.ly/2YCvsMU.
548 The offtake agreements or Power Purchase Agreement (PPA) involves a solar purchaser, sometimes known as an "offtaker," buying power from a project developer at an agreed rate for a certain period of time without owning the system. The system is procured, built, operated, and maintained by the project developer. The solar photovoltaic (PV) system can be installed on the offtaker's property (onsite PPA) or it can be installed remotely (offsite PPA) – see National Renewable Energy Laboratory *Using Power Purchase Agreements for Solar Deployment at*

which permits customers to generate power using renewable technologies.[549] The third goal is to use off-grid renewable technologies to address reduced demand and energy poverty.[550]

The built environment of Tshwane is resource-intensive, particularly in terms of energy use.[551] It is the first city in South Africa to enact a green building by-law that promotes green construction concepts and design initiatives.[552] In addition to new buildings, the Building Efficiency Accelerator programme supports and shows the retrofitting of existing buildings.[553] The programme also covers thermal housing efficiency, the danger of related heat impacts, particularly in areas where homes are extremely hot, and ways to reduce these heat impacts.[554]

GHG emissions from transportation are the second-largest source of emissions after energy.[555] The City of Tshwane's Cleaner Mobility Plan consists of three key components - improving mass transportation by implementing a BRT system, including low-carbon cars into its fleet, and encouraging active mobility (i.e. NMT).[556] The Cleaner Mobility initiative prioritises NMT, encourages cycling and mass mobility uptake, and supports infrastructure like solar-powered electric vehicle charging stations.[557] Moreover, the Tshwane Response Strategy recognises that waste-related emissions are the City's third-largest source of emissions.[558] The Tshwane Response Strategy acknowledges that decreasing landfill space emphasises the necessity of waste diversion and waste beneficiation for future use.[559] The diversion of recyclable and organic garbage is the major goal of the sustainable waste management

Universities 1. Municipalities can arguably then get into an agreement with third parties for the use of renewable energy.

549 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
550 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
551 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
552 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
553 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
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555 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
556 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
557 City of Tshwane *City of Tshwane Climate Response Strategy* 10.
558 City of Tshwane *City of Tshwane Climate Response Strategy* 11.
559 City of Tshwane *City of Tshwane Climate Response Strategy* 11.

programme.[560] This will be accomplished by providing recycling infrastructure in a resource-constrained context and collecting landfill gas to reduce the City's landfilling legacy.[561]

4.3.3.2 Comprehensive Integrated Transport Plan

The City of Tshwane's Comprehensive Integrated Transport Plan of 2016 (Tshwane's Transport Plan) guides the City's transportation development and operations.[562] The Plan has a number of objectives, including creating a fully integrated public transportation system and developing an ecologically friendly transportation system.[563] It also aims to create an efficient, effective, and development-oriented public transportation system by integrating land use and public transportation plans.[564] It directly addresses spatial layout and mobility issues inside the city. [565] Mixed-use, high-density, transit-oriented development is endorsed in best practice and recommended for transportation planning.[566]

The Tshwane's Transport Plan acknowledges the need for increased public transit and NMT[567] but cautions that these two modes of transportation may not be the only way to mitigate traffic congestion.[568] According to the Tshwane's Transport Plan, to fulfil the needs of a developing city, the City must promote and expand NMT as a valued form of transportation and a method to support and build liveable communities.[569] The strategy framework for NMT has proposed it to be a safe, appealing and widely utilised component and option in the city, also considering the relevance of the NMT mode in terms of establishing a low-carbon and equitable

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560 City of Tshwane *City of Tshwane Climate Response Strategy* 11.
561 City of Tshwane *City of Tshwane Climate Response Strategy* 11.
562 City of Tshwane *Comprehensive Integrated Transport Plan* 1.
563 City of Tshwane *Comprehensive Integrated Transport Plan* 2.
564 City of Tshwane *Comprehensive Integrated Transport Plan* 2.
565 City of Tshwane *Comprehensive Integrated Transport Plan* 3.
566 City of Tshwane *Comprehensive Integrated Transport Plan* 3.
567 Human and animal-powered NMT includes walking, cycling, using rickshaws, skating or rollerblading, manual wheelchairs, and animal-drawn carts – see City of Tshwane *Comprehensive Integrated Transport Plan* 1.
568 City of Tshwane *Comprehensive Integrated Transport Plan* 1.
569 City of Tshwane *Comprehensive Integrated Transport Plan* 1.

