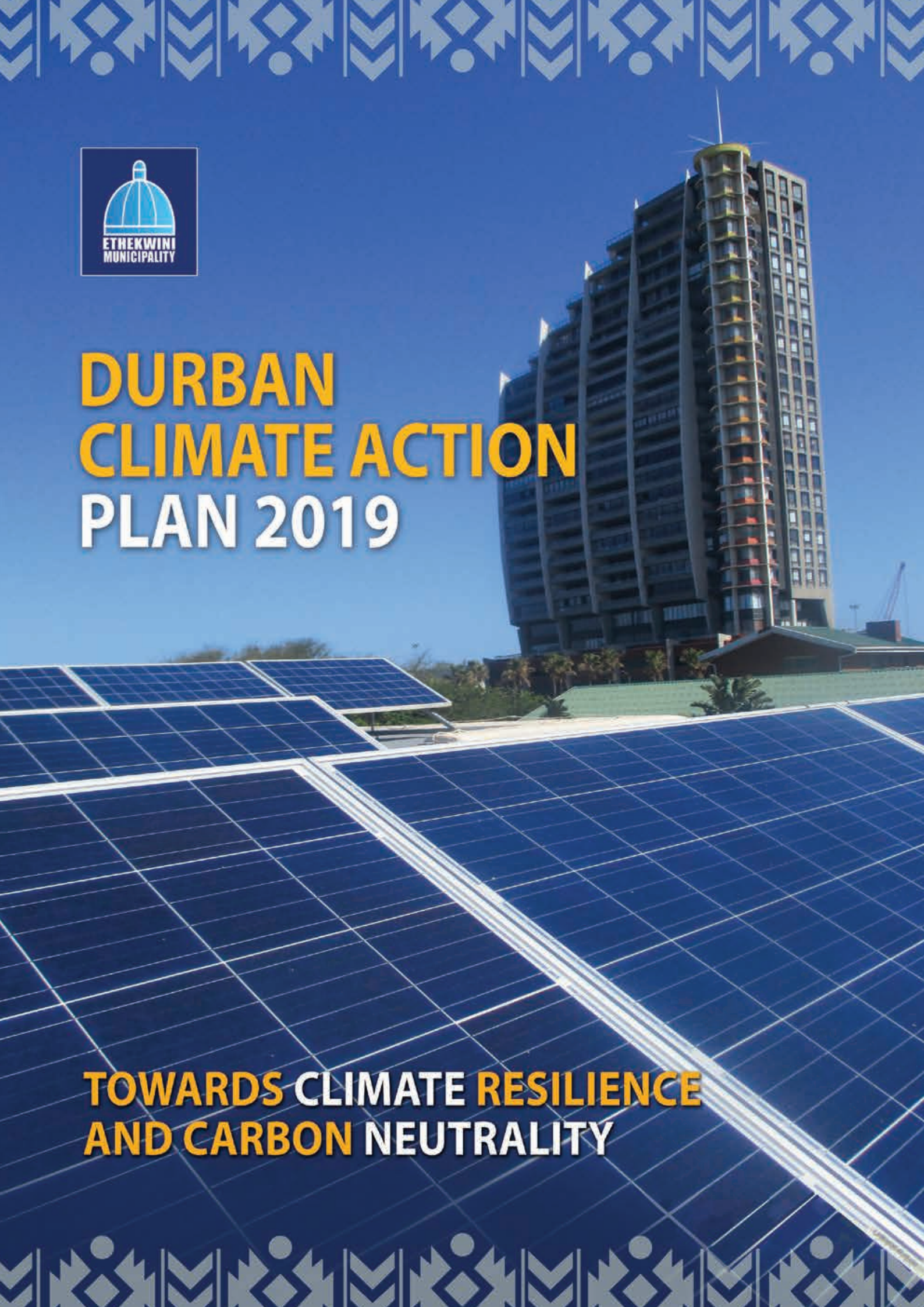


DURBAN CLIMATE ACTION PLAN 2019

TOWARDS CLIMATE RESILIENCE AND CARBON NEUTRALITY

Table of Contents

Message from the Mayor

Climate change is one of the most pressing challenges of our time. Its impacts will fall disproportionately in the global south and exacerbate the vulnerability of African countries economically and socially. The urgency to respond to climate change in Africa is demonstrated in the consensus reached by all African leaders and acknowledged in the Africa's Development Agenda 2063: The Africa We want. Over the past 25 years, the number of weather-related disasters has doubled, resulting in the African region having the highest mortality rate related to environmental change. The time for Africa to act is now, and the agenda should be driven at all levels of government.

EThekwini Municipality, as a city in the global south, is already experiencing the effects of climate change. On 22 April 2019, we were reminded of these dangers as our City received over 200mm of rainfall in a 24-hour period, resulting in wide-spread and disastrous flooding in the City and province of KwaZulu-Natal. The City mourns the loss of lives during these floods and recovery efforts are still underway.

The City has been leveraging on key strategic partnerships in particular with C40 Cities Climate Leadership Group to unlock some systematic challenges. To this extent eThekwini was privileged to be selected to pilot the Paris compatible 1.5°C Climate Action Plan. The 1.5°C Climate Action Plan seeks to drive ambition and bold actions to transform the City towards climate resilience and carbon neutrality. The City climate change team together with C40 has worked diligently, facilitating an inclusive and transparent process providing a platform for engagement among municipal sectors, and between the municipality and external stakeholders.

