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CITY OF CAPE TOWN
CLIMATE CHANGE STRATEGY

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The Climate Change Strategy was approved by Council on 27th May 2021 (Item C 21/05/21)

1

INTRODUCTION

1.1. BACKGROUND

Climate change is globally understood to pose the greatest risk yet to socio-economic development, environmental sustainability, and human health and well-being,[1] and is increasingly affecting Cape Town and the wider region. Globally, countries, cities and a broad base of civil society and organisations, including youth movements, are increasingly calling for ramped-up action in recognition of the urgent nature of this challenge. Climate change is an intergenerational problem with impacts that have been recorded as occurring since at least 1990 and that are projected to become increasingly severe throughout the course of the 21st century.

This strategy recognises that responding to climate change and dealing with its impacts are urgent and essential for building both resilience and a city that is able to prosper in an increasingly carbon neutral-focused world. Significant changes will be necessary to achieve this. As such, this strategy provides a framework for the City of Cape Town ('City') to transform the way it engages and operates, and to ensure alignment of key City policies, strategies and plans with effective climate change responses.

The people of Cape Town are very familiar with climate shock events, after an extreme multiyear drought between 2015 and 2019 led to the risk that Cape Town could effectively run out of water; an event which attracted international headlines. Working together, Capetonians reduced consumption by almost 50% in record time and avoided a worst-case scenario.

Now, with lessons learnt, the City is building back better to ensure the continuous improvement of resilience in the water system. However, there are a range of other climate shocks that can manifest in greater frequency and intensity in both the short- and long-term futures. At the same time, the world is increasingly moving towards carbon neutrality and a green economy; and while Cape Town has historically been proactive in mitigating its emissions, it risks being left behind by the pace of change. As such, this strategy has been developed to provide a clear approach for the City to take to address these twin challenges.

[1] *World Economic Forum (2017).*

1.2. PURPOSE OF THIS STRATEGY

The purpose of this strategy is to provide high-level strategic guidance for decision making, planning, and programme and project development and implementation in respect of climate change. This strategy should be read in conjunction with the City's Climate Change Action Plan, which provides a higher level of detail in terms of specific actions that will be implemented to achieve the vision, desired outcomes and goals of this strategy.

Having a clear climate change strategy in place enables the City to take action to reduce and prepare for these risks (adaptation), and to take action to pursue heightened ambition in reducing greenhouse gas (GHG) emissions (mitigation) to approach carbon neutrality by 2050. The strategy also aims to ensure that the co-benefits of climate change adaptation and mitigation – including job creation, improved health, reduced risk, improved energy and water security, and a range of other benefits – are maximised in the implementation of the strategy.

Addressing climate change in any city, but especially a city of high inequality like Cape Town, is as much political and economic as it is technical. The complexity and scope of the required changes mean that responding to climate change in an effective manner requires partnerships, deliberation, negotiation, learning, innovation and leadership.

This strategy requires the City to work differently and more innovatively, and therefore provides a framework to encourage and assist the City to do this more effectively. The strategy further enables the City to take an integrated approach to its climate change response and recognises that climate change is an urgent and key risk to the economy, society and the environment. It also acknowledges that an effective climate change response presents an opportunity to transition to a competitive, resilient and efficient green economy, while seeking new and innovative ways to deliver essential services in a more inclusive, cost-effective and sustainable manner.

Cape Town does not exist in isolation from the surrounding region, but rather is dynamically connected to the surrounding region with respect to water, food and energy supply, tourism, and other economic activities. The City, therefore, needs to engage with partners beyond its borders, including national and provincial government and other municipalities. The City also acknowledges that in order for this strategy to be effective, the City must work closely in partnership with residents, businesses, civil society, academia, and other partners across Cape Town. As such, this strategy provides clarity on the City's policy position and priorities with regard to climate change.

It is recognised that, while this strategy lays out the City's vision for responding to climate change, it will require a long-term and dedicated approach to ultimately achieve this vision. This strategy is a key step in taking the City towards this vision. Future revisions of this strategy will be informed by evolving climate science, tracking of implementation progress, and global best practice. It should be noted that climate change response is not a new area of work for the City of Cape Town. The City has a long history of responding to climate change through policy, planning, and programme and project implementation. Annexure A provides an overview of the timeline of climate change strategy, policy and planning undertaken by the City of Cape Town, as well as some key milestones.

Finally, it is acknowledged that this strategy is published during the midst of a global health pandemic, Covid-19, that has caused both loss of life and economic hardship across the globe, including in South Africa, during 2020 and 2021. This strategy is an important component of Cape Town's own emotional, ethical and economic recovery from Covid-19, and aims to ensure that Cape Town is able to build back better.

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PROBLEM STATEMENT AND CONSEQUENCES OF FAILURE

2.1. PROBLEM STATEMENT

The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2014), and the IPCC Special Report on Global Warming of 1,5 degrees (2018), states that warming of the climate system is now undeniable. Over the past several decades, unprecedented changes to global climate systems have been observed.

According to the IPCC, "Human activities are estimated to have caused approximately 1,0 °C of global warming above pre-industrial levels, with a likely range of 0,8 °C to 1,2 °C. Global warming is likely to reach 1,5 °C between 2030 and 2052 if it continues to increase at the current rate."[2] The atmosphere and oceans have warmed, snow and ice have diminished, sea levels have risen, and oceans have become more acidic as they absorb excess carbon dioxide (CO_2).

Atmospheric concentrations of GHG emissions, including carbon dioxide, methane (CH_4), and nitrous oxide (N_2O), are at their highest levels within the last 800 000 years and rising, with the rate and extent of climatic changes greater than previously projected by climate models.[3] The greater-than-expected rate and extent of climate changes, coupled with thermal inertia within the global climate system, are quickly closing the window of opportunity for averting catastrophic global warming. This heightens the urgency with which all of society needs to act to reduce emissions and to respond to climate impacts.

It is not currently anticipated that the incidence of severe storm events will increase, and it is possible that these may decrease slightly over the long term (towards the end of the 21st century); however, major storm events remain a key risk based on current incidence and severity. It is also important to note that this assessment may change in the future based on new scientific evidence.

Climate change will have direct physical and economic impacts on the city. However, the global response to climate change is having profound indirect economic and political impacts, which are expected to increase into the future. Currently, global investment in low-carbon technologies is creating markets for disruptive technologies such as small-scale embedded generation. With electric vehicles now heavily subsidised in many developed markets, these can also be expected to scale globally.

As low- and zero-carbon technologies scale and become economically viable, corporations are increasingly being regulated or are self-regulating to report and manage the emissions across their supply chains. South Africa, with its coal-intensive grid electricity, seems poorly positioned to trade in a world where emissions are tracked, reported, and increasingly a key component of the value proposition of goods and services. The City of Cape Town is, however, in many respects well placed to seek opportunities in a global green economy and this strategy seeks to give policy direction in this respect.

The climatic changes that Cape Town is facing are:[4]

- A significant decrease in mean annual rainfall
- Changed seasonality of rainfall
- A significant increase in mean annual temperature and increased maximum temperatures
- More high heat days,[5] and more frequent and intense heat waves[6]
- An increase in wind strength
- A rise in mean sea level and increased coastal erosion

[2] *IPCC (2018b).*
[3] *IPCC (2014b).*
[4] *Petrie, B., et al (2019).*
[5] *A high heat day is defined as hotter than 35 °C.*
[6] *A heat wave, within the context of Cape Town, is defined as three or more days in a row of 32 °C or hotter.*

2.2. CONSEQUENCES OF FAILURE

The consequences of failing to adapt to and mitigate climate change will be significant and potentially severe. Therefore, it is in the City's best interests to take bold action now to prevent the worst climate change impacts, through both adaptation and mitigation. Per capita emissions are relatively high for a city in a developing country, so a mitigation commitment to carbon neutrality is critical in order to allow the local economy to trade competitively in a world that is rapidly rejecting carbon-intensive goods and services, and to contribute fully to the global mitigation effort required to avoid catastrophic climate change.

While the timing and magnitude of impacts will always remain somewhat uncertain due to limitations in climate modelling at the scale of a city, there is little uncertainty regarding the types of impacts that Cape Town is facing and will increasingly face. This emphasises the need for investment in systems that are flexible and adaptive, and able to respond to a range of possible climate futures. Various studies[7] have also shown that the costs of early and proactive action will be far less than delayed action or inaction. Therefore, proactive planning and implementation to address anticipated impacts and put in place flexible and adaptive systems will be more cost effective and practical in the long term than an approach that focuses on reactive response. In addition, actions taken to reduce emissions have numerous co-benefits. They will increase social and economic resilience and productivity, ensure better access to public transport, promote a healthier urban environment, and ensure a more economically viable and cleaner energy system.

If steps are not taken to adapt to the predicted impacts of climate change and contribute to global efforts to mitigate climate change, there are a number of impacts that will be experienced with increasing intensity, severity, and frequency, and a number of missed opportunities.

These impacts and missed opportunities include:

- Drought and associated water shortages
- Flooding and associated impacts on people and infrastructure
- Heat stress and associated health impacts
- Increased coastal erosion, mean sea level rise, stronger storm surges, and associated impacts on coastal infrastructure
- Damage to infrastructure and property due to severe storms and strong winds
- Increased risk of fire, affecting both the natural environment and urban areas
- Loss of biodiversity and associated loss of ecosystem goods and services
- Loss of agricultural productivity in the region and associated impacts on food security
- Loss of jobs and livelihoods due to the impacts of climate change on key sectors
- A lapsed window of opportunity to facilitate an inclusive green transition and thus deliver essential services in a more sustainable manner, while creating employment opportunities in a new economy
- Increased vulnerability to volatile oil prices and economic risks associated with investments in coal, fossil fuels, and associated infrastructure that could see taxes or embargoes imposed on Cape Town's goods and services by trade partners

These projected impacts have the potential to affect all forms of service delivery, with impacts likely to be more severe in areas, sectors, and amongst groups that are at a higher risk due to high levels of vulnerability and low levels of resilience and adaptive capacity. In this regard, climate change has a multiplier effect that exacerbates existing challenges facing the city.

This strategy aims to address these identified impacts within the City's mandates and spheres of influence, and to ensure that the City is able to address the challenges posed by climate change and avoid locking itself into unsustainable investments or development pathways.

[7] *Department of Environmental Affairs (2011).*

3

FRAMING THE STRATEGY

3.1. CAPE TOWN'S CLIMATE CONTEXT[8]

Cape Town exists within a unique environmental context that makes the city particularly vulnerable to a number of climate change-related challenges. The city is located within the Cape Floristic Region – a global biodiversity hotspot – and is surrounded by 307 km of coastline. The city is also home to a large number of seasonal wetlands, freshwater bodies and watercourses. The climate of the region is classified as 'warm-summer Mediterranean climate'; a rare climate type characterised by cold, wet winters and warm, dry summers.

In addition, as a city within a developing country, Cape Town struggles with a number of socio-economic challenges, including high levels of unemployment, poverty and informality, as well as numerous health challenges due to both communicable and non-communicable diseases. All of these factors combine to create high levels of climate vulnerability in the city.

Vulnerability can be categorised as follows:

- Physical vulnerability is due to geographic factors such as elevation and natural drainage, as well as urban development in too close a proximity to watercourses, wetlands, the coastline, and areas of fire-prone indigenous vegetation.
- Socio-economic vulnerability is due to low levels of adaptive capacity within communities. This is caused by a range of factors, including poverty, unemployment, education levels, poor social cohesion, a lack of access to services, and the legacy of past planning decisions that have resulted in spatial inequalities. Economic sectors that are reliant on the natural environment, such as agriculture and tourism, are at higher risk than other sectors.

Vulnerability exacerbates the impact of climate change and increases the risk that an area or community will be severely impacted by climate hazards. Women and girls, the elderly, and disabled people are particularly at risk from the negative impacts of climate change due to existing high levels of vulnerability.

3.2. CAPE TOWN'S GREENHOUSE GAS EMISSIONS

Cape Town – in common with all cities in South Africa – is a significant emitter, relative to its size, of greenhouse gases (GHG) that contribute to global climate change. The City has a well-established and credible sector-based GHG inventory, which is updated on an annual basis and is a key element in reporting annually to the Carbon Disclosure Project.[9] It complies with international best practice and emissions are assessed in accordance with the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC). As GHG emissions are a consequence of activities taking place within the city boundary, these data are a valuable knowledge base that serves a variety of purposes beyond emissions accounting. It also provides the City with tools to help assess and manage the sustainability of energy supply and consumption, waste and transportation.