city.[570] This vision must be translated into policies, strategies, and infrastructure projects that promote a pleasant and safe environment for all NMT users in the City of Tshwane.[571] Also, the City of Tshwane could achieve its NMT goal of seeing walking and cycling as fundamental pillars of its fully integrated transport system.[572] There are several general principles that should govern the transportation planning authority to achieve the NMT policy objectives, and one includes incorporating NMT into the transportation system, which includes both transportation and spatial planning.[573]

4.3.3.3 Public Transport and Non-Motorised Transport Draft Bylaws

The City of Tshwane Public Transport and Non-Motorised Transport Bylaws (Tshwane Transport Draft Bylaws) were published in 2014 for public comment. Although the Tshwane Transport Draft Bylaws have still not been promulgated, they offer some perspective on the City's management, planning and regulation of transport to the benefit of climate change mitigation.[574] According to the preamble, the City of Tshwane oversees municipal public transportation, traffic and parking, and municipal roadways.[575] The goals of these bylaws are to govern and regulate public transportation facilities (ranks, stops, and terminuses) and their operation, and encourage the efficient and effective operation of public transportation to serve the travelling public in the municipal area.[576] As already indicated in Chapter One, public transportation is vital for emissions reduction.[577] Therefore, clause 4(1) in the

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570 City of Tshwane *Comprehensive Integrated Transport Plan* 1.
571 City of Tshwane *Comprehensive Integrated Transport Plan* 1.
572 City of Tshwane *Comprehensive Integrated Transport Plan* 1.
573 City of Tshwane *Comprehensive Integrated Transport Plan* 1-2.
574 Preamble of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.
575 Clause 2(1)(b) of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.
576 Clause 4(1) of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.
577 See Chapter One above.

Tshwane Transport Draft Bylaws speaking to the use and encouragement of efficient public transportation is crucial for climate change mitigation.[578]

Chapter 2 of the Tshwane Transport Draft Bylaws provides that the City of Tshwane may establish public transport facilities for exclusive public transport vehicles by notice in the Gazette.[579] It further specifies that the City of Tshwane must provide a bus terminal for the sole use of buses, a fast transportation station, and a parking ground, among other things.[580] The City of Tshwane is also responsible for granting rank permits.[581] The bylaws provide that no public transportation vehicle may enter or use a regulated facility unless it shows the sticker that came with the permission to use the rank or that was granted to replace it.[582]

4.3.3.4 Draft Consolidated Bylaws

The City of Tshwane Draft Consolidated Bylaws[583] (Tshwane Draft Consolidated Bylaws) supplement the NBRBS Act *National Building Regulations and Building Standards Act* and the regulations made thereunder.[584] The Tshwane Draft Consolidated Bylaws do not directly talk to spatial planning towards climate change. However, climate change mitigation and spatial planning can be inferred from clause 8 of the Tshwane Draft Consolidated Bylaws.[585] A building may not be erected in close proximity to the centre of a natural watercourse without the specific authorisation of the municipality.[586] Clause 8 further states that the municipality is the sole judge of the position of the line and the natural centre of the watercourse.[587]

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578 See section 1.1 and para 3.4.2 above; Clause 4(1) of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.

579 Clause 4(4) of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.

580 Clause 4(4) of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.

581 Clause 6 of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.

582 Clause 6(2) of City of Tshwane Public Transport and Non-Motorised Transport Bylaws Draft of 2014.

583 The bylaws are still in the drafting process – see City of Tshwane 2015 https://www.tshwane.gov.za/sites/business/Bylaws/Pages/Draft-By-Laws.aspx.