The "Vulnerable Communities" and "Sisonke" chapters are of particular interest to me, as they are subjects close to my heart. We as the City need to ensure the safety of our communities and their livelihoods for a prosperous and inclusive society that is well-equipped for climate impacts. Let us value and protect natural resources to rekindle a harmonious living for our people, while leveraging on its free and valuable services. Indeed "the City cannot do this alone" theme is significant as it calls for closer collaboration and partnering with national government, the private sector, traditional leadership, non-profit organisations as well as the community at large, in driving a collective agenda that will secure the future of the City and its people.

This plan is a true representation of the proverb in isiZulu that says "umuntu ungumuntu ngabantu" meaning "an individual is nothing without their community". The City, cannot be impactful without the support of the wider community. It is through this action plan that our City will become a leading prosperous, economically viable city for the future. I am confident that our pro-activeness would yield us a safe City with citizens resilient against the impacts of climate change.

The climate emergency is upon us, and now, more than ever, collective action matters.

masiBambisane! - Lets work together!

Mayor Cllr Mxolisi Kaunda
September 2019

Message from C40 Cities Regional Director for Africa

Following the launch of *Deadline 2020: How Cities Will Get the Job Done* in 2016, C40 cities have demonstrated commitment and leadership towards delivering ambitious, transformative climate action plans. To date, 11 cities have developed integrated, evidence-based climate action plans that provide a detailed pathway for what each city needs to do to meet the goals of the Paris Agreement by 2050.

I am pleased to recognise Durban as the first African city and the twelfth C40 City to deliver a climate action plan that aims to transition the city towards carbon neutrality and climate resilience while also ensuring the benefits of this transition are distributed equitably. Durban presents a plan that is both bold and ambitious, providing low carbon-resilient development consistent with the objectives of the Paris Agreement. Notably, the plan integrates both mitigation and adaptation measures and prioritises the need to ensure that the City and its people are resilient to climate-related hazards and extreme weather events. In addition, Durban has integrated inclusivity throughout the plan, recognising that vulnerable communities bear the brunt of climate-related disasters.

The next step is to accelerate implementation and deliver on Durban's transformational climate actions. We, as C40, look forward to working with the City to learn from their journey and work with them to achieve the ambition set out in these climate action plans. The time to act is now, and the best way to act is to act together, learn from each other and continuously share our best practice to enable us limit global average temperature to 1.5°C and strengthen the ability of cities to deal with the impacts of climate change through increased resilience.

I would like to conclude with an African proverb, "If you want to go fast go alone, if you want to go far go together." So let's get to work to accelerate the transition to a carbon neutral, resilient Durban.

Mr Hastings Chikoko
September 2019

C40 CITIES

Preamble

Climate change is no longer a future phenomenon, it is already upon us and affects us all. There is growing recognition that it is not only an environmental issue, but also an economic and social issue.

The 2015 Paris Agreement clearly outlines the international commitment to limit global average temperature rise to well below 2°C. The IPCC Special Report: Global Warming of 1.5°C (2018) further indicates that we are already 1°C warmer than pre-industrial levels and while we will face major impacts with 1.5°C of warming, 2°C warming is significantly worse.

Building on the momentous Paris Agreement, nations, states and cities around the world are firmly transitioning towards low carbon, resilient economies. However, this transition is complicated in developing and under developed countries. In South Africa the challenges of unemployment, poverty and inequality must also be acknowledged. During the 2019 State of the Nation Address, President Ramaphosa emphasised that in prioritising the interests of the poor and vulnerable, we need to act with greater urgency in responding to climate change.

From the recent storms in Durban (10 October 2017 and 22 April 2019), it is evident that business as usual (BAU) is no longer an option; we need to do things differently in order to transform our city.

To address the need for rapid transformation, the eThekwini Municipality, with support from C40 Cities Climate Leadership Group (C40), has developed this Climate Action Plan (CAP) that builds on the 2015 Durban Climate Change Strategy. A 1.5°C CAP is a city-wide plan that provides a pathway to transition Durban towards climate resilience and carbon neutrality by 2050, in a manner that is inclusive and leaves no one behind. The goal of the plan is to ramp up ambition and action that is required to limit temperature increase to 1.5°C. This is vital to avoid catastrophic impacts, especially facing our more vulnerable communities.

The CAP comprises of 33 actions and 149 sub-actions aligned to nine thematic areas that provide a pathway for Durban to achieve climate resilience and carbon neutrality. Durban sets out to achieve a 40% reduction in emissions from a 2015 baseline by 2030 and an 80% reduction by 2050 and has committed to identifying various opportunities to achieve carbon neutrality, including exploring the opportunity to generate carbon offsets, as the National Carbon Tax gets implemented.

Importantly, eThekwini Municipality realises that this incredible goal cannot be accomplished alone and has called on the support from national and provincial government, the private sector, civil society and the City's citizens to enable it to meet the ambition set out in the plan.

1. Durban as a city

EThekwini Municipality (Durban) is a city in the province of KwaZulu-Natal situated within the east coast of South Africa. It is the third largest city in South Africa and is home to the busiest port in the African continent. Durban is bordered by the Indian Ocean to the east, with a warm Agulhas current that brings in balmy weather all year round and is dwarfed by the Drakensberg mountain range in the west. It is a sunny seaside city, attracting over a million tourists per annum.

Durban is rich in cultural diversity, a melting pot with a diverse population where the predominantly spoken languages are isiZulu and English. The eThekwini Municipality governs an area of 2 297 km^2 with a population of 3.7 million people that includes urban and rural landscapes.