The inventory conforms to the 'BASIC'[10] reporting level that includes the main contributors to the city's inventory (energy consumption, road transportation, organic waste and wastewater), but excludes emissions from the non-energy emitting sectors, Industrial Processes and Product Use (IPPU), and Agriculture, Forestry and Land Use (AFOLU). However, there are no significant heavy industrial, forestry and farming activities taking place within the city boundary, and high-level estimates support the assumption that these sources make a relatively small contribution to Cape Town's GHG emissions.

The use of a fuel sales-based methodology to estimate road transport emissions means that, in practice, a large share of trans-boundary emissions from freight and long-distance passenger trips arising in the city, usually not included in BASIC inventories, are accounted for. Most aviation emissions are trans-boundary and are not required to be reported against targets under BASIC standards but are still accounted for in the Cape Town inventory.

[8] *For more information on key economic, social and environmental indicators, please see the State of Cape Town Report (2018).*
[9] *https://www.cdp.net*
[10] *The BASIC reporting level for cities covers scope 1 and scope 2 emissions from stationary energy and transportation, as well as scope 1 and scope 3 emissions from waste. Cities can select between BASIC and BASIC+ (more advanced) levels of reporting. In future, cities will be further required to report on their consumption-based emissions, which reflect the indirect emissions resulting from the consumption of goods and services in the city.*

Given the historical growth of this sector and the local importance of tourism, mitigation of aviation emissions is a strategic priority along with other transport emissions. Emissions occurring outside the city's boundary from marine fuel bunkers taken on in the city's port are estimated but not currently reported against targets.[11] The local marine bunker industry has diminished considerably in recent years due to high port charges and regional competition, and is no longer a significant emissions source associated with the city.

The inventory and its data are subject to continual improvement and the City aims to transition to BASIC+ reporting standards by 2025, starting with the AFOLU sector and followed by the IPPU sector. By 2030, the City aims to transition to a consumption-based emissions inventory to support the long-term strategy of building carbon-neutral value chains. Data quality and availability remain a significant challenge in this respect and, therefore, form part of the strategic pathways for change.

A historical view of Cape Town's GHG inventory is presented in figure 1. The best available data indicate that total emissions are stable. This stabilisation is most likely due to a combination of energy efficiency (especially evident in residential electricity demand) and suppressed energy demand due to a period of low economic growth and dropping per capita incomes.

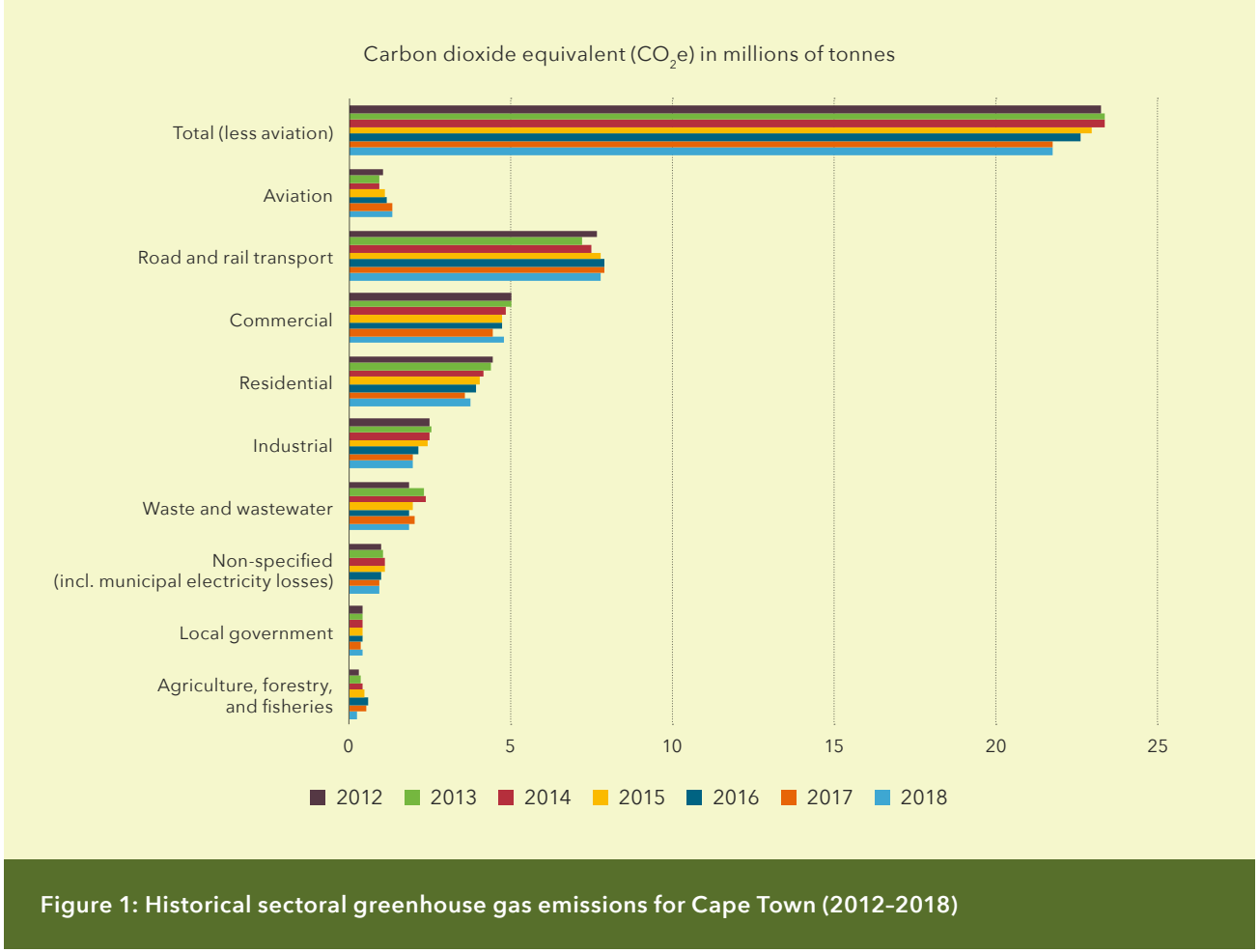


Figure 1: Historical sectoral greenhouse gas emissions for Cape Town (2012–2018)

[11] *"IPCC guidelines allow for exclusion of international waterborne navigation and air travel, but these journeys and their associated emissions can be useful for a city to understand the full impact of the transit connecting through the city. The GPC requires water transportation wholly occurring within a city to be reported in scope 1 for BASIC, while emissions from all departing ships for inter-city/national/international trips shall be reported in scope 3 under BASIC+." WRI (2014).*

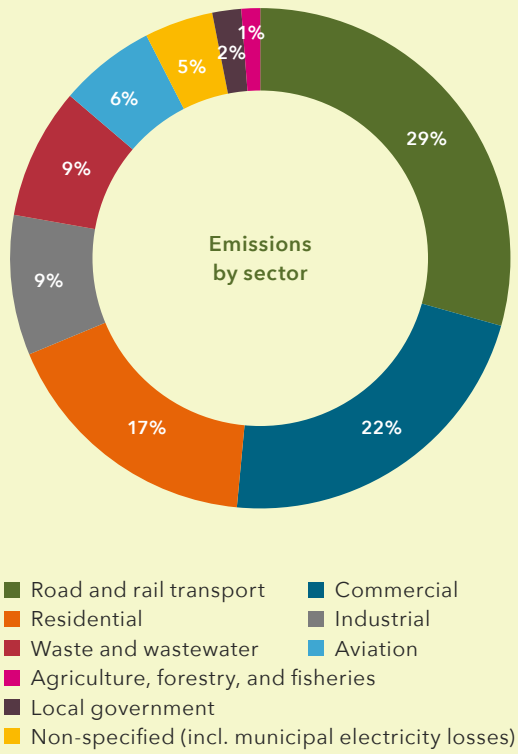


Figure 2: Sectoral emissions contributions for Cape Town (2018)

Figure 2 provides a sectoral breakdown of emissions for 2018, the latest year for which comprehensive information is available at the time of publishing. Although liquid fuels consumed by transport account for more energy in total, over half of the city's emissions arise from electricity use; this is due to the high carbon intensity of South Africa's coal-based grid electricity as compared to the relatively lower carbon intensity of transport fuels such as petrol and diesel.

The high emissions share of the transport sector is linked to low densities on transport corridors and urban sprawl, making viable mass transit challenging. This has been compounded by significant dysfunction of the rail system (owned by state-owned enterprise PRASA) and a sharp drop in its passenger numbers over the past decade. The City operates a relatively new bus utility – MyCiTi – which offers a high-quality scheduled service, but in-mode share terms remain small. The provincial government contracts a scheduled bus service operated by the Golden Arrow Bus Company, which, while critical at peak demand, satisfies less than 10% of overall travel demand. Minibus taxis, with a mode share[12] of around 30%, remain a key provider in the South African transport sector, providing an essential transport service to a large proportion of Capetonians. Mobility is, however, increasingly dominated by carbon-intensive private vehicles, having a mode share of around 50% but accounting for over 80% of passenger transport energy consumption and emissions.

Solid and liquid waste, and industrial heating fuels account for smaller, but still significant, shares of the city's GHG emissions, together accounting for over one-fifth of emissions. The waste sector offers some of the more short-term mitigation opportunities through aerobic composting and treatment. However, industrial heating fuels are, at this time, difficult to substitute.

[12] *Mode shares are of passenger km and not trips.*

3.3. CAPE TOWN'S COMMITMENTS TO ADDRESSING CLIMATE CHANGE

3.3.1. City of Cape Town Climate Change Policy

In 2017, the municipal Council ('Council') adopted the first City of Cape Town Climate Change Policy. This policy followed approximately 15 years of work on both climate change mitigation and adaptation, and several previous action plans. The adoption of the Climate Change Policy in 2017 was an important milestone, marking the point at which it was recognised that climate change is a significant threat to Cape Town and thus required a dedicated policy and strategy approach.

In 2019, the City of Cape Town Climate Change Policy was reviewed and it was determined that the policy should be upgraded to a strategy in order to ensure that climate change is addressed and integrated at the highest level within the organisation. This strategy, therefore, builds on the commitments of the 2017 Climate Change Policy and includes new commitments and a more ambitious programme of action.

3.3.2. International commitments

The City of Cape Town is a member of C40 – a global climate change leadership group aimed at promoting climate change response action at local government level. Cape Town, along with the major metropolitan municipalities in South Africa and nearly 100 of the world's largest cities, has signed up to C40's Deadline 2020 programme, which aims to put cities on track to meet the goals of the Paris Agreement and achieve carbon neutrality and climate resilience by 2050. Cape Town also has an important role to play in helping South Africa meet its Nationally Determined Contributions in terms of the Paris Agreement.

The carbon-neutrality component of the Deadline 2020 commitment includes a parallel commitment to attain net-zero carbon emissions from the City's own buildings (both existing and new) by 2030, for all new buildings in Cape Town by 2030, and for all existing buildings in Cape Town by 2050. Despite the challenges, the target of carbon neutrality has notable advantages over previous 'low-carbon' targets, in that it is more consistent with the requirements of science, it does not place temporally determined constraints on decarbonisation that quickly become obsolete, and is easier to comprehend and communicate. Furthermore, a commitment to carbon neutrality enables the City to join with other leading cities to signal a determination to take up the opportunities and long-term benefits of a sustainable, equitable and green economy.

The City is also working towards implementation of the Sustainable Development Goals as part of South Africa's commitment in this regard. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations member states in 2015 as a universal call to action to end poverty, protect the planet, and ensure that all people enjoy peace and prosperity by 2030. This strategy is aligned with Goal 13, which focuses on Climate Action and includes targets related to adaptation, mitigation, and mainstreaming of climate change response action.

3.4. EVIDENCE BASE

3.4.1. Hazard, Vulnerability and Risk Assessment study

In 2018/19, a Climate Change Hazard, Vulnerability and Risk Assessment was conducted for the City of Cape Town[13] based on a low climate change mitigation scenario, in line with current global trends.

This assessment included the following components:

- Mapping of climate hazards
- Identification of areas of vulnerability (both spatially and across sectors)
- An economic risk analysis
- Identification of key risk areas (both spatially and across sectors) based on the combination of hazards and vulnerability
- A set of recommended adaptation options

[13] *Petrie, B., et al (2019).*

This study forms the evidence base for the City's Climate Change Strategy as it relates to climate change adaptation and climate resilience. The key findings of the study, as it relates to Cape Town's climate change risk, are described in section 2.1 of this strategy. More details of the methodology and results of the study are provided in the City of Cape Town Climate Change Action Plan.