584 Long title of City of Tshwane *Consolidated Draft Bylaws*.

585 Clause 8(1) of Tshwane *Consolidated Draft Bylaws*.

586 Clause 8(1) of Tshwane *Consolidated Draft Bylaws*.

587 Clause 8(2) of Tshwane *Consolidated Draft Bylaws*.

The UN suggests that ecosystems may function as carbon sinks, absorbing GHG emissions,[588] and advocates conserving or restoring wetlands, reforesting coastal mangrove forests, and preserving natural floodplains in watercourses.[589] Clause 8 of the Tshwane Draft Consolidated Bylaws is arguably considered essential because once enacted, it may be used to safeguard ecosystems that are vital for carbon sinks, thereby mitigating climate change. According to the Tshwane Draft Consolidated Bylaws, sheet metal used for a roof visible from a roadway or a nearby erf must be properly coated within 15 months of its installation if the Municipality so requires.[590] Interestingly, according to Peters, Victor and Sanya's[591] studies on roof colour, which have been ongoing for some time, replacing dark roofs with white shingles and asphalt-based roads with concrete or other light-coloured material may offset 44 billion Gt of GHG emissions in the world's 100 largest cities,[592] - therefore, roof colours are arguably important for mitigation of climate change.

4.3.3.5 Land Use Management Bylaw

The City of Tshwane *Land Use Management Bylaw* of 2016 (*Tshwane Land Use Bylaw*) gives effect to municipal planning as contemplated in the Constitution.[593] In doing so the City of Tshwane will be able to establish and consolidate processes and procedures and facilitate and make preparations for the execution of land development and land development applications, spatial planning, and an LUS within its authority.[594] All properties in the municipality's jurisdictional geographical area, including state-owned assets, are subject to the *Tshwane Land Use Bylaw* requirements.[595] Furthermore, every property owner, successor-in-title and

588 United Nations *Climate Change and Water: UN-Water Policy Brief* 13.
589 United Nations *Climate Change and Water: UN-Water Policy Brief* 13.
590 Peters, Victor, and Sanya 2017 *International Journal of Scientific Research and Innovative Technology* 87.
591 Peters, Victor, and Sanya 2017 *International Journal of Scientific Research and Innovative Technology* 87.
592 Peters, Victor, and Sanya 2017 *International Journal of Scientific Research and Innovative Technology* 87.
593 Long title of City of Tshwane *Land Use Management By-law* of 2016.
594 Long title of City of Tshwane *Land Use Management By-law* of 2016.
595 Section 2 (1) of City of Tshwane *Land Use Management Bylaw* of 2016.

occupant, including the state, is bound by this Bylaw.[596] The municipality may define the processes and procedures for spatial planning, land use, land use management, and land development, including land development applications, in accordance with the *Tshwane Land Use Bylaw* and Regulations.[597]

The City of Tshwane may leverage its authority to govern and manage land use in its region and spatial planning to mitigate climate change.[598] In doing so it may determine which land can be developed and which areas are off limits to development.[599] The areas where the development of land may be prohibited include city parks and greenways for the purpose of carbon sinks.[600] Similarly, as already indicated in Chapter Three of this study, spatial planning may be used to protect green infrastructure with the aim of conserving the ecosystem.[601] LUS and other spatial tools are useful because they may be used to zone particular areas of land as public open spaces or green spaces.[602] In a similar vein, there may be zoning of land for residences - where they are classified from lower to higher-density residential use.[603] As previously stated, in section 3.3, developing urban forms with high density and mixed land uses may considerably reduce GHG emissions.[604] In the light of the above discussion, the *Tshwane Municipal Planning Bylaw* may arguably be employed to achieve a desirable spatial transformation by making the City denser, more compact, more walkable, and give effect to transit-oriented development.[605]

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596 Section 2 (2) of City of Tshwane *Land Use Management Bylaw* of 2016.

597 Section 10 of City of Tshwane *Land Use Management Bylaw* of 2016.

598 See Section 3.5 above. The national law gives Category A municipalities the authority to govern and manage their affairs. This includes authority over the use of land in their respective jurisdictions. Therefore, the municipalities are empowered to utilise their spatial planning instruments to regulate and promote mitigative measures in their territories.

599 The City of Tshwane is empowered to zone land for development and declare other areas of land as non-development areas for the purpose, amongst other things, of conservation – see Schedule 2 of SPLUMA.