Durban is an economic hub that is home to South Africa's sugar industry and is a centre for diversified commercial activity. It is home to the iconic Moses Mabhida Stadium, which was designed as a sustainable recreational and multi-disciplinary sporting venue that represents the success of the city and the country as a whole in being the first African country to host the 2010 FIFA World Cup.

The City's vision is to be Africa's most caring and liveable city where all people live in harmony. Durban was ranked as South Africa's most liveable city and Africa's second most liveable city after Port Louis, according to the Mercer Quality of Living Survey[i], living up to its vision.

While Durban is a thriving city, it is also faced with a number of complex challenges in socio-economic, environmental and dual governance systems, as are many developing African cities. The City has high levels of industry, especially concentrated in the South Durban Industrial Basin. South Durban has the largest concentration of petrochemical industries in the country, including the two biggest oil refineries that refine approximately 60% of South Africa's petroleum. Furthermore, there remains a challenge of apartheid spatial planning that relegated historically disadvantaged communities to the outskirts of the City and around the South Durban Basin industrial complex, thus compounding inequalities and affecting health. Also, there is an increasing rate of migration to the city due to the high levels of poverty in outlying rural areas. These challenges will be further compounded and exacerbated by the effects of climate change.

It is in the context of being an industrial port city containing large rural areas with high levels of inequality and vulnerability, that this ambitious 1.5°C action plan is developed.

The infographic on page 6 provides a snapshot of Durban.

Durban in numbers

Durban is home to

3,7 million people

7% of South Africa's population

Population growing at **1.1%** p.a

The economy is diverse

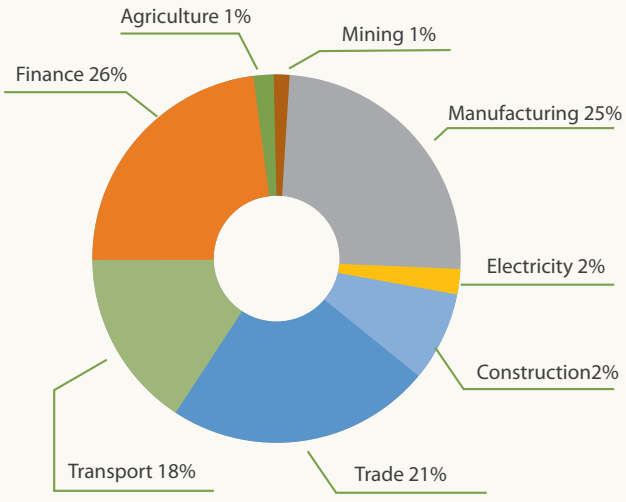
R302.3 billion in 2017

GDP Growing at **1%** p.a

Durban is a port city, the busiest port in Southern Africa:

60% of container traffic to and from SA

Sectoral Composition of eThekwini GDP: Broad Sectors: 2016 (Constant 2010 Prices)



City's dominant sectors:

Finance

Manufacturing

Highest growing sector:

Agriculture

Durban is an unequal City with growing informality

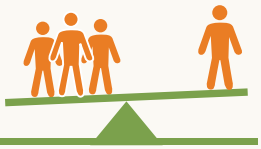
The poor and marginalised are still victim to apartheid planning, with most urban poor being located far from places of employment

Informal economy growth from 2004-2014

68% of the municipal area is peri-urban or rural

Gini co-efficient:

0.63* **(1 being highly unequal)**



Durban excels in service delivery

Total households

945 910

96% access to water

74% access to electricity

84% access sanitation

42% access to free basic water

37% access to free basic electricity

Durban is a GREEN City under threat

Durban is located in one of the world's 35 Global Biodiversity Hotspots and contains three of South Africa's eight biomes, namely grassland, savannah and forest areas.

1/3 of the City's 2 556km² falls under Durban's Metropolitan Open Space System (D'Moss)

YET

Only

9.4% is formally conserved

98km coastline

18 major rivers

16 estuaries

**Adapted from eThekwini Municipality Integrated Development Plan 2017/2018*

2.
Why a 1.5°C Climate Action Plan?

The global shift to 1.5°C

Climate change, which has been identified globally as the key challenge of the 21st century, is no longer something of the future; it is now upon us and we need to act now. There is growing evidence of human interference in the world's climate system. Thus, the aim of the United Nations Framework Convention on Climate Change (UNFCCC), an international environmental treaty that came into force in 1994, is to assess global progress in responding to climate change. Major milestones include the 1997 Kyoto Protocol, which established legally binding obligations for developed countries to reduce their greenhouse gas emissions. The Paris Agreement, adopted in 2015, for the first time brought all nations into a common cause to undertake ambitious efforts to combat climate change and adapt to its effects.

The science is now clear that we need to limit temperature increase to 1.5°C to avoid severe climate impacts, such as extreme high temperatures, more frequent floods, electricity blackouts, droughts and food shortages. According to the recent Intergovernmental Panel on Climate Change (IPCC) Special Report: Global Warming of 1.5°C (SR1.5), published in 2008 the world has already warmed to 1.0°C above pre-industrial levels, and if we continue at current levels of warming, the global average temperature increase will reach 1.5°C by as early as 2030[ii]. The SR1.5 confirms the initial thinking that the carbon budget to limit global temperature increase to 1.5°C, as opposed to just within 2°C pre-industrial levels, is running out. New evidence in the report shows that the world will already face severe impacts with 1.5°C warming, however, this will be further exacerbated if warming rises to 2°C.