3.4.2. Carbon Neutral 2050 scenario modelling

A data collection, stakeholder engagement, and emissions modelling[14] exercise was undertaken in-house with the assistance of an embedded C40 adviser during 2018–2020. The emissions modelling for the various scenarios builds on the previous energy and emissions modelling carried out by the City, the most recent being the Energy2040 Goal emission reduction targets adopted by Council in 2015. The new scenarios present a significant ramp-up in ambition from Energy2040, acknowledging the need to align with the goals of the Paris Agreement and the City's commitment to the C40 Deadline 2020 programme of achieving carbon neutrality and climate resilience by 2050.

While the City acknowledges its responsibility to lead, drive, and enable a local carbon-neutral transition, achieving citywide carbon neutrality is not wholly within the control of the City administration. This transition requires action from other stakeholders, including national government, national utilities like Eskom and PRASA, the private sector, and residents. There are also a number of uncertainties related to growth in the local economy, types of economic activities, population growth, and technological transition.

For these reasons, updated scenario modelling was carried out to identify priority focus areas under alternative possible futures. Emissions were projected as a baseline based on current technologies and development patterns, and two scenarios of ambitious mitigation, as follows:

- **Baseline projection:** This projection shows that under a modest economic recovery to a growth rate of 1,6%, emissions could be expected to grow significantly – to over 50% more than 2016 emissions – by 2050.
- **Green economy future:** In this scenario, mandates and markets favour ambitious mitigation. Early and steady procurement of renewable electricity nationally and locally enables electrification of transport. The need to travel is significantly reduced due to a more efficient spatial form, which encourages active mobility and supports public transport and local economic opportunity; transport thus requires less energy. As such, by 2050, emissions are reduced by more than 90% from 2016 emissions.
- **Limited mandate and opportunity:** In this scenario, various challenges remain unresolved. The City is unable to procure electricity independently at scale, the local automotive and oil industries resist transport electrification, and spatial transformation fails, hampering public transport development. Even though the City acts ambitiously, citywide emissions can only be reduced by 60% from 2016 emissions levels.

Many GHG emissions targets are set using a framework of 'burden sharing', whereby the global problem of decarbonisation is shared across emitters according to a set of principles. This is the case with the C40 Deadline 2020 commitment under which the carbon-neutrality pledge was made in support of the Paris Agreement. Under this framework, Cape Town is categorised as an 'early-peak' developing city and needs to peak its emissions by 2030 with modest rise and then, leveraging technology scaled in developed markets, decarbonise rapidly to a minimum of 80% lower than current emissions by 2050.

The emissions remaining at the end point of scenario projections, which cannot be mitigated by anticipated technology change, are called 'residual emissions'. As a city within a developing country, the City of Cape Town is not expected, at this time, to plan for investments in offsetting or capturing these. Currently, such technologies are extremely expensive and large-scale afforestation is unsuitable because forest ecosystems are not part of Cape Town's natural environment.

[14] *Using C40's 1,5 degrees pathways tool.*

Given that Cape Town's emissions are stable, the required level of interim targets in 2030 are deemed achievable under all scenarios. The modelling exercise, however, shows that given the carbon intensity of the South African economy, the 2050 target will be very challenging unless the long-term foundation for carbon neutrality is systematically put in place leading up to 2030.

A full analysis of the scenarios and a more detailed breakdown of the outputs and description of the approach to developing the scenarios are provided in the City of Cape Town Climate Change Action Plan.

3.5. CHALLENGES FOR THE IMPLEMENTATION OF THIS STRATEGY

A number of challenges for the implementation of this strategy have been identified. It is important to identify and acknowledge these challenges so that measures can be put in place to address these.

- The fiscal consequences of the Covid-19 pandemic and its associated suppression methods are expected to cause a decrease in revenues and financial support from both national and provincial government, resulting in a reduced municipal budget. This means that hard choices may need to be made in order to ensure financial sustainability. This may impact components of the strategy implementation, particularly in the early years of implementation.
- The City is currently dependent on coal-intensive grid electricity acquired through 55 injection points in its distribution system or purchased directly by customers from the state utility (Eskom). Carbon neutrality by 2050, however, implies a wholesale transformation of the way energy is supplied to Cape Town's economy. Therefore, meeting these goals is highly contingent on the City of Cape Town being able to procure or generate its own renewable electricity with supply enabled by a functional framework involving regulatory, transmission and system operating stakeholders.
- The City only has a partial mandate in public transport and a considerable amount of spatial transformation of the city is required to make mass public transit economically viable for the entire city.
- Conversion to electric vehicles will only mitigate significant emissions if low-carbon or carbon-neutral electricity supply is made available.
- To fast track new and existing buildings towards carbon neutrality and climate resilience will require regulatory interventions that go beyond national requirements. The continued regulatory support of national authorities (e.g. the December 2020 gazetting of mandatory energy performance certificates) is essential for the goal of greener buildings.
- The City is partially reliant, like all South African municipalities, on the contribution to rates of the regulated margin on electricity revenues. Energy efficiency and small-scale embedded generation have been growing organically due to an increasing bulk electricity price, but mitigation through active promotion of these technologies has a financial trade-off under the current municipal business model.
- There is significant uncertainty regarding the details of timing and magnitude of climatic changes affecting Cape Town, creating difficulty for forward planning.
- There is a high upfront cost for certain adaptation interventions, especially those where significant infrastructure development or upgrading is required. Although cost savings are likely to occur over the longer term, this creates a barrier for implementation.
- There is potential for maladaptation that may occur if adaptation actions have unforeseen negative outcomes or increase local carbon emissions.

4

VISION, PRINCIPLES AND DESIRED OUTCOMES

Together, the vision, principles and desired outcomes of this Climate Change Strategy define a clear set of strategic work areas and goals. These need to be achieved in a dynamic and complex local context. The following sections provide an overview of how the strategy aims to move Cape Town towards achieving the vision and goals of this strategy.

4.1. VISION

To become a climate-resilient, resource-efficient, and carbon-neutral city that enables inclusive economic development and healthy, thriving communities and ecosystems.

4.2. PRINCIPLES

4.2.1. Resilience

The City will work to ensure that its actions and decisions increasingly and progressively strengthen resilience and reduce the vulnerability of Cape Town's environment, communities, and economy to climate change impacts, and enhance their ability to prepare for, adapt to, and recover from shocks and chronic stresses. The City will work to ensure that its systems are flexible and adaptive in order to remain responsive to a range of possible climate futures, and will support the development of flexible and adaptive systems across Cape Town.

4.2.2. Economic inclusiveness

The City will work to ensure that its actions and decisions contribute towards addressing the socio-economic challenges and impacts of climate change, and optimise the socio-economic opportunities that arise from adapting to and mitigating climate change in an inclusive manner. The City will use the opportunities presented by implementation of climate change response to transform how it deals with poverty alleviation, inequality, and the informal sector. The City will prioritise the well-being of the whole economy over that of one sector or entities within a sector. Where disruptive transition arises, consideration will be given to protecting vulnerable workers in a just transition for a time period sufficient for retraining and diversification.

4.2.3. Embedded sustainability

The City will work to ensure that its actions and decisions retain, restore, expand and optimise sustainability, ecosystem functioning and green infrastructure, and that such work is integrated into the City's development path in order to adapt to climate change impacts and enhance carbon sequestration. The City will strongly discourage activities that damage, destroy, or reduce the sustainability or integrity of ecosystems and green infrastructure.

4.2.4. Carbon neutrality

The City will work to ensure that its actions and decisions support carbon neutrality and carbon-neutral development within the residential, commercial, industrial, transport and waste sectors, and within its own operations, thereby being a leader in the transition to a competitive, resilient, and efficient green economy.

4.2.5. Health and well-being

The City will work to ensure that its actions and decisions support and promote human health and well-being, and that the health impacts of both climate change and a carbon-intensive economy are addressed, including communicable and non-communicable diseases, psychological distress, and the effects of environmental degradation and pollution.

4.2.6. Collaboration and integration

The City will work to ensure that its actions and decisions are informed by partnerships and collaboration with external organisations and entities focused on addressing climate change, including national and provincial government, international and local non-governmental organisations (NGOs), academia, and the private sector. The City will also

work to increase public consultation and engagement, and build trust with the public with regard to the City's climate change response. The City recognises that it is integrated into, and dependent on, the national economy, and other spheres of government. Where the City has higher ambitions than national policy, it may choose to seek additional mandates in order to fulfil this ambition and work towards benefiting the national interest by piloting new regulatory approaches and utility business models.

4.2.7. Climate-responsive urban development

The City will facilitate and manage urban growth and development in a way that enables urban efficiencies, economic vitality, climate resilience, and improved access to opportunities and quality of life. The City will strongly discourage urban development in areas of high climate risk and high environmental sensitivity or where ecosystem goods or services that support climate resilience would be significantly degraded or lost.

4.2.8. Equitable and inclusive service delivery

The City will ensure that its climate change response is implemented in an equitable and inclusive manner that recognises the needs of the most vulnerable residents of Cape Town, with a particular focus on the needs of vulnerable groups such as women and girls, the elderly, and disabled people, and prioritises interventions that aim to maximise sustainable service delivery. Direct subsidies or subsidised price signals to support carbon neutrality will only be considered if these support local employment and economic development.

4.2.9. Precautionary principle

The City will adopt the precautionary principle – defined as a risk-averse and cautious approach that takes into account the limits of current knowledge about the consequences of decisions and actions – in decision making where there is uncertainty regarding whether a decision may have a negative impact on climate resilience, may expose an area or group of people to increased climate risk, or may reduce the adaptive capacity of an area or group of people. In addition, the precautionary principle means that uncertainty will not be used as a reason for postponing measures to reduce climate risk.

4.2.10. Innovation and transformational planning

The City will work to ensure that its actions and decisions promote innovation in responding to climate change, and will seek opportunities for implementation of novel and innovative approaches in its own operations. The City will also take a transformative approach to planning for climate change response interventions where possible, recognising that an incremental approach may not be suitable where significant change is required.

4.3. LONG-TERM DESIRED OUTCOMES

The following long-term desired outcomes provide a more detailed vision for the future in which this Climate Change Strategy has been fully implemented:

4.3.1. All City of Cape Town-led policies, plans, programmes and projects have effectively incorporated climate change considerations into their design and implementation.

4.3.2. Climate change is seen as a shared risk to Cape Town, and its residents, businesses, visitors, and government work collectively to address climate change.

4.3.3. An electricity supply system that is supplied by renewable utility scale and embedded sources backed up by clean storage and demand-side management.

4.3.4. A city where travel is by safe, reliable, economically viable, and electric-powered public transport (including minibus taxis) in preference to private vehicles. The formal transport system is complemented by appealing active-mobility options, such as walking and cycling. Cycling infrastructure is depoliticised and cycling is supported as an efficient, healthy utility.

4.3.5. A city where the cost of doing business is reduced and competitiveness maximised through responding to climate change by investment in infrastructure resilience and efficient technologies, structures, processes and spatial organisation.

4.3.6. A city that does business in net-zero carbon buildings and carbon-neutral business hubs that include carbon neutrality as a quality assurance for their traded products and services, and cause 'carbon neutrality as a service' to arise across value chains.

4.3.7. A city with a compact and efficient urban form, with development that is well located and well connected, in order to grow within the limits of available resources and enable social and economic inclusivity.

4.3.8. All infrastructure, including the built environment in Cape Town, is designed and built to be resilient to the impacts of climate change.

4.3.9. Cape Town's natural ecosystems are protected, managed, and made resilient to enable these to act as effective buffers to climate change impacts and provide benefits of green infrastructure in support of current and future built infrastructure.

4.3.10. Cape Town's organic waste is diverted to productive uses, including composting and bio-energy production at sufficient scale, to viably support optimal recovery and derive maximum economic value from reusable and recyclable materials.

5

PATHWAYS, WORK AREAS, AND A FRAMEWORK FOR ACTION

Together, the vision, principles and desired outcomes of this Climate Change Strategy define a clear set of strategic work areas and goals. These need to be achieved in a dynamic and complex local context. The following sections provide an overview of how the strategy aims to move Cape Town towards achieving the vision and goals of this strategy.

5.1. OVERVIEW

Ambitious principles for action and desired outcomes have been developed as part of this strategy. However, implementation has to happen in a very challenging local context as described in the framing of the strategy. This is in common with other developing cities that have also committed to supporting the strong ambition of the Paris Agreement. While these cities cannot always leverage the resources and influence of the larger developed cities to enact rapid wholesale change, climate resilience and carbon neutrality can incrementally be built one citizen, one institution, one product or service, one firm, and one value chain at a time.