600 See section 1.1.

601 See para 3.5.3 above; Van der *Berg Municipal Planning Law and Policy for Sustainable Cities in South Africa* 163.

602 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 241.

603 Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 163.

604 See section 3.3 above; Van der Berg *Municipal Planning Law and Policy for Sustainable Cities in South Africa* 163.

605 See para 4.3.5.1 below.

4.3.3.5.1 Tshwane Spatial Development Framework

In accordance with sections 6, 20, 21, and the related provisions of the bylaw and sections 23 to 35 of the MSA, a municipality should design an MSDF.[606] An MSDF[607] does not confer, cancel, limit, compromise, or impinge on land use rights. Instead, it guides and informs municipal land development choices.[608] The City of Tshwane has a MSDF also (Tshwane 2021 MSDF) approved by the council in 2021. According to the MSDF, the City of Tshwane's spatial inefficiencies continue to determine the City's sparse pattern of growth in some areas.[609] In order to obtain social services and facilities, many communities in the City of Tshwane are required to travel the length and breadth of the city.[610] Despite the fact that the majority of commuters uses public transportation, the number of private vehicles on the road, along with traffic congestion, leads to increased carbon emissions.[611] Greener, smarter transportation should be prioritised.[612] Cities that are dense, compact, walkable and transit-oriented contribute to a lesser carbon footprint.[613] As a result, transportation planning in the City of Tshwane should be based on growth management.[614] The mission of the City of Tshwane in the previous SDF was to lead integrated planning efforts that maximise spatial efficiency for the best possible service delivery.[615] According to the Tshwane 2012 SDF, the City has decentralised nodes that are primarily suburban in character and not an ideal urban size.[616] Low-density sprawl,

606 Section 4(1) of *City of Tshwane Land Use Management Bylaw* of 2016.
607 The Municipal SDF must contain a longer-term spatial portrayal of the planned shape and structure of the geographic region it governs. This must be read in conjunction with section 21 of the bylaw, which includes land use management standards for the proper type, form, scale, and placement of the development and contributes to spatial coordination – see section 5(3) of City of Tshwane *Land Use Management Bylaw* (2016).
608 Section 4 (5) City of Tshwane *Land Use Management Bylaw* (2016).
609 City of Tshwane 2021 *Tshwane 2021 MSDF* 208.
610 City of Tshwane 2021 *Tshwane 2021 MSDF* 208.
611 City of Tshwane 2021 *Tshwane 2021 MSDF* 209.
612 City of Tshwane 2021 *Tshwane 2021 MSDF* 209.
613 City of Tshwane 2021 *Tshwane 2021 MSDF* 209.
614 City of Tshwane 2021 *Tshwane 2021 MSDF* 209.
615 City of Tshwane 2012 *Tshwane SDF* 10.
616 City of Tshwane 2012 T*shwane SDF* 30.

the reliance on private cars, and function separation define the areas surrounding decentralised nodes.[617]

4.3.3.5.2 Tshwane Rationalised Municipal Spatial Development Framework

In 2018, the City of Tshwane adopted a Regionalised Municipal Spatial Development Framework (Tshwane RSDF). It states that all spatial development shall adhere to broad principles for spatial development in terms of the NDP, such as spatial efficiency.[618] In order to support productive activity and job development, spatial efficiency must be promoted, as well as efficient commuting patterns and the circulation of products and services in the city.[619] Spatial efficiency reflects the values for spatial development that can be linked with climate change mitigation. These strategic spatial development guidelines are intended for use by all three levels of government, especially municipalities, in carrying out their mandated spatial planning activities and making decisions on land development applications, infrastructure investments, and development spending.[620]

The guidelines include prioritising densification along current BRT routes and constructing future Gautrain stations as integrated, mixed-use, high-density, and accessible urban hubs.[621] The goal is to create integrated, accessible, mixed-use, and high-intensity settings by allowing higher-density land projects and dwelling typologies in nodes.[622] The guidelines also include encouraging the construction of new low-density residential projects in and around major economic centres and discouraging the spatial fragmentation of private estate development - further redirecting housing subsidies to the construction of affordable homes near workplaces and public transportation.[623] All the above guidelines relate to spatial