A world exceeding 1.5°C is highly uncertain and can potentially lead to irreversible damage to society and ecosystems. This is significant and will require urgent, rapid transformational change across energy, land, industrial and urban systems. Global economic losses and damage from 1.5°C of warming is estimated to be about US$54 trillion, which rises to US$69 trillion for a 2°C temperature rise[iii]. The sooner we act, the less expensive it will be and the less we will have to adapt to exacerbated extreme events and hazards.

While the task at hand is titanic, there is hope. Limiting temperature increase is still possible, but will require a major global shift in raising ambition in line with 1.5°C. Bold, urgent climate action can have immediate, tangible impacts on people's lives – from generating green jobs, to creating healthier lives and cleaner air and water. Everyone, including state and non-state actors such as cities and the private sector, needs to ramp up action now.

Cities taking bold action

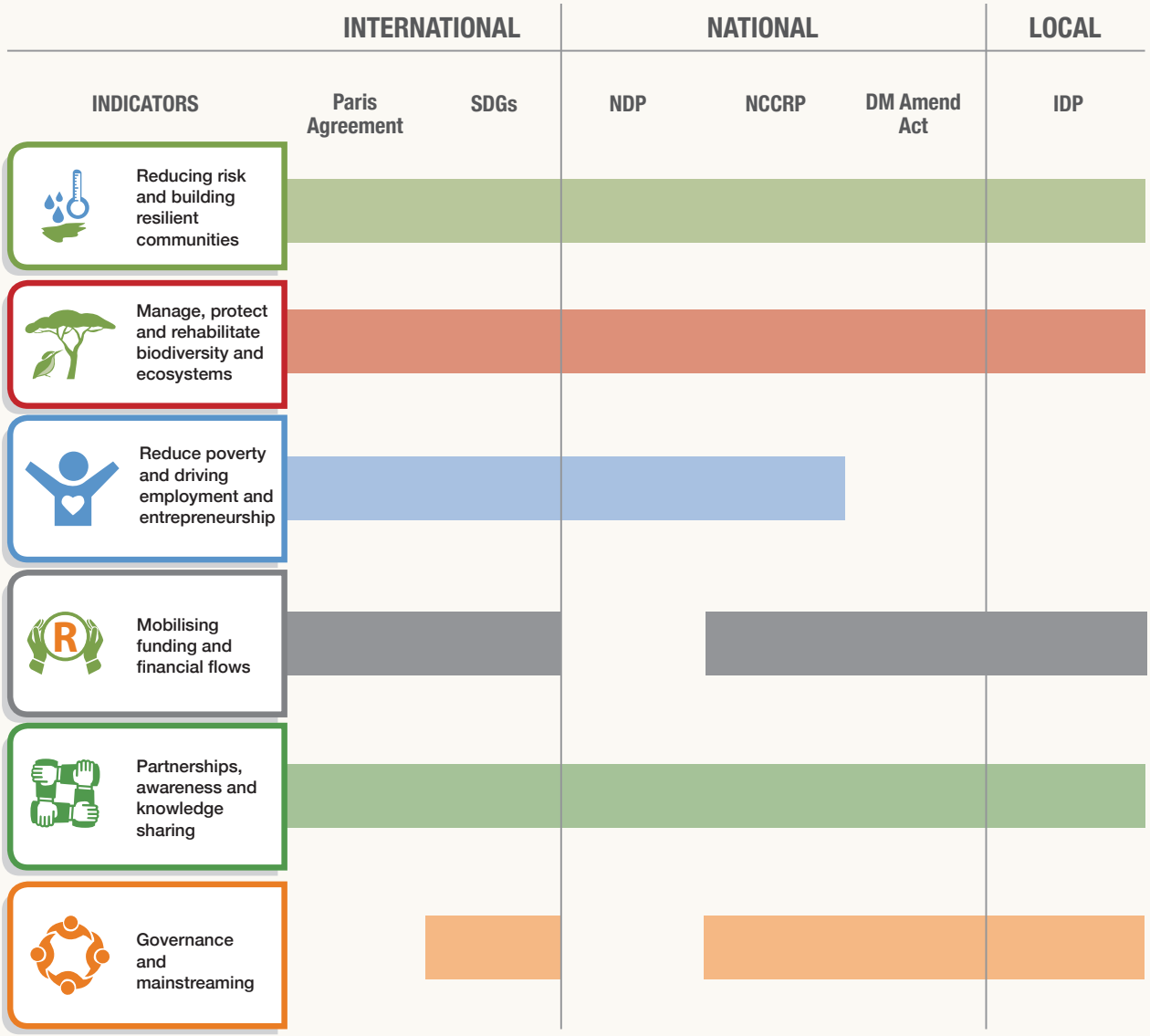
Over half of the world's population reside in urban areas and this is projected to increase to about 70% by 2050. Cities play a significant role in adapting to adverse climate change impacts and reducing their carbon emissions. In 2015, Durban joined C40, which is a network of global megacities that are taking bold climate action, leading the way towards a healthier and more sustainable future.

The C40 Deadline 2020 report[iv] highlights the important role of cities in responding to climate change. We have until 2020 to make drastic and transformational changes to prevent global average temperatures exceeding 1.5°C. It was recognised that for national governments to implement the Paris Agreement, cities need to be empowered both financially and politically to develop ambitious climate targets and to take on transformational climate action.

Durban recognised the challenge and is ramping up its efforts to respond to the urgent call for action. Durban is fully aware that it cannot do it alone and will rely on a range of partners from international organisations like C40, to national government, the private sector and individuals and communities on the ground, to make this happen. The City further recognises the unique challenges that this commitment presents to cities in the global south. As a result, the importance of climate change adaptation strategies and inclusivity resonate strongly in the CAP.