The urgency of the City's climate change response requires elevation within the City and expansion through collaboration, while at the same time it can only work through existing structures and approaches. To address this, the strategy combines new, more narrative-based approaches with traditional managerial approaches. Figure 3 visually depicts how these approaches work together.

- Pathways have been developed to provide a conceptual direction for taking action in navigating a highly complex endeavour for a metropolitan government. These pathways provide high-level direction to the actions required and act as a roadmap towards a carbon-neutral and climate-resilient city.
- The strategy then describes the work that needs to be done within the City through more traditional City management approaches, articulated within a strategic focus areas (SFAs) and cross-cutting work areas (CCWAs) framework. Each SFA and CCWA contributes to achieving multiple different pathways.
- Finally, the strategy describes a framework for action, which outlines the transition streams and action types that are required to deliver the strategy principles and outcomes. Each SFA and CCWA will include many different types of action in order to be realised.

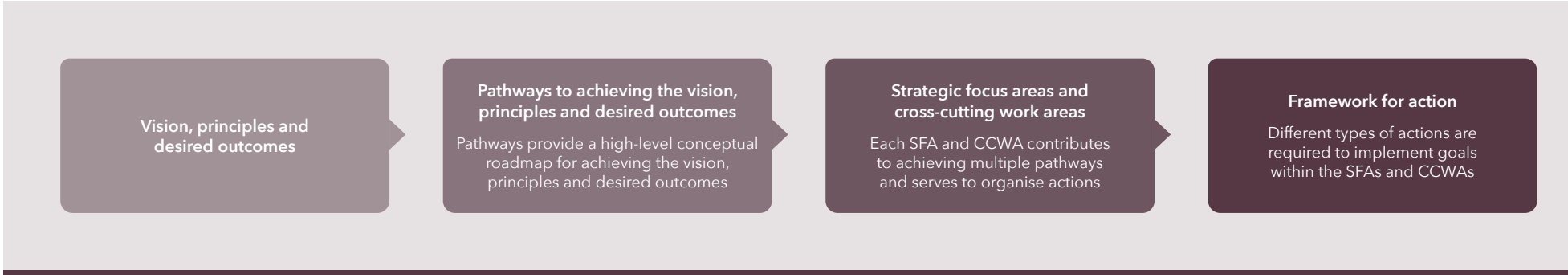


Figure 3: How the pathways, work areas, and framework for action support achieving the vision, principles and desired outcomes

5.2. PATHWAYS TO DELIVERING ON THE VISION, PRINCIPLES AND DESIRED OUTCOMES

Pathway 1: Leadership and governance

Exercise leadership and governance through planning, regulation, open data development, and engagement of stakeholders. Decouple resource risk from revenue and ensure that all municipal governance processes promote climate change response, while ensuring that adequate municipal revenue is generated and available to meet climate change goals.

Pathway 2: Sustainable urbanisation

Promote sustainable densification through planned urbanisation that enables proximity to work, amenities, culture and transport corridors, therefore promoting a high degree of positive interaction between people and improving social cohesion.

Pathway 3: High-value ecosystems

Ensure that Cape Town's ecosystems are sustainable and resilient, with increasing reliance on nature-based solutions and green infrastructure for supporting service delivery and providing ecosystem services that support climate change response.

Pathway 4: Risk reduction

Reduce risk and losses associated with climate shocks and stresses for both the City and Cape Town's residents and businesses through implementation of risk reduction interventions and anticipatory action.

Pathway 5: Leading by example in City operations and infrastructure

Lead by example and contribute to creating a market for climate-responsive products and services through greening the City's own operations and services, achieving carbon neutrality in City facilities, and making public infrastructure more resilient.

Pathway 6: Green economy and special economic zones

Build green economy partnerships around special economic zones (SEZs), which not only become markets for renewable energy, but also increase the share of the local economy in green value chains. Reduce the cost of a green economy transition and maximise economic co-benefits through ongoing residential, commercial, and industrial energy-efficiency programmes with a focus on achieving net-carbon neutrality in new building stock from 2030.

Pathway 7: Carbon accounting and carbon-neutral quality assurance labelling

Promote corporate carbon accounting and the concept of 'carbon neutrality as a service'[15] or similar approaches to the development of supply chains for carbon-neutral goods and services where this offers local business a global trade advantage. This will require carbon-neutral materials and transport services that become a value proposition through 1) global carbon prices; 2) corporate accounting; and 3) compelling and attractive product labelling underwritten by credible verification agents.

Pathway 8: Drive energy supply-side change at scale by building local carbon-neutral markets

In addition to ongoing efforts to develop a renewable electricity supply, the City will work, through partnerships, to build demand from local carbon-neutral markets. Carbon neutrality will be achieved one product, one firm, and one value chain at a time to drive change in the supply side. Carbon-neutral energy will be supplied to green economy business through aggregation of available supply at increasing scale, even if initial supply is very modest, starting with electricity and extending in time to molecular fuels.

Pathway 9: Promote climate-responsive individual and institutional choices and actions

Promote and empower climate-responsive individual and institutional choices and actions through communication, engagement, collaboration, and enabling action; recognising that many small actions have the potential to create big changes.

Pathway 10: Greater equity, inclusivity and a just transition

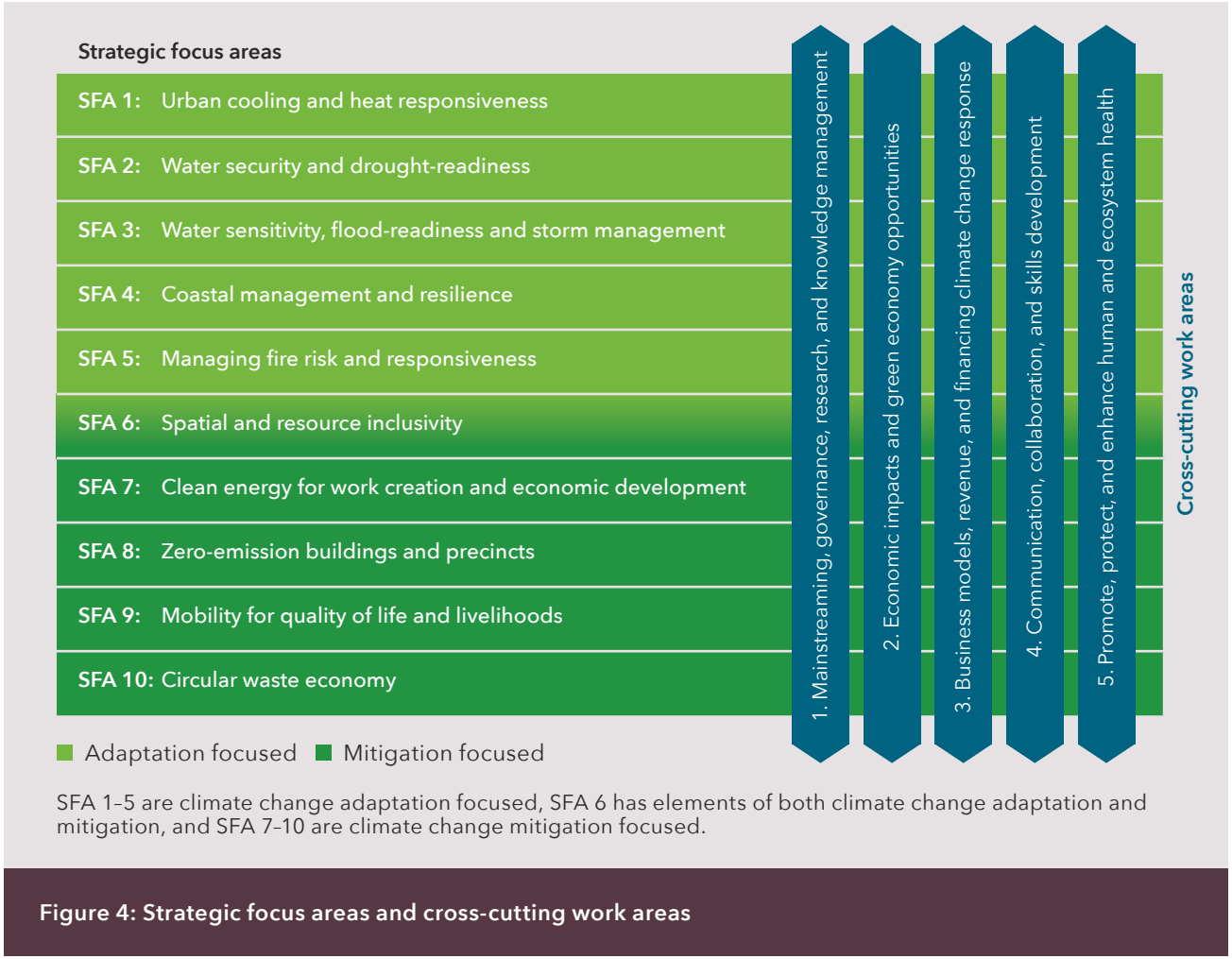
Work towards greater equity, inclusivity, and a just transition to a carbon-neutral and climate-resilient future that is centred around strong participation and engagement by all stakeholders to eliminate resource poverty, ensure sustainable and equitable land use, enable poverty reduction, and encourage and ensure well-being and a healthy environment.

[15] *Many jurisdictions, for example Paris, are opting for consumption-based accounting, which requires assessment of the carbon embedded in the materials and transport of imported goods. This trend does not currently favour South African goods, but offers an opportunity for commodifying the different sectoral components of carbon neutrality as services to an export product at industry or industrial park scale.*

5.3. MECHANISMS FOR ACTION: STRATEGIC FOCUS AREAS AND CROSS-CUTTING WORK AREAS

Ten SFAs and five CCWAs were developed to organise actions in alignment with City organisational structures, and to group goals in a clear and logical way to enable uptake of these by City departments responsible for implementation.

The SFAs contain goals specific to key areas of adaptation and/or mitigation, while the CCWAs house the enabling goals required to be implemented across sectors and activities. SFAs and CCWAs are described in more detail in sections 6 and 7, respectively. More detail of the actions that support these goals can be found in the City's Climate Change Action Plan. Figure 4 shows how these SFAs and CCWAs intersect.



SFA 1–5 are climate change adaptation focused, SFA 6 has elements of both climate change adaptation and mitigation, and SFA 7–10 are climate change mitigation focused.