617 City of Tshwane 2012 *Tshwane SDF* 30.
618 City of Tshwane 2018 *Tshwane RSDF* 5. .
619 City of Tshwane 2018 *Tshwane RSDF* 5.
620 City of Tshwane 2018 *Tshwane RSDF* 8.
621 City of Tshwane 2018 *Tshwane RSDF* 8-9.
622 City of Tshwane 2018 *Tshwane RSDF* 8-9.
623 City of Tshwane 2018 Tshwane *RSDF* 8-9.

planning and talk to the important sectors for reducing GHG emissions as outlined earlier in section 3.4 above.

4.3.4 Assessment

The appraisal of the City of Tshwane planning laws and policy has shown that the City has been empowered to use spatial planning in sectors such as transportation, energy and the built environment to mitigate climate change. The City of Tshwane is showing progress in planning mitigation initiatives as recorded in the Climate Response Strategy, specifically about sustainable energy, green buildings, greener mobility, and waste management.[624] There is mass transportation in the City of Tshwane, such as the A Re Yeng buses, as against which there is also the operation of the Gautrain.[625] The mitigative initiatives in the Climate Response Strategy have a direct link with guidelines included in the RSDF. Among the RSDFs is the prioritisation of densification, the establishment of BRT routes and constructing future Gautrain stations for integrated, mixed-use, high-density, and accessible urban hubs.[626] As indicated, the City of Tshwane is already offering bus and rail services to the citizens.

The City of Tshwane planning laws and policy arguably do not entirely fall short as measures for climate change mitigation. The above instruments under section 4.3.3 show a clear indication of how the City of Tshwane could manage its land, using spatial planning instruments such as LUS and SDFs to reduce emissions, as stated also in terms of national law and policy under section 3.5 above. The City of Tshwane SDF stresses the issue of spatial transformation, as the present use of space results in the inefficient consumption of energy in the transport sector due to the need for long-distance transportation.[627] However, the SDF suggests that the problem is to be addressed. Mitigative initiatives such as green construction, NMT,

624 See para 4.3.3.1 above.
625 City of Tshwane 2021 *Tshwane 2021 MSDF* 230.
626 See para 4.3.5.1 above.
627 City of Tshwane 2021 *Tshwane 2021 MSDF* 209.

public transportation, which already find resonance on all instruments discussed above, are found within the parameters of the spatial planning.

The issues that might be raised are whether the measures set out in the plans are being implemented, and whether the transport measures are safe and affordable in order for the majority of the people to be attracted to the public transportation. In 2019 the World Resource Institute published the City of Tshwane's announcement of its new commitments to retrofit and refurbish public buildings with the assistance of the Building Efficiency Accelerator (BEA). Even though this is a bold step towards climate change mitigation, the City has not released any information so far about buildings in its jurisdiction that have been retrofitted. And the safety of A Re Yeng and NMT for use by the generality of people has arguably not been publicly and thoroughly articulated.

The concern raised at the time of writing this dissertation is that the important instruments are still *drafts*, such as Tshwane Draft Consolidated Bylaws and Tshwane Transport Draft Bylaws. Both these are important for climate change mitigation, and they have yet to be approved by the City of Tshwane Council. It is safe to argue that the City of Tshwane has spatial legal and policy instruments that directly link to climate change mitigation. However, the concern about their implementation remains, and the delay in the approval of important instruments is hindering progress towards climate change mitigation.

4.4 Concluding remarks

This chapter has evaluated the current local planning laws of City of Cape Town and the City of Tshwane. The chapter aimed to evaluate the municipal planning law in relation to climate mitigation in these two municipalities. Under section 4.2.3, the chapter discussed several planning laws and policies of City of Cape Town that relate to climate change mitigation. City of Cape Town has made progress in passing and adopting policies that link to municipal planning and could be used for climate change mitigation. In consideration of this City of Cape Town's regulatory and policy instruments, in particular the *Municipal Planning Bylaw*, the City controls and

regulates land use and development within its area. The City of Cape Town is able to use its development management scheme to pave the way for more efficient, cost-effective and sustainable land use in its area - which is a crucial action for climate change mitigation.