The Durban CAP is guided by the C40 Climate Action Planning Framework. Developing an ambitious CAP that responds to the four criteria required in the C40 Framework will enable Durban to address its climate needs and other important Sustainable Development Goals (SDGs) imperatives, especially those with a social and environmental focus. The plan also recognises the need to align with national and local imperatives including the Integrated Development Plan (IDP), National Development Plan (NDP), the National Climate Change Response White Paper (NCCRP) and the Disaster Management Amendment Act 16 of 2015 (DM Amend 2015) (Figure 1 and Table 1).

Table 1: An illustration of common indicators from the policies



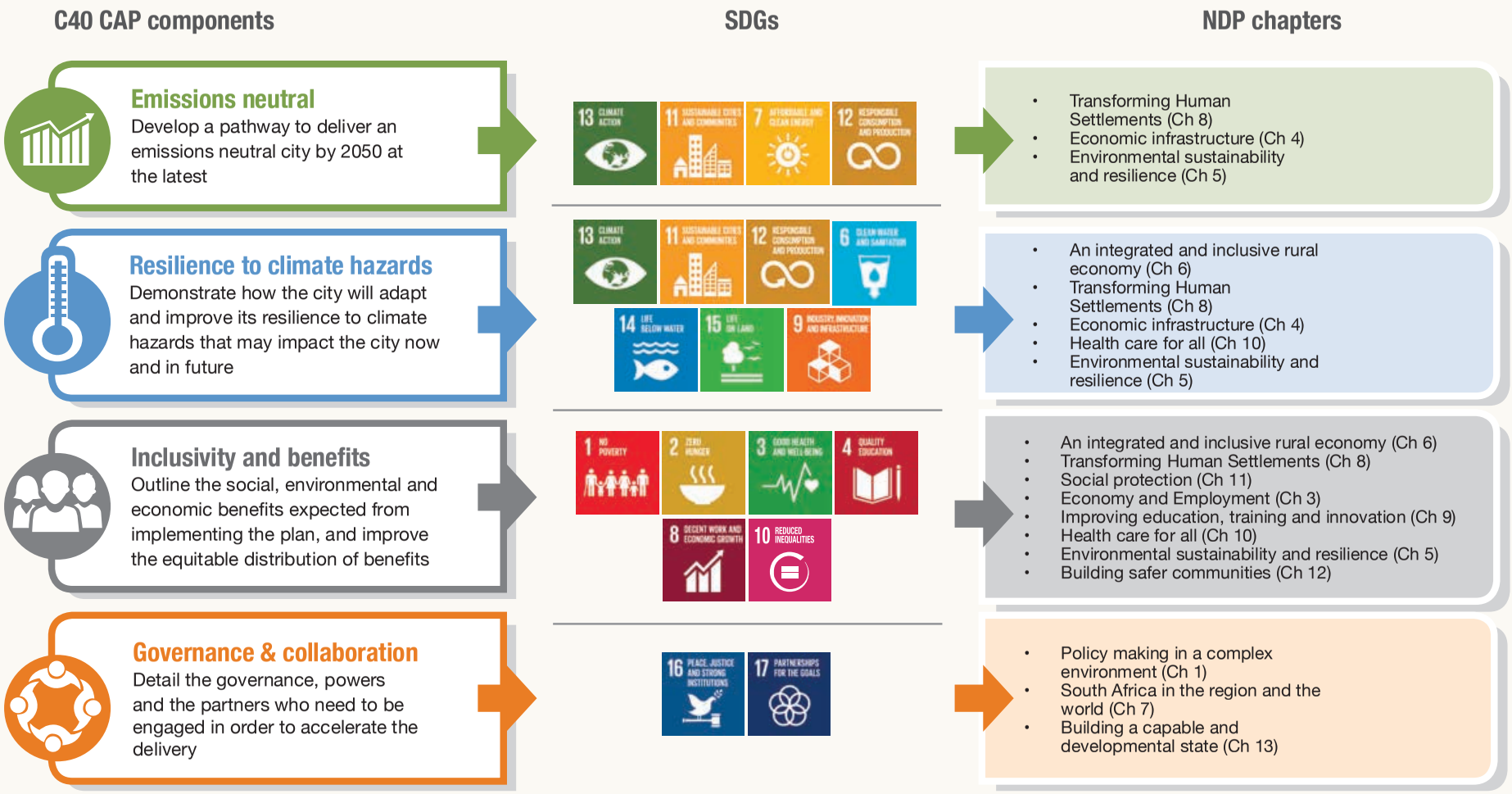
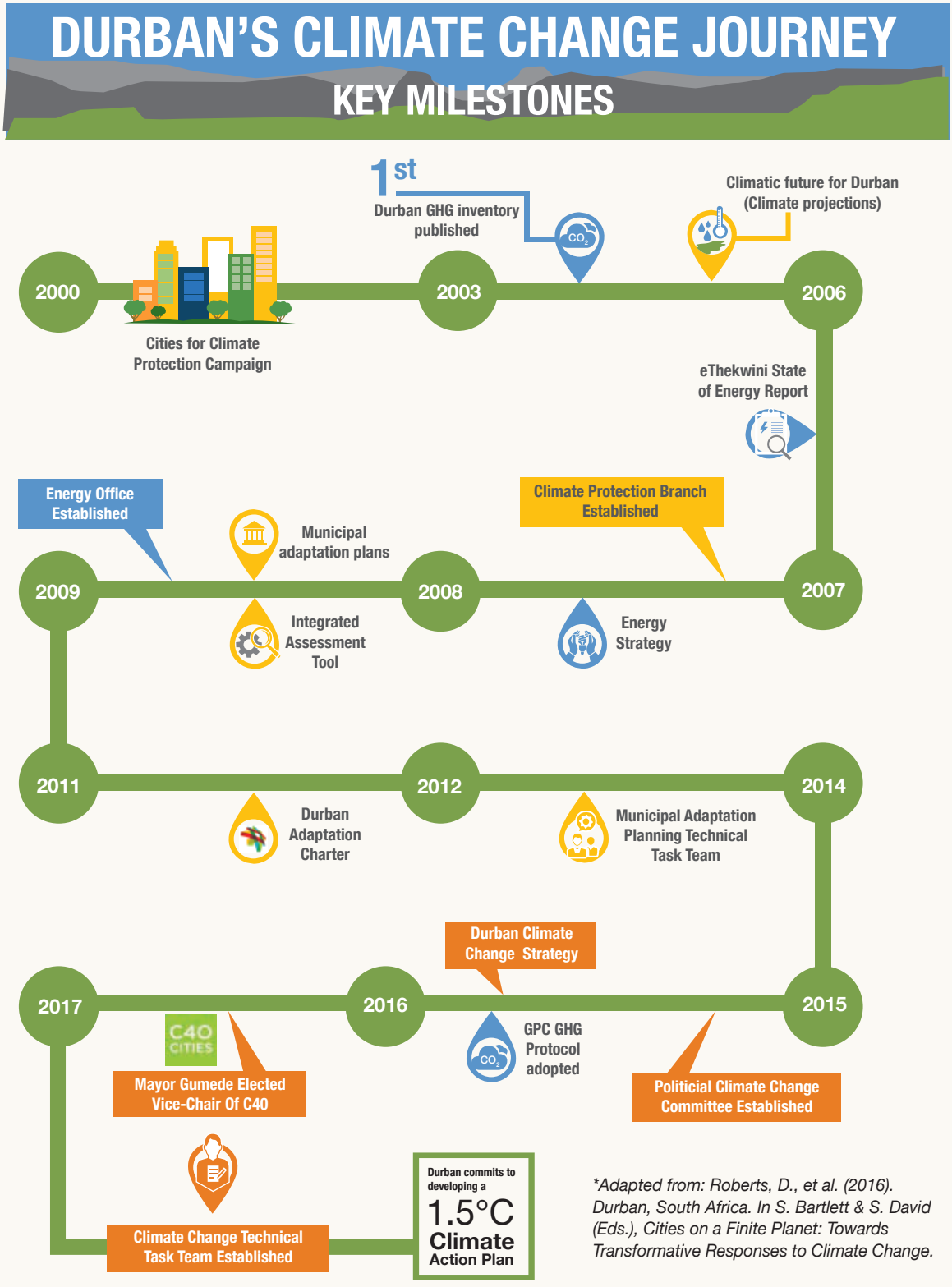