Figure 4: Strategic focus areas and cross-cutting work areas

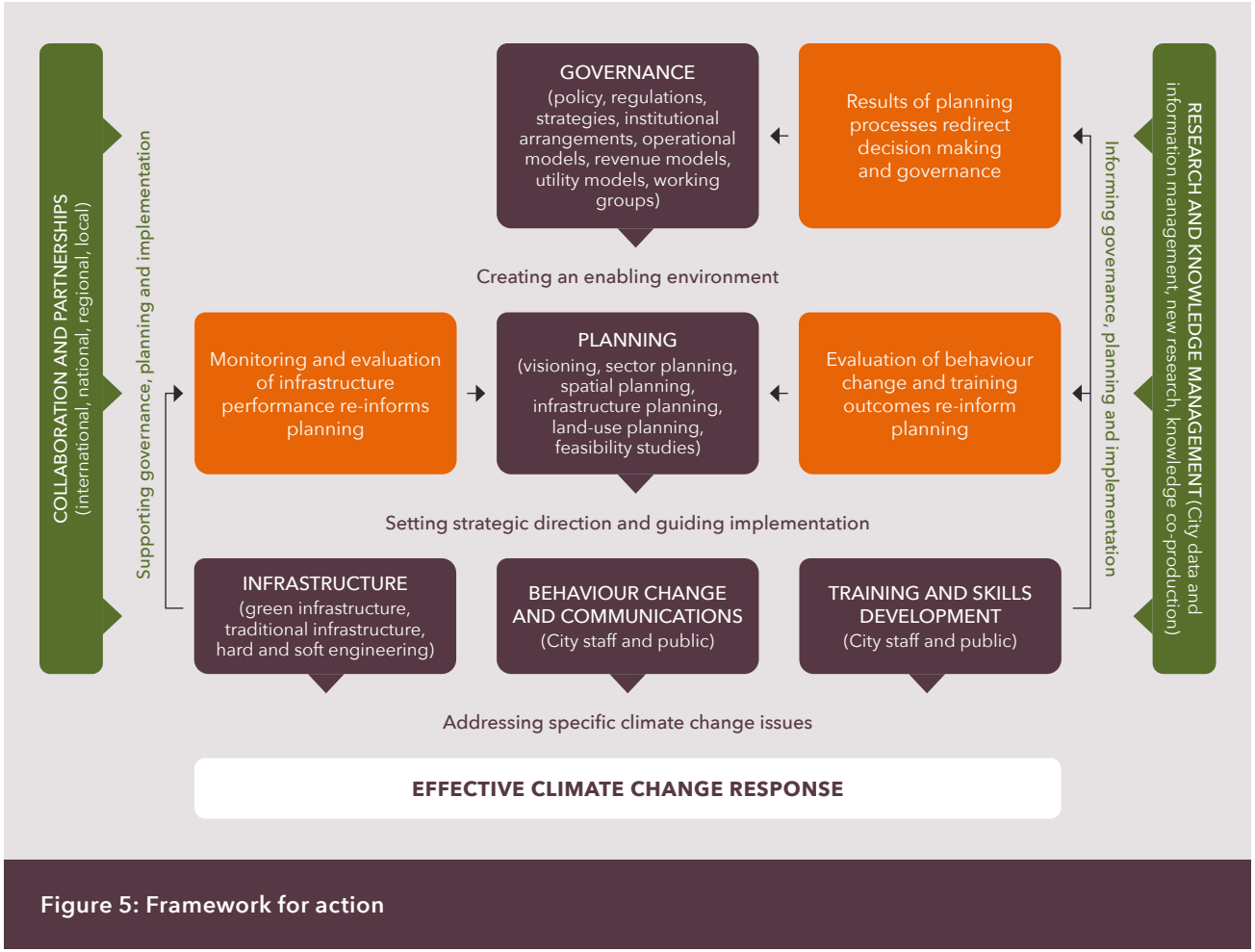


Figure 5: Framework for action

5.4. FRAMEWORK FOR ACTION

Figure 5 shows the types of actions required to implement the SFAs and CCWAs. This framework for action includes an ongoing process of evaluation, assessment and learning to determine if actions being taken are having the desired effect and achieving the vision, desired outcomes and goals. This ongoing cycle of monitoring re-informs planning and implementation, thus leading to improved outcomes.

The actions that will be taken to implement the vision, desired outcomes, and goals of the strategy can be summarised as follows:

- **Governance and regulation:** Adapting leadership, policy, by-laws, strategies, and institutional arrangements for climate change response mainstreaming and enhancing the enabling environment for climate-resilient and carbon-neutral development, and fostering adaptive governance approaches that engender a wider societal response.
- **Planning and visioning:** Climate-responsive and transformational planning, strategy development and incentives that are jointly conducted and integrated across relevant sectors, departments, and external stakeholders to provide strategic direction for climate-resilient and carbon-neutral infrastructure development and behaviour change.

- **Infrastructure and assets**: Integrated infrastructure development and maintenance actions, balancing green and grey infrastructure, with nature-based solutions that limit the incidence of stranded economic assets and reduce or eradicate the impact of extreme climate events.
- **Behaviour change and communications:** Changing behaviour for climate change response decision making, planning, and management by all stakeholders and social partners (government, labour, industry and civil society) through education, mobilisation, and sensitisation towards the realisation of a social contract for climate resilience and carbon neutrality.
- **Training and skills development:** Providing targeted training and skills development to City staff and partner organisations to equip them to effectively respond to climate change within their work areas.
- **Collaboration and partnerships:** Working with international, national, and local climate change-focused partner organisations, and collaborating effectively with other spheres of government and the private sector to implement effective climate change responses.
- **Research, data and knowledge management:** Programmes that ensure that the City remains up to date with scientific progress and knowledge in the field, and is effectively managing and utilising data, information, and knowledge products to support decision making.

6

STRATEGIC FOCUS AREAS AND GOALS

These SFAs have been identified as being critical to ensuring the implementation of the City's climate change vision and principles. SFA 1–5 are climate change adaptation focused, SFA 6 has elements of both climate change adaptation and mitigation, and SFA 7–10 are climate change mitigation focused.

6.1. SFA 1: URBAN COOLING AND HEAT RESPONSIVENESS

Projections show that heat in Cape Town will increase over time, with a significant increase in average, minimum, and maximum daily temperatures, as well as an increase in heat waves (three or more days in a row of 32 °C or hotter) and high heat days (35 °C or hotter). Heat creates significant health risks for people, including heat stroke, heat exhaustion, and increased mortality amongst elderly and vulnerable populations.

Goals and actions within this focus area are focused on both adapting to the impacts of increased heat and putting in place measures to reduce (mitigate) heat where possible. Heat adaptation focuses on putting in place disaster management approaches and protocols to reduce the impact of heat waves and high heat days. Heat mitigation efforts are focused on urban greening to reduce the heat island effect.

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 1:** Reduce immediate risks to health during heat waves and high heat days.
- **Goal 2:** Proactively reduce heat impacts on the city through urban greening.

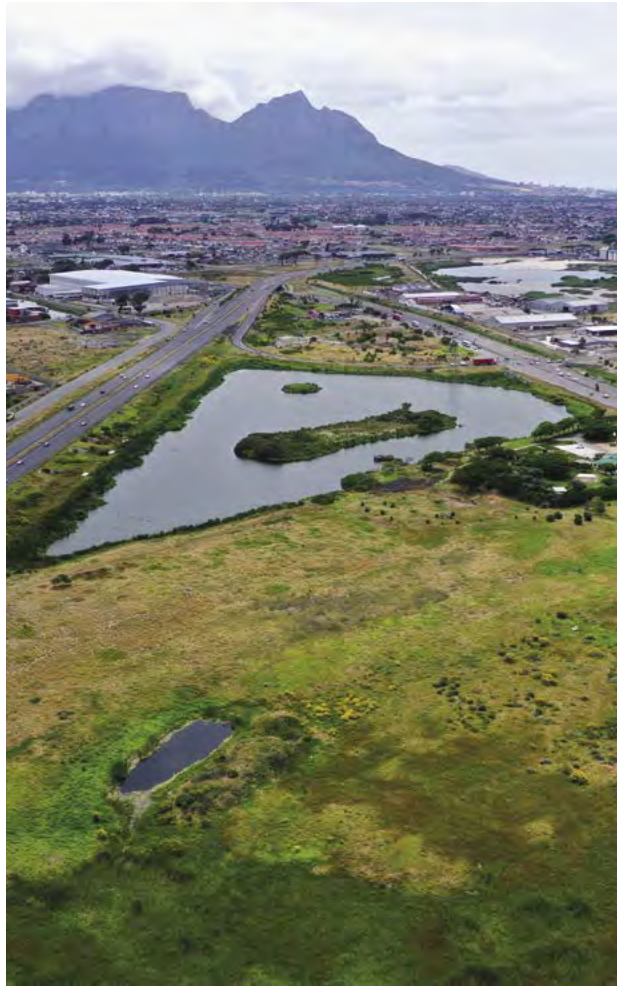
6.2. SFA 2: WATER SECURITY AND DROUGHT-READINESS

Projections indicate that Cape Town and the surrounding region, particularly the area where the primary dams are located, will experience a significantly drier climate in the future. Since 2015, Cape Town has experienced a period of significantly below-average rainfall, resulting in drought and associated water scarcity. During 2017 and 2018, this resulted in the emergence of the 'Day Zero' crisis, in which Cape Town was at risk of running out of water. Concerted action by the City and the public to reduce water demand and implement water-saving measures averted the crisis. It is now recognised that the City must take action to secure Cape Town's future water supply through a range of measures addressing both the diversity and reliability of water supply, managing water demand and reducing wastage.

The City of Cape Town's Water Strategy commits the City to taking bold action to reduce the risk of drought and water scarcity. The vision of the Water Strategy is that "Cape Town will be a water-sensitive city by 2040 that optimises and integrates the management of water resources to improve resilience, competitiveness and liveability, for the prosperity of its people".

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 3:** Reduce demand for water to protect water resources and ensure sustainability of supply.
- **Goal 4:** Work to augment and increase water supplies to achieve 99,5% assurance of supply.



6.3. SFA 3: WATER SENSITIVITY, FLOOD-READINESS AND STORM MANAGEMENT

Flooding has long been a challenge faced by Cape Town. Although rainfall is projected to decrease over time, it is expected that Cape Town will continue to experience several high-rainfall storm events annually. Although the number of cold fronts making landfall is projected to decrease, it is not anticipated at this stage that winter storms related to cut-off low pressure systems will either decrease or increase.

It is also very important to note that flooding in Cape Town is largely related to high levels of vulnerability rather than particularly extreme rainfall events. Vulnerability is related to a range of factors, including geographical location, infrastructure and economic status.

Wind speed and strength are also projected to increase over time. Cape Town already suffers from damaging gale force winds at times, and this will increase in intensity and frequency. Strong winds can cause significant damage to buildings and to infrastructure, such as overhead electricity cables, either directly or due to damage from falling trees or tree branches.

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 5:** Proactively reduce flood risk through the implementation of a water-sensitive city strategy or plan.
- **Goal 6:** Take action to reduce flood risk and storm damage through disaster mitigation approaches.

6.4. SFA 4: COASTAL MANAGEMENT AND RESILIENCE

Cape Town has a coastline of approximately 307 km, consisting of both rocky and sandy shores. Cape Town's coastline is an important asset for the city's economy, provides recreational and tourism opportunities, and supports important biodiversity assets. The coastline also provides an important buffer function by protecting coastal areas from storm surges during storm events. However, due to urban development the natural functions of the coast are threatened; encroachment on the coastline has interrupted natural sand movement dynamics; reduced or eliminated natural vegetation cover; and put in place fixed infrastructure that is vulnerable to impacts of wave action and wind-blown sand.

Climate change is projected to negatively impact the coastline in two significant ways: increased coastal erosion due to a change in coastal dynamics caused by increased wind speed; a change in wind direction; changes in ocean currents and wave action; and sea level rise. Although sea level rise is seen as a longer-term risk, increased coastal erosion is already taking place at various points on the city's coastline and poses a significant risk to infrastructure and property in those areas.

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 7:** Promote coastal resilience to the benefit of both coastal communities and coastal ecosystems.
- **Goal 8:** Put in place effective cooperative and empowering mechanisms for addressing complex coastal management issues in the context of climate change.

6.5. SFA 5: MANAGING FIRE RISK AND RESPONSIVENESS

Fire has been a feature of Cape Town throughout the city's history. The city's location within the Cape Floristic Region, which contains vegetation types that are both fire-prone and require fire to survive, means that wildfires have been a relatively frequent and essential natural occurrence in the city.

However, wildfire poses a risk to people that live at the interface of urban and natural areas along the outskirts of the city and adjacent to Table Mountain National Park. In addition, wildfires that occur too frequently or burn too intensely contribute to biodiversity loss. Wildfires are strongly associated with hot, dry and windy conditions that predominate in the summer months; these conditions are projected to worsen in the future due to climate change. The presence of invasive alien plant species also contributes significantly to wildfire risk.

Within the urban environment, destructive fires are a significant risk in dense informal settlements, causing both loss of life and loss of property, as well as physical injury and psychological trauma. The occurrence of fires in informal settlements has numerous complex underlying factors, but is driven by the use of unsafe fuels for heating, lighting and cooking, and by densities that allow for the rapid spread of fire and hamper access for firefighters.

There is a moderate seasonal component to urban fire, with more frequent fires occurring during the summer months, indicating that hot, dry and windy conditions also contribute to the spread and intensity of urban fires.

Goals and actions within this focus area are focused on reducing the incidence, spread and impact of urban fires, and reducing the incidence of too-frequent and intense wildfires that have the potential to cause biodiversity loss.

In order to address this challenge, the City commits to working towards achieving the following goal within this SFA:

- **Goal 9:** Proactively reduce fire risk and the impact of fires on communities and natural areas.

6.6. SFA 6: SPATIAL AND RESOURCE INCLUSIVITY

A citywide climate action plan driving transformative change must be inclusive. Inclusivity means addressing social and developmental needs and correcting historical legacy, while also tackling the global climate crisis. Vulnerable communities are also disproportionately impacted by climate change.

The City's Resilience Strategy has proven that safe and affordable electricity services and transportation options, with amenities and employment opportunities in proximity to transport nodes, are critical to livelihoods and societal well-being. Applying a developmental lens to climate action allows for a broader range of funding and financing options than actions that are purely about emissions reduction.

Given that the majority of the city's growth is in the informal sector, it is critical that the City is able to instil spatial and resource efficiency at the outset to avoid costly overlays of infrastructure in the long term. Building smartly also has significant adaptation co-benefits (e.g. reduced heat exposure, rainwater harvesting, and resilience to storms and flooding).