City of Cape Town has instruments such as a MSDF, a Climate Change Policy and a IDP which directly link with the reduction of GHG emissions in the City. These instruments link and can be used to regulate the sectors that emit GHG emissions, as stated under section 2.3 above. For instance, City of Cape Town has stated in its MSDF that it seeks to achieve an urban form with increased densities and mixed land use, supported by BRT and rail networks. These plans can be included in the IDP, which already addresses inefficiencies in the transport sector and seeks to achieve spatial transformation.

Like City of Cape Town, the City of Tshwane has several regulatory and policy instruments that also link to climate change mitigation and can be used to meet its climate mitigation pledges. Through the *Tshwane Land Use Bylaw,* the City of Tshwane controls land use and development in its area. The City is in a position to receive applications for land development. It has the power to decline such applications if they threaten parks and greenways, which are essential for carbon sinks and climate change mitigation, as discussed in 4.3.5 above. The City of Tshwane's Climate Response Strategy, SDF and RMSDF are all important for reducing GHG emissions since they advocate shorter commute distances, public transportation, NMT, and building efficiency, amongst other things. These measures enable the City of Tshwane the power to act in terms of climate change mitigation.

Both cities are regulating their environments through spatial planning bylaws which can mitigate climate change as stated above.[628] According to the evaluation in sections 4.2.3 and 4.3.3, the challenge that both City of Cape Town and the City of Tshwane must address is the implementation of the plans and the safety concerns

[628] See section 2.2.3, 4.3.3, 4.2.4 and 4.3.3 above.

related to public transportation. The next chapter concludes the study with recommendations and a suggestion for a future research agenda.

CHAPTER 5 CONCLUSION

5.1 Background

This study has examined municipal planning law as a tool for use in climate change mitigation in South African cities. The main aim was to explore if and how South African municipal planning law could assist municipalities in meeting their climate change mitigation targets and objectives. A substantial amount of scientific research indicates that climate change threatens human life, especially urban dwellers.[629] It is globally acknowledged that cities continue to be susceptible to the widespread effects of climate change. Cities are already experiencing climate-related environmental effects, such as the floods and droughts experienced in Kampala, Cape Town and Tshwane, amongst others.[630] In addition to being susceptible to the effects of climate change, cities are also responsible for contributing to the climate change owing to their considerable release of GHG emissions.[631] However, cities have a unique ability to contribute towards mitigating the effects of climate change, and they have legal instruments like municipal planning instruments that they can employ to mitigate climate change.[632]

In the first chapter, this study provided an assessment of the contributors to and sources of GHG emissions in South African cities. This was followed by an analysis of the extent to which some South African cities have, to date, committed to GHG emission reductions. Chapter two demonstrated that South African cities contribute to the discharge of GHGs primarily from the transportation, built environment, AFOLU, energy and waste sectors.[633] However, in addressing the aim of chapter two, the literature review indicated that cities are making pledges to mitigate climate change.[634] Chapter three discussed municipal planning, specifically spatial planning, as an important tool for mitigating climate change, because it involves the use and

629 See section 1.1 above.
630 See the discussion in section 1.1 above.
631 See section 2.3 above.
632 See section 1.1. above.
633 See section 2.3 above.
634 See para 2.4.1 above.

development of land in urban areas.[635] Similarly, chapter three gave an overview of the intersection of national planning law and policy and climate change at the local government level - in section 3.5 above.[636] As such, the consideration of the regulatory and policy planning instruments discussed in the chapter emphasised that city governments have the power to pass bylaws, policies and other instruments appropriate to responding to the mitigation of the effects of climate change.

The main research methodology used in this study was a doctrinal legal research. This consisted of the process of identifying and analysing the planning laws and policies of the City of Cape Town and the City of Tshwane with the aim of ascertaining the progress both cities have made in mitigating climate change through the said instruments in section 4.2.3 and 4.3.3 above.[637] The instruments identified through this analysis form the basis of the recommendations concerning if and how South African municipal planning law could assist municipalities in meeting their climate change mitigation targets.