Figure 1: Alignment of C40's Climate Action Planning Framework[v] to the SDGs[vi] and the National Development Plan.[vii]

3.
A snapshot of Durban's climate change journey

Since the early 2000s, Durban has been at the cutting edge of climate change response. The development of the 1.5°C Paris compatible climate action plan is an expansion of a long history of climate change action. The infographic provides a snapshot of Durban's climate change journey.



Adapted from: Roberts, D., et al. (2016). Durban, South Africa. In S. Bartlett & S. David (Eds.), Cities on a Finite Planet: Towards Transformative Responses to Climate Change.

4.
Climate change governance in Durban

Context

EThekwini Municipality is the local government body responsible for governing and managing the city of Durban and the surrounding area. It is located in the KwaZulu-Natal province and is 36% rural and a further 29% peri-urban. The province has a dual governance system where the municipality shares the governance of 38% of the municipal area with 21 traditional councils.

Climate change impacts on all levels of government, thus, there should be policy and strategy coherence between the three spheres of government in order to guide climate change responses. However, the municipalities are at a coal-face of service delivery and disasters. Effective climate planning needs to balance the social and economic development imperatives with climate objectives. Identifying opportunities is key and climate policies should be tailored to this.

Existing governance structures

To enable the successful implementation of the CAP, the City needs to build on and strengthen the existing governance structures to ensure that climate change is mainstreamed across key clusters as well as with external stakeholders.

Currently, the climate change function sits in Durban's Environmental Planning & Climate Protection Department (EPCPD), which is in the Economic Development and Planning Cluster, because climate change has traditionally been regarded as an environmental issue. This fragmented approach makes it difficult to drive implementation and to achieve integrated planning across the City. However, there is a growing recognition that climate change is also a social and economic issue and cuts across various departments in the City.

In order to enable effective governance and to mainstream climate change planning and implementation across the City's departments, a Climate Change Implementation Framework containing a governance theme, was established. The governance theme comprises two principal committees (Figure 2), namely the eThekwini Municipality Climate Change Committee (EMCCC) at a political level and the Durban Climate Change Strategy (DCCS) Technical Task Team (TTT) at a technical level. The EMCCC consists of 12 non-partisan councillors, headed by the political head of the municipality, the Mayor. The committee provides political oversight to the climate change activities in the City to ensure alignment with the City's strategic objectives. The TTT, convened at the level of Heads of Units, represents a trans-sectoral body of municipal sectors tasked with leading the implementation and mainstreaming of climate change activities. These committees have evolved to provide not only oversight to the DCCS related work, but also to all key strategic climate change programmes implemented by the City.