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 10:** Densify mass transit routes through mixed-use developments that support public transport and include social housing.
- **Goal 11:** Ensure low-income residents are climate resilient and have equitable access to essential services.

6.7. SFA 7: CARBON-NEUTRAL ENERGY FOR WORK CREATION AND ECONOMIC DEVELOPMENT

Electricity accounts for around 30% of the energy consumed by the city's economy, but over 60% of energy-related emissions. This is because around 90% of South Africa's grid electricity is coal fired and highly carbon intensive. An initial clean energy policy focus on electricity is therefore justified, while being cognisant that substitutes need to be found for industrial heating fuels and jet fuel in the longer term.

Cape Town is home to a growing green economy, as well as a number of industries that are currently exposed to trade risk due to high levels of embedded carbon in the electricity used to produce their goods and services. As corporate carbon accounting and global regulation become more prevalent, these industries and their workers stand to lose.

South Africa's electricity system is centrally planned with a single state utility (Eskom) licensed to buy electricity and transmit to the national grid. An Integrated Resource Plan (IRP) determines the technology and build rate of new capacity, which is directly authorised by the Minister of Mineral Resources and Energy, through a process known as a Ministerial Determination. The Electricity Regulation Act was amended on 16 October 2020 to allow municipalities to apply to the minister to procure or buy new generation capacity in accordance with the IRP. The City has welcomed the amendments, as it acknowledges that municipalities have a role to play in new generation development.

Against a recent backdrop of industry upheaval, political uncertainty, mixed policy signals, and periods of economically devastating unreliable supply and load-shedding, the City faces a very challenging landscape in fulfilling this role. Ultimately, prosperity clearly lies with a globally integrated green economy; yet, with 55 national grid injection points and few generating assets, the city remains, for the time being, highly reliant on the high carbon intensity coal-based electricity from Eskom. A balance must be struck between the independent procurement of renewable electricity required to reach carbon neutrality and collaborating responsibly to support system integrity, and reform and modernise the sector and its assets nationally.

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 12:** Move as quickly as prices and opportunities allow towards 100% carbon-neutral electricity supply by 2050.
- **Goal 13:** Get technologically and commercially ready to operate the metropolitan distribution grid of the future.
- **Goal 14:** Minimise the economic cost of energy transition through maximising energy efficiency and developing a regional value chain for carbon-neutral molecular fuels.

6.8. SFA 8: ZERO-EMISSION BUILDINGS AND PRECINCTS

One of the major opportunities associated with ambitious climate targets is to transform the city through climate smart development, and this can be most effectively achieved through the built environment and urban form. Electricity consumption makes up the city's largest source of emissions, and most of this electricity is consumed in buildings. In Cape Town, residential and commercial buildings account for approximately 24% of energy consumption and are responsible for the largest proportion of carbon emissions (approximately 50%) due to poor energy efficiency and the high carbon intensity of South Africa's electricity production. Significant opportunities exist for decreasing emissions from buildings through reducing building energy demand and supplying remaining building energy needs with a renewable source of energy.

Energy efficiency in buildings is in line with national policy directions, supported by the intentions articulated in the draft National Energy Efficiency and Climate Change Strategies (2011, 2015) and the National Development Plan (2012), which envisages net-zero-emission building standards by 2030. A multipronged approach is required to achieve net-zero carbon buildings. This includes developing more stringent building efficiency regulations, increasing awareness and capacity for low-carbon developments, considering possible incentive packages, developing financing mechanisms to support access to finance for the upfront additional capital costs of energy efficiency and renewable energy interventions, decarbonising Cape Town's electricity grid by developing City-owned renewable energy projects, and enabling the purchase of large-scale renewable energy from independent power producers (IPPs).

The success of the multipronged approach hinges on the City's ability to lead and drive the required changes, using policy and regulation to signal the direction of change. More resource-efficient building approaches will, very importantly, prevent the lock-in of long-lived and inefficient building investments.

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 15:** All new buildings (residential, commercial and municipal) to be net-zero carbon by 2030.
- **Goal 16:** All existing residential and commercial buildings to be retrofitted with energy-efficient technologies to be net-zero carbon in operation by 2050.
- **Goal 17:** All existing municipal buildings (excluding industrial plants) to be net-zero carbon by 2030.

6.9. SFA 9: MOBILITY FOR QUALITY OF LIFE AND LIVELIHOODS

Spatial and economic inequity is apparent in all aspects of service delivery in our city, including energy, transportation, water, sanitation and waste services. In the case of transportation, this was highlighted by an analysis indicating that the 25% poorest households spend an average of 43% of their income on transportation.[16] While the Covid-19 pandemic has reduced what was an escalating congestion problem, with many citizens working from home, it is uncertain to what degree the demand for transport will rebound in the longer term. Economic recovery will in any event require a flourishing services and manufacturing sector, which will require effective and sustainable commuter and freight transport.

Despite efforts to address efficiency and quality of transport systems across the city, the combination of several factors continues to make Cape Town an increasingly congested city, negatively impacting residents across a wide range of geographical locations and income brackets. The spatial form of the city obliges residents to travel long distances to reach their place of work and to return home. The backbone of the city's transportation network – the rail system – is ailing. This is exacerbated by increasing population growth and property development in outlying areas of the city, placing a higher demand on commuter services. At the same time, private vehicle ownership is increasing at approximately 3% per annum.

Overall, energy consumption in the city is dominated by road-based transport fuel consumption (around 50% of total energy consumed). Nearly all of Cape Town's current mobility options are dependent on imported fossil fuels, which are a net drain on our economy, exposing our economy and residents to risks associated with volatile oil and fuel prices on the international market. From 2002 to 2014, for example, petrol doubled in real-term costs before dropping sharply again. Transport is the second biggest contributor to the carbon intensity of Cape Town's economy. This is exacerbated by urban sprawl and the long distances that freight has to travel over a country as large as South Africa. Increased congestion and inefficiencies do not only increase the city's GHG emissions; they worsen air quality and therefore contribute to adverse and costly health impacts on our residents.

The transport mitigation strategy will be to continue to build an efficient and ultimately electric transport network through the best practice EASIA framework (Enable, Avoid, Shift, Improve, Adapt). This entails promoting efficiencies in: transport governance, land use, multimodal transport systems, road space usage and vehicles; and that infrastructure is adapted to climate hazards. In the local context, EASIA involves enabling a shift to walking and cycling, while switching to electric vehicles in the transport sector off the back of clean energy, and continuing the longstanding national and local efforts to achieve better public transport and, in particular, be proactive on the rail system so that its future role in the system is clear.

[16] *City of Cape Town (2018).*

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 18:** Through the City's role as the transport planning authority and the contracting authority for bus rapid transport (BRT) services, support the restoration, rehabilitation and expansion of the rail system to a carrying capacity of 30% above 2010 levels by 2030, and put in place a contingency for alternative mass transit infrastructure in the event that the rail system does not recover or ceases to be functional altogether.
- **Goal 19:** Integrate transport modes to improve efficiency and fast track a modal shift from passenger kilometres by private vehicles to other modes (decreasing from 58% in 2016 to 23% in 2050).
- **Goal 20:** Prepare for a scenario of complete transition to electric or alternative fuel-powered freight, bus, taxi and passenger vehicles by 2050.
- **Goal 21:** Develop and maintain indicators for GHG and local air pollutants from the transport sector, both citywide and for City operations, ensuring that they inform City transport planning, procurement and regulation.

6.10. SFA 10: CIRCULAR WASTE ECONOMY

Landfilled organic waste is not only a contaminant of other potentially recoverable materials in the waste system, it is the major source of methane emissions in Cape Town. Solid waste contributes approximately 95% and wastewater contributes approximately 5% to the total combined emissions from solid waste and wastewater. Methane arising from landfilled organic waste and from wastewater treatment is a powerful GHG that historically has resulted in the waste sector being responsible for 10–11% of citywide GHG emissions.

Recovering and deriving value from Cape Town's waste and wastewater stream is a key element in the shift towards a green economy, with multiple co-benefits with respect to job creation, cleanliness of the city, and reduced littering and illegal dumping. A range of consistently implemented interventions will be required to stimulate the transition of the waste management system. Central to the transition is removal of organic waste from the general waste stream, which enables the recovery of useful waste materials such as electronic waste, builders' rubble and textile waste (in addition to existing recyclables such as paper, glass, plastics and metals). However, efforts also need to be invested in inclusion of informal waste pickers, and advancing towards elimination of single-use packaging and materials in Cape Town's economy by addressing producer responsibility. Further opportunities exist in the development of waste-to-energy systems, and the beneficiation of wastewater sludge for productive use.

Transversal coordination and collaboration with private (non-City) waste service providers, provincial government, and informal waste pickers are important for enabling the desired transition. The programme of interventions in this sector will serve to unblock challenges with respect to resourcing and financing, and to facilitate opportunities for collaboration and involvement of other waste sector stakeholders through the plan. This also requires additional work to better understand the costs and benefits of this transition, and the resources required to create a circular waste economy.

In order to address this challenge, the City commits to working towards achieving the following goals within this SFA:

- **Goal 22:** Develop and implement an integrated waste management strategy that is financially feasible, and maximises material efficiency by prioritising waste avoidance, reduction, treatment and recycling in line with national targets.
- **Goal 23:** Reduce organic waste disposal to landfill (in line with provincial Integrated Waste Management Plan targets) by 50% by 2022 and 100% by 2027 through better waste separation, treatment and utilisation.
- **Goal 24:** Increase diversion of recyclables from disposal to landfill by 40% by 2025, 55% by 2030, >70% by 2035, and 85% by 2050 through improved collection, waste separation, and providing support to informal workers.
- **Goal 25:** Reduce the climate and environmental impact of waste disposal and wastewater treatment facilities by increasing biogas and landfill gas collection efficiency, treatment and utilisation.

7

CROSS-CUTTING WORK AREAS AND GOALS

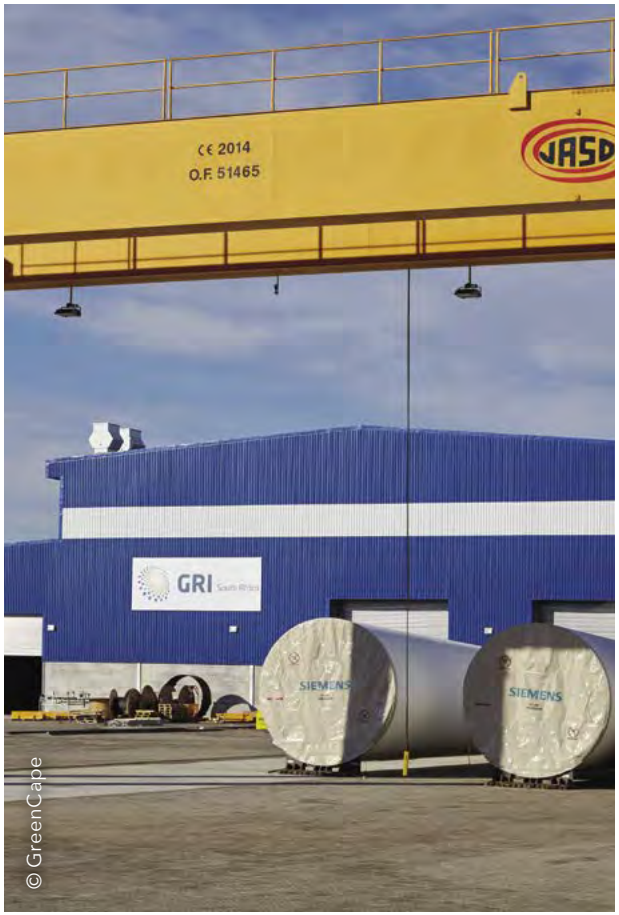
In order to effectively address climate change, several CCWAs have been identified. These CCWAs support the implementation of SFAs and are necessary to ensure that the appropriate governance measures are in place to enable an effective and integrated climate change response by the City of Cape Town.

7.1. CCWA 1: MAINSTREAMING, GOVERNANCE, RESEARCH AND KNOWLEDGE MANAGEMENT

Mainstreaming is essential in order to ensure that climate change response is not seen as the responsibility of only one or two departments, but rather becomes a shared responsibility across all City departments and functions. Mainstreaming also works to ensure that climate change response is recognised as an essential part of all City policies, strategies, plans and processes, rather than a niche or sectoral work area. In addition, it is essential that the City remains up to date with the latest research related to climate change adaptation and mitigation, in order to ensure that this is effectively mainstreamed into action, and that actions are taken based on the best available scientific knowledge. Therefore, improved data, information and knowledge management are important to ensure that research outputs are effectively utilised, managed and disseminated, and fed back into planning and implementation processes.