5.2 Limitations of the study

This study has limitations in terms of the content covered, the methodology used, and the possibility of extrapolating the findings from the two cities to other cities in South Africa. In terms of the content that was covered in this study, it should be noted that it is limited in its scope. The focus fell on mitigation and municipal planning, although much is to be said for understanding adaptation in the South African city context. The limited focus on mitigation arises from the fact that this study is a desktop review of municipal planning law as a measure for climate change mitigation. In this regard, the study does not venture into the legal and policy planning instruments of adaptation.

As far as it concerns the methodology adopted, this had to be limited due to time and financial constraints. The study focussed on general aspects, but the case study

635 See section 3.1 and 3.3 above.
636 See section 3.5 above.
637 See sections 4.2.3 and 4.3.3 above.

aspect was limited to only two municipalities. Other municipalities' planning regulatory and policy instruments on climate change could not be covered even though they would be important to the study of the mitigation of climate change as a country-wide imperative.

Another limitation lies in the fact that the study looked into two relatively well-resourced metropolitan municipalities. This has implications, if one has any hope of extrapolating generalisations from the findings of this research. The findings and recommendation of this study (see below) can thus not be extended as is to other municipalities. Such extension should for scientific legitimacy be limited to municipalities in the same position as City of Cape Town and the City of Tshwane. Furthermore, the research method used only allows for an assessment of the current laws and policy in the municipalities identified. The researcher has not ventured into the question of real-life implementation and the enforceability of the instruments identified.

5.3 Main findings

The main findings of the study are the following:

- South Africa's municipal planning law can assist municipalities in meeting their climate change mitigation targets and objectives. Municipalities can use the regulatory and policy instruments to regulate sectors critical for climate change mitigation. These sectors include transport, built environment, and energy, amongst others.[638] These regulatory and policy instruments include the Constitution, SPLUMA and others, as illustrated in chapters three (section 3.5 above). Furthermore, as indicated in in chapter four of the study, municipalities have the power to adopt and pass local policy and regulatory instruments in their respective areas to regulate high emitting sectors as mentioned in section 2.3 above.[639]

[638] See section 1.1, 3.4. The sectors are also high GHG emitting sectors as mentioned under section 2.3 above.

[639] See section 2.3; para 4.2.3 and 4.3.3 above.

- The study found that African cities in general and South African cities in particular experience urbanisation and contribute to increased GHG emissions (from transport, energy, waste and the built environment).[640] Municipalities may reduce emissions by applying and imposing building retrofits and codes, adopting energy-efficient transport modes, promoting NMT and green infrastructure through regulatory and policy instruments such IDP, IUDF, bylaws, LUSs, amongst others.[641] Furthermore, municipalities may address emissions through waste management programmes such as reuse, recycle and recovery as pledged by City of eThekwini Metropolitan Municipality above.[642]
- The concern that the study established is the limited literature on GHG in cities (i.e. emissions inventories showing recent emissions in cities) in the public domain, such as publication of emissions inventories on their websites.[643] This makes it difficult to assess the true GHG emissions profiles of cities.
- The study ascertained that municipal planning as regulated in terms of South African local government and spatial planning legislation is a valuable tool for climate change mitigation. This is because municipalities can use their urban planning authority to control land development in their areas.[644] Further, municipalities are able to promote mixed development as a way of shortening long-distance commuting, promoting NMT, and efficient energy use in buildings, for example. These measures are important for reducing GHG emissions and could therefore assist cities in meeting targets and objectives set at different levels.[645]
- The study found an intersection between South African's mitigation and municipal planning law and policy. South African cities are empowered by national law and policy to mitigate climate change by virtue of having the

640 See sections 2.2 and 2.3 above.
641 See sections 1.1 and 3.5 above.
642 See para 2.4.1 above.
643 See para 2.4.1 above
644 See para 3.5.3 above.
645 See para 3.4.1 above.

power to develop, adopt and also pass policy and regulatory instruments to give effect to climate change mitigation.[646] Cities may use bylaws, policies, SDFs and LUSs to regulate and promote critical areas.[647] For instance, cities may use these instruments to protect green infrastructure, encourage the greening of the cities and reserve land for particular practices,[648] thereby mitigating climate change as stated under paragraph 3.5.3 above.

- It was established that both the City of Tshwane and City of Cape Town have made commendable progress in adopting and passing planning instruments (e.g. MSDFs, the *Tshwane Land Use Management Bylaw*, City of Cape Town *Municipal Planning Bylaw*, and IDPs). These instruments are important for climate change mitigation and can aid both cities in achieving climate change mitigation targets.[649]
- The study assessed the planning and policy instruments of the City of Tshwane and City of Cape Town, and the instruments seem to fall short when it comes to implementation, which a legal study of this kind can unfortunately not address.[650]

5.4 Recommendations

Considering the above findings, the study makes the following recommendations:

- Municipalities should creatively use their planning law and policy powers as given by national law and policy to mitigate climate change actively. In principle, municipalities will not find it challenging to mitigate climate change with the regulatory and policy measures already at their disposal.
- Urbanisation and GHG emissions should be managed and addressed as a matter of priority by all levels of government, and this should be prioritised in the light of the existence of implementation municipal governance tools such as the IUDF.

646 See section 3.5 above.
647 See the discussion under para 3.5.3 above.
648 See para 3.5.2 above.
649 See section 4.2.3 and 4.3.3 above.
650 See section 4.2.3 and 4.3.3 above.

- National, provincial and municipal governments must use planning tools to manage urbanisation as one of the causes of increased GHG emissions. Planning policies and regulatory means must create high density living areas, promote efficient land use, preserve public space, and introduce integrated public transportation, for example.
- Municipalities and city planners should prioritise mitigative measures in the transportation sector and the built environment because these sectors emit large quantities of GHGs. Considerable reductions can be achieved through the development and implementation of relevant transport and buildings laws and policies. These measures include promoting mixed land use development and encouraging and prioritising NMT infrastructure (cycling and walking).[651]
- Municipalities should raise awareness and encourage residents to use renewable energy in the built environment. Both City of Cape Town and the City of Tshwane should make it mandatory for all public buildings to make use of renewable energy and should also promote green roofs and walls in the city centres and public buildings. These measures could be addressed in their bylaws, SDFs and LUSs, and also included in their IDPs.
- It is recommended that municipalities publish their GHG emissions information (on their websites) and their plans to reduce the said emissions. This might help ensure that they do not only make pledges, but also take action to deliver on the pledges they make.
- It is recommended for all levels of government, city planners, and academic researchers that they embark on multi-disciplinary research regarding the importance of relevant municipal planning in each sector (e.g. the transportation sector) and regarding how it could be used to mitigate the effects of climate change.
- It is recommended that both the City of Cape Town and the City of Tshwane establish bodies or committees to deal with the improved implementation of

[651] See para 3.4.1 above.

their laws and policies and to strengthen compliance towards the climate change mitigation goals they have set for themselves.[652]

5.5 Comments on future research

As indicated under the limitations of the study, climate change is a broad topic with two approaches (adaptation and mitigation) in the general response. Law and policy in South Africa are also complex. This has been found throughout the study. Several intriguing notions, questions and issues may inform future studies on the interrelations between climate change and municipal planning law:

- How can municipal planning law be used as a measure for both climate change mitigation and adaptation? How can we utilise the benefits of taking a two-pronged approach?
- What are the strengths and weaknesses of municipal planning law (i.e. spatial planning) in mitigating climate change in specific sectors (e.g. transportation, the built environment, energy and waste).
- To what extent can spatial planning law assist municipalities in adapting to climate change?

5.6 Conclusion

This study has demonstrated that urban areas are still vulnerable to climate change. Furthermore, because they are responsible for sectors that emit GHG emissions, urban areas remain areas where climate change mitigation may be achieved. In the light of the foregoing, the study concludes that municipal planning law remains an important tool at the disposal of city authorities, capable of assisting South African cities in attaining their climate change mitigation targets and objectives through regulatory and policy instruments. Admittedly though, municipal planning law is not the holy grail and need to be seen as but one of the tools in the toolbox necessary for comprehensive climate mitigation in the cities and towns of South Africa.

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652 See Chapter 2 for pledges and goals the cities have made.

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