The City therefore commits to working towards achieving the following goals within this CCWA:

- **Goal 26:** Mainstream climate change responses into key City strategies, policies, processes and plans.
- **Goal 27:** Conduct and commission climate change-related research and ensure that the City remains up to date with emerging research in the field.



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7.2. CCWA 2: ECONOMIC IMPACTS AND GREEN ECONOMY OPPORTUNITIES

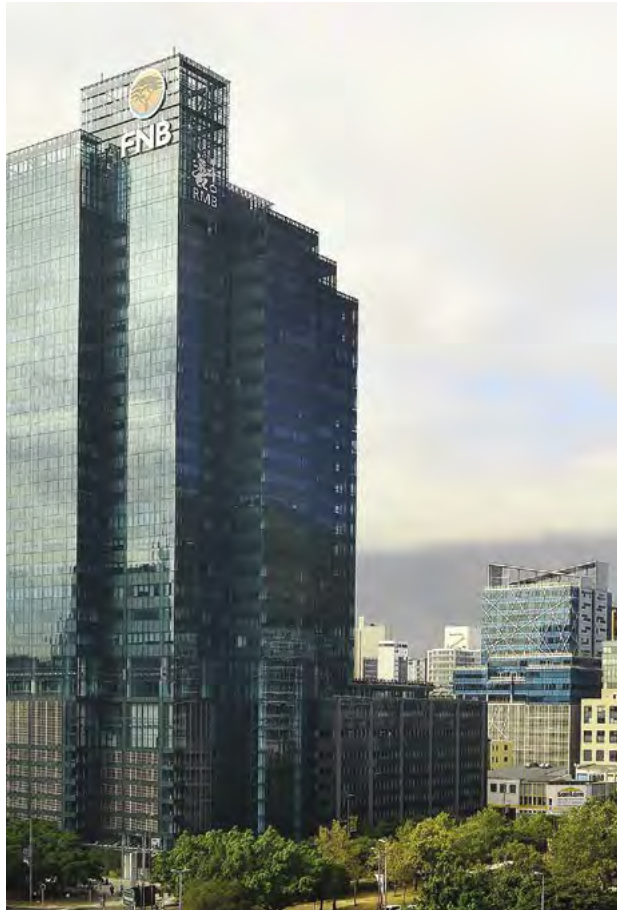
The economic impact of climate change has been identified as a major challenge facing Cape Town. This impact is related to both the negative effects of climate change on infrastructure, human health, and the city's natural resource base, and the potential impacts on the City's economic competitiveness should Cape Town not keep pace with international trends in carbon-neutral processes, products and services.

Solutions to decarbonisation need to account for the highly integrated regional, national and global context. These solutions need to consider the GHG emissions embedded in local economic inputs and outputs, and the associated need to remain competitive in view of the regulatory environment, value chains and economic niches.

Goals and actions within this work area therefore focus on working with various economic sector bodies to reduce climate risk within their sectors, increase international competitiveness as it relates to carbon neutrality, and mainstream climate change adaptation and mitigation into the City's existing green economy approach.

The City therefore commits to working towards achieving the following goals within this CCWA:

- **Goal 28:** Advance the local green products and services market and reduce the risks of climate impacts on local economic development.
- **Goal 29:** Support the development of a climate-resilient and carbon-neutral green economy through City operations.



7.3. CCWA 3: BUSINESS MODELS, REVENUE AND FINANCING CLIMATE CHANGE RESPONSE

Responding to climate change may be costly, especially where significant infrastructure may need to be installed, replaced or upgraded in order to ensure climate resilience and carbon neutrality. Municipal budgets alone may be insufficient to cover these costs, and therefore innovative ways of financing this work is required. In addition, nature-based solutions and other lower-cost and green infrastructure-focused methods may significantly reduce the costs of climate change response implementation and will therefore be explored as a priority means of implementation, where appropriate.

There is also a need to re-look at how the City assesses the costs and benefits of actions and decisions, and adopt new mechanisms for doing so, including lifecycle analyses and accounting for both positive and negative externalities. In addition, the City will need to re-look the various business models of its services in light of the disruption to electricity income that is likely to occur due to increased uptake of small-scale embedded generation and the impact of new and disruptive technologies. Finally, where the City invests its money has implications for its financial sustainability, and the City's investment strategy needs to take account of the risks associated with unsustainable investments – particularly assets that are likely to be affected by climate change and those that are related to the causes of climate change. Divestment is motivated by greater responsibility and greater long-term returns.

The City therefore commits to working towards achieving the following goals within this CCWA:

- **Goal 30:** Investigate sources of climate finance and the use of innovative financial mechanisms to support climate change response and implement where feasible.
- **Goal 31:** Use financial mechanisms, including business models, tariffs, investment and divestment to respond to climate change impacts and mitigation opportunities.

7.4. CCWA 4: COMMUNICATION, COLLABORATION AND SKILLS DEVELOPMENT

Communication, awareness raising, education and training are vital components of addressing both climate change mitigation and adaptation. From a mitigation perspective, communication, awareness raising, education and training programmes are important to help change behaviours related to energy consumption and emissions production, as well as providing support for transitioning to new technologies or ways of living. From an adaptation perspective, communication, awareness raising, education and training programmes support people to take action to improve their resilience and protect themselves against climate shocks and stresses. An effective communication system is also an important part of disaster risk management to ensure that people receive clear and up-to-date information about how to lower their risks or receive assistance during a climate shock.

Climate change response also cuts across all three spheres of government, and as such requires integration and collaboration to ensure effective implementation. Collaboration with international organisations such as C40, ICLEI (Local Governments for Sustainability), Global Resilient Cities Network, World Economic Forum: Systemic Efficiency Group, and with other cities committed to addressing climate change – both within South Africa and internationally – forms an essential part of the City's response. This allows the City to learn from best practice and benefit from knowledge sharing.

The City therefore commits to working towards achieving the following goals within this CCWA:

- **Goal 32:** Ensure that Cape Town's residents, businesses, visitors and City officials receive timely, effective, and appropriate climate change education, communication and training.
- **Goal 33:** Establish and maintain partnerships with local, regional and international organisations to support climate actions.
- **Goal 34:** Work with national and provincial government to collaboratively reform/devolve decision making to support inclusive climate change action.

7.5. CCWA 5: PROMOTE, PROTECT, AND ENHANCE HUMAN AND ECOSYSTEM HEALTH

Cape Town is situated within a global biodiversity hotspot, creating a unique environment that brings with it the challenges of conservation and biodiversity management in a rapidly developing urban context. The city's natural environment provides a range of important ecosystem goods and services, including: provisioning services such as food, water, timber and fibre; regulating services that affect climate, floods, disease, waste, and water quality; cultural services that provide recreational, aesthetic and spiritual benefits; and supporting services such as soil formation, photosynthesis and nutrient cycling,[17] as described in the Millennium Ecosystem Assessment (MEA).

The MEA emphasises the interrelatedness of human and ecosystem health, and the significant contribution that ecosystem health makes to human well-being, as follows:

Human well-being is assumed to have multiple constituents, including the basic material for a good life, such as secure and adequate livelihoods, enough food at all times, shelter, clothing and access to goods; health, including feeling well and having a healthy physical environment, such as clean air and access to clean water; good social relations, including social cohesion, mutual respect, and the ability to help others and provide for children; security, including secure access to natural and other resources, personal safety, and security from natural and human-made disasters; and freedom of choice and action, including the opportunity to achieve what an individual values doing and being. The conceptual framework for the MEA posits that people are integral parts of ecosystems and that a dynamic interaction exists between them and other parts of ecosystems, with the changing human condition driving, both directly and indirectly, changes in ecosystems and thereby causing changes in human well-being.

Human health challenges related to air and water pollution have been identified as posing a significant and increasing risk in the context of climate change. Cape Town's food systems have also been identified as a source of significant risk – both in terms of their vulnerability to climate change, and the negative impact that food and nutritional insecurity have on vulnerability and thus increased climate risk.

The City therefore commits to working towards achieving the following goals within this CCWA:

- **Goal 35:** Develop and implement a green infrastructure programme that supports climate change response, protects biodiversity, and enhances ecosystem goods and services.
- **Goal 36:** Ensure that physical health and mental well-being are addressed through the City's climate change response.
- **Goal 37:** Promote food security, as well as low-carbon and climate-resilient food systems in Cape Town.

[17] *Millennium Ecosystem Assessment (2005).*

8

CLIMATE CHANGE ACTION PLAN

This Climate Change Strategy provides the broad and overarching framework for decision making regarding climate change, as well as the strategic direction for action planning and programme implementation.

However, this strategy does not include detail on specific actions or programmes of action. This level of detail is captured within the City of Cape Town Climate Change Action Plan, which should be read alongside this strategy.

The Climate Change Action Plan includes details on a range of actions across all of the SFAs and CCWAs. These actions are programmatic in nature and contain many sub-actions that take the form of programmes of action, projects, detailed plans of action, and operating procedures.

9

STRATEGY AND POLICY LINKAGES

A number of existing City, provincial and national policies, strategies, plans, and pieces of legislation address various aspects of climate change adaptation and mitigation. This Climate Change Strategy is aligned with and builds on these.

9.1. CITY OF CAPE TOWN STRATEGIES, POLICIES AND PLANS

- **Cape Town Resilience Strategy (2019):** This strategy aims to put in place programmes and projects to address a set of prioritised chronic stresses and acute shocks, including climate change and related climate shocks and stresses, and to increase Cape Town's resilience and reduce vulnerability into the future.
- **Cape Town's Water Strategy (2019):** This strategy sets out the City's high-level vision and plan for transitioning Cape Town to become "a water-sensitive city that optimises and integrates the management of water resources to improve resilience, competitiveness, and liveability for the prosperity of its people". Addressing the impacts of climate change, specifically drought, is a core concern of the strategy.
- **Inclusive Economic Growth Strategy (Draft, 2019):** This strategy rests on six core principles: inclusivity, competitiveness, accessibility, resilience, sustainability and collaboration. These principles encourage inclusive, sustainable and resilient development, and will contribute significantly to reducing vulnerability for those that are most at risk from climate hazards.
- **Municipal Spatial Development Framework (2018):** This framework sets out the spatial vision and development priorities to achieve a reconfigured, inclusive spatial form for Cape Town. Fundamental to the framework is ensuring spatial transformation via dense and transit-oriented growth and development, anchored by an efficient transport system.
- **Environmental Strategy (2017):** The City of Cape Town Environmental Strategy recognises the risks posed by climate change and natural hazards, and therefore commits the City to the following principle: "In taking decisions, implementing service delivery, operating, and planning for the future, the City will ensure a focus on resilience, enabling the city to withstand and mitigate the negative impacts of environmental hazards, proactively reduce Cape Town's vulnerability, and protect the city's economy."
- **Transit-Oriented Development (TOD) Strategic Framework (2016):** The purpose of the City of Cape Town TOD Strategic Framework is to identify the tools and mechanisms to be employed by various role players who have a collective impact on development to ensure that they move progressively towards a more sustainable, compact and equitable urban form.
- **Cape Town Bioregional Plan (2015):** This plan comprises a biodiversity profile for the bioregion, the Biodiversity Network and management guidelines. The Cape Town Biodiversity Network is a spatial plan that shows terrestrial and aquatic features that are critical for conserving biodiversity and maintaining ecosystem functioning. The plan aims to increase the sustainability of the city's ecosystem goods and services, as well as mitigate the impact of climate change by improving biotic adaptation to climate change.
- **Integrated Coastal Management Policy of the City of Cape Town (2014):** This policy sets out the City's approach to coastal management and includes a principle committing to strategic, proactive, consistent, and risk-averse coastal decision making in the best interests of the broader community of Cape Town, including the implementation of proactive and progressive measures to reduce coastal risk from climate change, sea level rise, and storm surge events.

9.2. PROVINCIAL STRATEGIES

- **Western Cape Climate Change Response Strategy (2014):** This strategy is a coordinated climate change response that aims to guide climate change adaptation and mitigation programmes, plans and actions across nine focus areas in the Western Cape province.

9.3. NATIONAL POLICIES AND LEGISLATION

- **National Climate Change Adaptation Strategy (2020):** This strategy aims to guide South Africa's journey towards a climate-resilient society through adaptation by outlining a set of strategic objectives, interventions and outcomes with associated actions for all key sectors and stakeholders in South Africa's adaptation landscape.
- **National Low Emissions Development Strategy (LEDS) 2050 (2020):** This strategy is a response to the Paris Agreement's call for countries to set out long-term climate change strategies and serves as an extension of South Africa's Nationally Determined Contribution with the goal to ultimately become zero carbon by 2050. It draws together existing policies, planning, and research across economic sectors. Amongst these is the IRP, which is how South Africa plans its electricity supply.
- **Carbon Tax Act, Act 15 of 2019:** The act gives effect to the polluter-pays principle for large emitters and aims to ensure that firms and consumers take the negative adverse costs (externalities) into account in their future production, consumption and investment decisions. The current carbon tax is R120/tCO_2e. However, as per the tax design, a series of tax allowances have been introduced for the first phase (1 June 2019 – 31 December 2022), which will reduce the initial effective tax rate.
- **Climate Change Bill (Draft, 2018):** The Climate Change Bill will become the legal instrument that regulates the implementation of climate response, and outlines the development of specific adaptation and mitigation targets, plans, strategies and objectives, such as the development of a National Adaptation Strategy and a National Greenhouse Gas Inventory.
- **Green Transport Strategy: 2018–2050 (2018):** To address the significant contribution of transport to national GHG emissions, the Department of Transport has developed a Green Transport Strategy (GTS), which aims to minimise the adverse impact of transport on the environment, while addressing current and future transport demands. This is underpinned by sustainable development principles. The strategy aims to promote green mobility to ensure that the transport sector supports the achievement of green economic development targets and the protection of the environment.
- **SANS 204 and the National Building Regulations Part XA, 'Energy Efficiency' (2011):** This document provides for the amendment of the National Building Regulations to include energy-efficiency standards in all residential and commercial buildings. Importantly, it includes water heating, where at least 50% of heating needs must be met by non-electrical resistance means. The amendment has made provision for a building envelope, fenestration, passive solar heating, and insulation.
- **National Climate Change Response Policy (2011):** This policy provides an overarching "vision for an effective climate change response and the long-term, just transition to a climate-resilient and lower-carbon economy and society", and outlines ten near-term priority flagship programmes in key sectors to achieve this vision.

10

MONITORING, EVALUATION AND LEARNING

A monitoring, evaluation and learning plan will be developed to ensure that the City is able to track progress regarding the implementation of this strategy, and the Climate Change Action Plan, and make updates or changes as required. The monitoring and evaluation process will include regular assessment of progress in order to feed back into the implementation cycle as depicted in figure 5.

The process will also include a focus on identifying areas for continued learning and ensuring that results of learning processes are provided to stakeholders to support more effective future action. Where learning opportunities are identified, the City will work with partner organisations to promote learning from and with partners, and disseminate the results of learning processes.

This plan will include regular reporting to relevant City portfolio committees, and integration with the City's Service Delivery and Budget Implementation Plan (SDBIP) process where necessary and appropriate.

This strategy will be reviewed and updated every five years at a minimum, and may be reviewed and updated more frequently if deemed necessary. The City acknowledges that climate change response is a fast-moving and developing field, and therefore regular review is necessary to ensure that the strategy remains up to date.

11

GLOSSARY

11.1. DEFINITIONS

For the purposes of this Climate Change Strategy, the following definitions apply. Where appropriate, the official IPCC definition has been used:[18]

'Adaptation' means, in human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities; in natural systems, it means the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects.

'Adaptive capacity' means the ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.

'BASIC reporting' means the current emissions reporting standard for local governments under the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC) and includes scope 1 and scope 2 emissions from stationary energy and transportation, as well as scope 1 and scope 3 emissions from waste. Cities have the option of selecting between two reporting levels under the GPC city-induced framework: BASIC or BASIC+.

'Carbon neutral', in simple terms, means that after taking into account any potential carbon sinks (vegetation that absorbs carbon), the net greenhouse gas emissions from all sources are zero (or as close as possible to zero). Progress towards carbon neutrality is tracked by measuring the city carbon footprint on a regular basis.

'Carbon sequestration' means the process by which carbon sinks remove carbon dioxide (CO_2) from the atmosphere.

'City' means the City of Cape Town, a municipality established by the City of Cape Town Establishment Notice No. 479 of 22 September 2000, issued in terms of the Local Government: Municipal Structures Act, Act 117 of 1998, or any structure or employee of the City acting in terms of delegated authority.

'city' means the greater metropolitan area of Cape Town in which the City of Cape Town has jurisdiction.

'Climate change' means a change of climate, which is attributed directly or indirectly to human activity, that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

'Council' means the Municipal Council of the City of Cape Town.

'Ecosystem services' means ecological processes or functions having monetary or non-monetary value to individuals or society at large. These are frequently classified as (1) supporting services such as productivity or biodiversity maintenance; (2) provisioning services such as food or fibre; (3) regulating services such as climate regulation or carbon sequestration; and (4) cultural services such as tourism or spiritual and aesthetic appreciation.

'Exposure' means the presence of people, livelihoods, species, ecosystems, infrastructure, resources, environmental functions and services, and economic, social, or cultural assets in places and settings that could be adversely affected.

'Fossil fuel' means carbon-based fuels from fossil hydrocarbon deposits, including coal, oil and natural gas.

'Green economy' means expanded economic opportunities created through the provision of goods and services, and the use of production processes that are more resource efficient, enhance environmental resilience, optimise the use of natural assets, and promote social inclusivity.

'Green infrastructure' means an interconnected set of natural and constructed ecological systems, green spaces, and other landscape features that provides ecosystem services. It includes both indigenous and exotic trees, wetlands, parks, greenbelts and green open spaces, and nature reserves and biodiversity sites, as well as building and street-level design interventions that incorporate vegetation.

[18] *IPCC (2018a).*

Green infrastructure provides services and functions in the same way as conventional infrastructure.

'Hazard' means the potential occurrence of a natural or human-induced physical event, trend or physical impact that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources.

'Impact' means the consequences of realised risks on natural and human systems, where risks result from the interactions of climate-related hazards (including extreme weather and climate events), exposure and vulnerability. Impacts generally refer to effects on lives, livelihoods, health, well-being, ecosystems, species, services (including ecosystem services), infrastructure, and economic, social and cultural assets. Impacts may be referred to as consequences or outcomes and can be adverse or beneficial.

'Maladaptation' means actions that may lead to increased risk of adverse climate-related outcomes, including via increased GHG emissions, increased vulnerability to climate change, or diminished welfare, now or in the future. Maladaptation is usually an unintended negative consequence.

'Mean annual rainfall' means the average total amount of rainfall recorded during a year in a particular place.

'Mean annual temperature' means the average air temperature recorded during a year in a particular place.

'Mean sea level' means the height of the sea surface averaged over all stages of the tide over a long period of time.

'Mitigation' means, in the context of climate change, a human intervention to reduce emissions or enhance the sinks of greenhouse gases.

'Nationally Determined Contributions' are the commitments that each country has made on adaptation, mitigation and investment requirements towards the implementation of the Paris Agreement (2015).

'Resilience' means the capacity of individuals, communities, institutions, businesses, and environmental systems to survive, adapt and thrive no matter what kind of chronic stresses and acute shocks they experience.

'Risk' means the potential for adverse consequences where something of value is at stake and where the occurrence and degree of an outcome is uncertain. Risk results from the interaction of vulnerability (of the affected system), its exposure over time (to the hazard), as well as the (climate-related) hazard and the likelihood of its occurrence.

'Sink' means a reservoir (natural or human, in soil, ocean and plants) where a greenhouse gas, an aerosol, or a precursor of a greenhouse gas is stored.

'Sustainability' means a dynamic process in which individuals, communities and society are enabled to reach their full potential, maximise quality of life, and meet their economic, social, and cultural needs, while simultaneously protecting, enhancing and managing the natural environment and optimising the economic benefits of ecosystem goods and services. This occurs through a framework of good governance and considered decision making that ensures that these assets, their current functions and future potential are not eroded.

'Vulnerability' means the propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm, and lack of capacity to cope and adapt.

11.2. ACRONYMS AND ABBREVIATIONS

AFOLU	Agriculture, Forestry and Land Use
BRT	bus rapid transport
C40	C40 Cities Climate Leadership Group
CCWA	cross-cutting work area
CH_4	methane
CO_2	carbon dioxide
EASIA	Enable, Avoid, Shift, Improve, Adapt
GHG	greenhouse gas
GPC	Global Protocol for Community-scale Greenhouse Gas Emission Inventories
GTS	Green Transport Strategy
ICLEI	Local Governments for Sustainability (formerly known as the International Council for Local Environmental Initiatives)
IPCC	Intergovernmental Panel on Climate Change
IPP	independent power producer
IPPU	Industrial Processes and Product Use
IRP	Integrated Resource Plan
MEA	Millennium Ecosystem Assessment
N_2O	nitrous oxide
NGO	non-governmental organisation
PRASA	Passenger Rail Agency of South Africa
SDBIP	Service Delivery and Budget Implementation Plan
SDG	Sustainable Development Goals
SEZ	special economic zone
SFA	strategic focus area

12

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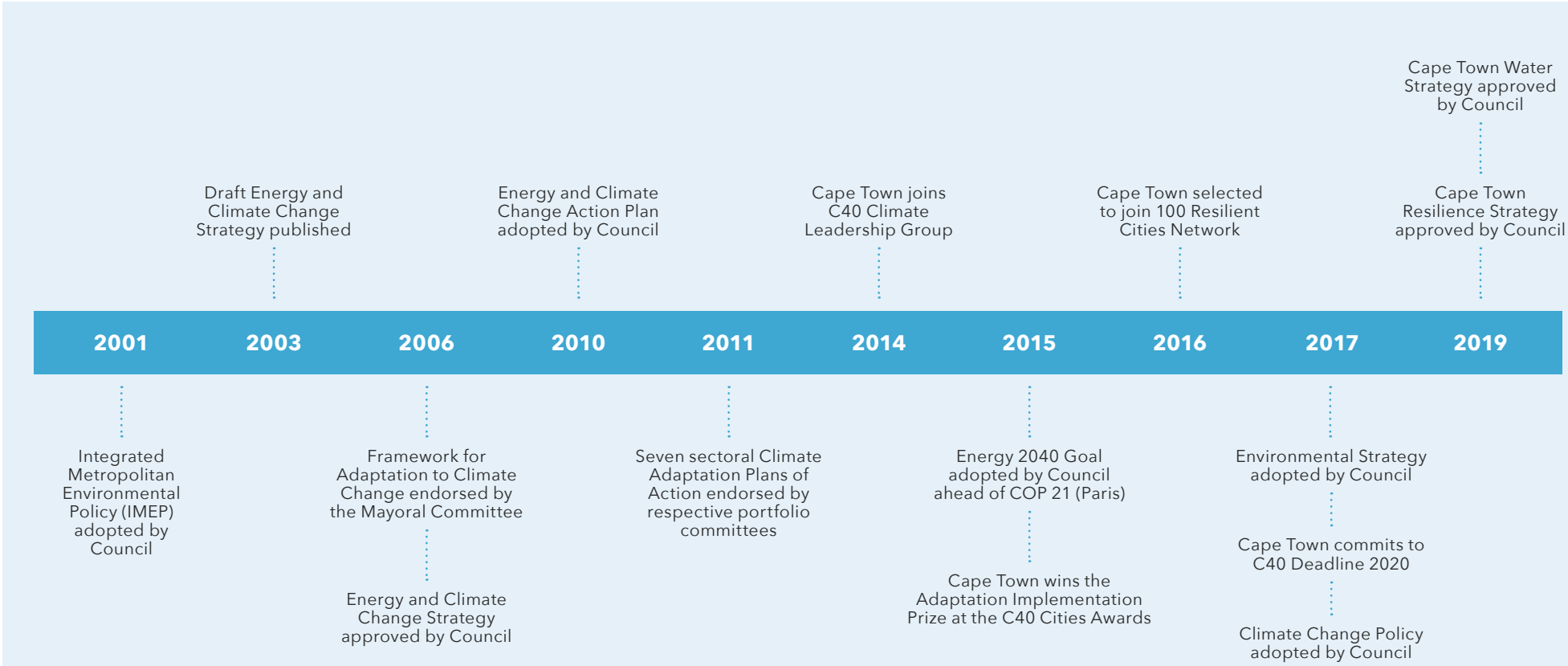
ANNEXURE A

TIMELINE OF CITY OF CAPE TOWN CLIMATE CHANGE STRATEGY, POLICY, AND PLANNING

The diagram on the next page shows an overview of key strategies, policies and plans that the City of Cape Town has adopted as part of its climate change response, alongside some key milestones. These strategies, policies and plans support and guide the implementation of key programmes and projects.



Timeline of City of Cape Town Climate Change Strategy, Policy, and Planning

CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Making progress possible. Together.