The EMCCC and TTT will be used to support the implementation of the CAP, ensuring transparency in the process and securing ongoing input from relevant line departments.

Opportunities for climate change governance

Implementing the CAP will require a shift in climate governance and engagement in cross-cutting approaches to implementation. The EMCCC and TTT are effective platforms to provide a policy structure to integrate climate change across departmental plans and presents a number of opportunities to mainstream climate change across the City. These include to:

- Act as a platform to enable a cross-cutting and integrated climate response through a transversal management approach.
- Incorporate and integrate climate change into strategic planning, departmental strategies and implementation plans.
- Facilitate the provision of resources and capacity to implement actions in departments where this is lacking.

- Support monitoring systems for tracking progress on mitigation and adaptation actions, and targets.
- Incorporate climate change indicators to performance criteria where relevant.
- Facilitate continuous external stakeholder engagement on climate change issues and opportunities.

Governance

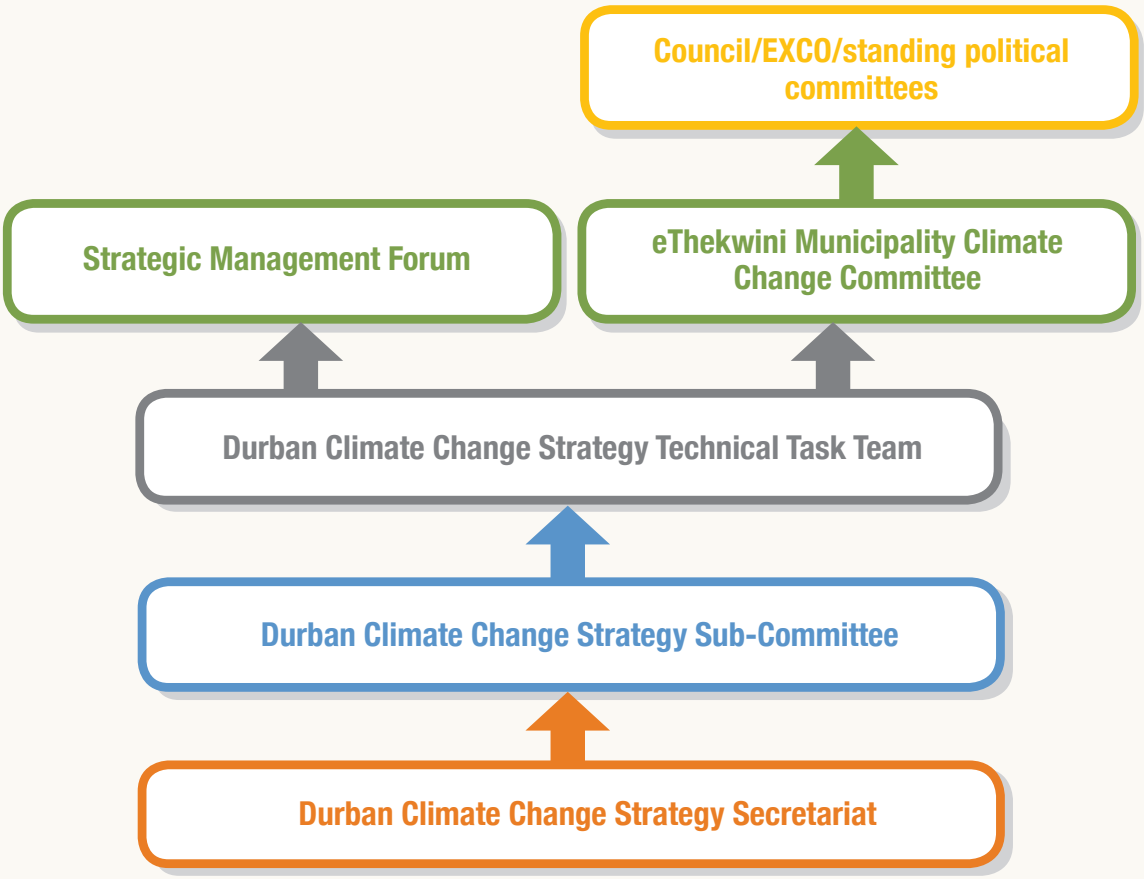


Figure 2: Durban Climate Change Strategy Governance Framework

Pathways to strengthen climate governance

An initial component of the climate action planning process was a strategic review to unpack the City's strengths, weaknesses, opportunities and threats to help inform strategies for developing the CAP and delivering ambitious mitigation and adaptation measures. The process looked at the governance structure of the City, which was further interrogated in an in-city workshop with cross-departmental municipal officials. The following recommendations were made to strengthen and mainstream climate change governance in the City:

1. Put in place the necessary governance and communication arrangements to ensure that the EMCCC and the TTT has the necessary mandate to enable implementation, and fully 'institutionalise' the climate activities
2. Elevate the TTT to the level of the City Manager and Deputy City Managers to ensure senior management level support and buy-in of climate change issues across the City
3. Develop key performance areas (KPAs) for climate change at a sector-level linked to the CAP
4. Ensure that all relevant departments have officials with climate change knowledge who can drive implementation of the actions
5. Provide a framework to enable the implementation of climate change programmes that require cross-departmental collaboration
6. Institutionalise the CAP into all the City's key strategic documents, including the Integrated Development Plan (IDP), Service Delivery and Budget Implementation Plan (SDBIP), Spatial Development Framework (SDF)
7. Identify criteria to ensure that all major capital projects are reviewed to incorporate climate change mitigation and adaptation implications and response measures
8. Develop and implement a communications strategy for climate change
9. Consider whether the current location of the climate change functions in the city governance structure are optimal for delivering climate actions needed
10. Implement capacity building and engagement activities with Heads of Units and political councillors to support the design, measurement and tracking of mitigation and adaptation impacts of actions over time
11. Strengthen community engagement and adaptive governance within the City's climate change governance structures using a 'bottom up' strategy, focusing on community-based actions that are centred on human well-being and sustainability
12. Consider whether the GHG inventory can be made more 'policy sensitive' by reviewing the data underpinning it and that is used by the departments to track actions. Furthermore, increase the level of disaggregation of data in order to better understand the contributions of different sources
13. Utilise the risk management processes to further advance the mainstreaming of climate actions in Durban, work with Enterprise Risk Management to integrate climate change risks into various line functions, and ensure consultation and participation with key line functions, either through a working group, or through bilateral meetings
14. Liaise with the supply chain management team to explore options and/or develop a Green Procurement Policy that will enable procurement processes to take into account climate change and environmental issues

5.
Towards a carbon neutral and a resilient Durban

The path that Durban follows towards carbon neutrality and climate resilience is informed by the City's greenhouse gas (GHG) emissions and priority climate risks. The City's GHG emissions are largely influenced by the existence of an expanding port, designating the City as the second most industrialised in the country. Consequently, the City's industrial area has a high demand on electricity that is coal intensive, supplied by South Africa's national grid. In addition, the industries are major contributors to air pollution through industrial emissions as well as freight transport.

A healthy and sustainable future requires a carbon neutral economy, requiring significant actions and efforts to transition the City. Durban needs to make concerted efforts to ensure that this transition takes into consideration the poor as well as the most vulnerable communities. This should include taking bold actions to improve the quality of life for all Durban's citizens, while the City remains an attractive and economically viable hub.

Durban's GHG emissions

Past and present

In 2015, Durban's total city-wide GHG emissions were 20,8 million tonnes CO_2e[viii]. Durban's GHG emissions are dominated by manufacturing industries, which make up 41% of the City's emissions, followed by the transport sector, which accounts for 30% of emissions (Figure 3). The City is highly dependent on fossil fuels, with 46% of emissions originating from electricity use (Scope 2). Durban has high electricity emissions due to the City being dependent on the national grid that currently is coal intensive. Other dominant fossil fuels in Durban include diesel and petrol. Diesel consumption is particularly high due to high volumes of freight traffic from the port.

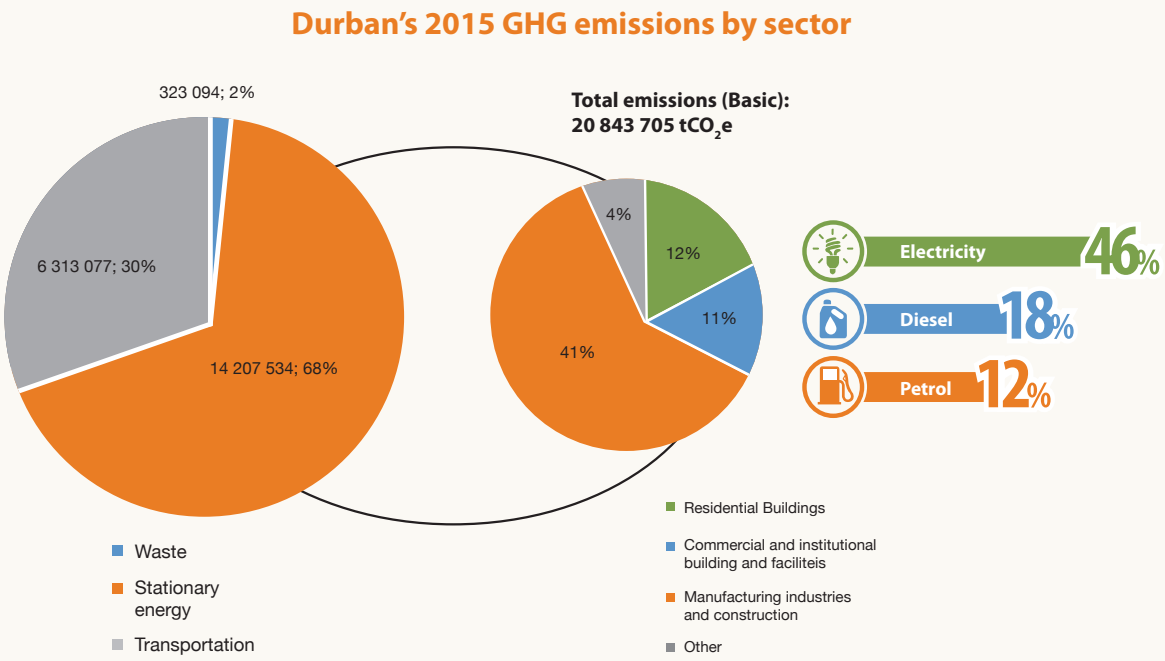


Figure 3: Durban's GHG inventory showing the dominant sector emissions

Durban's GHG emissions reporting was formalised in 2010 and reported annually thereafter. During this time, while both the City's population and economy grew, there was a decline in emissions per capita by an average of 7% from 2010 to 2015. At the same time, emissions per million Rand GDP also declined by 11% (Figure 4).

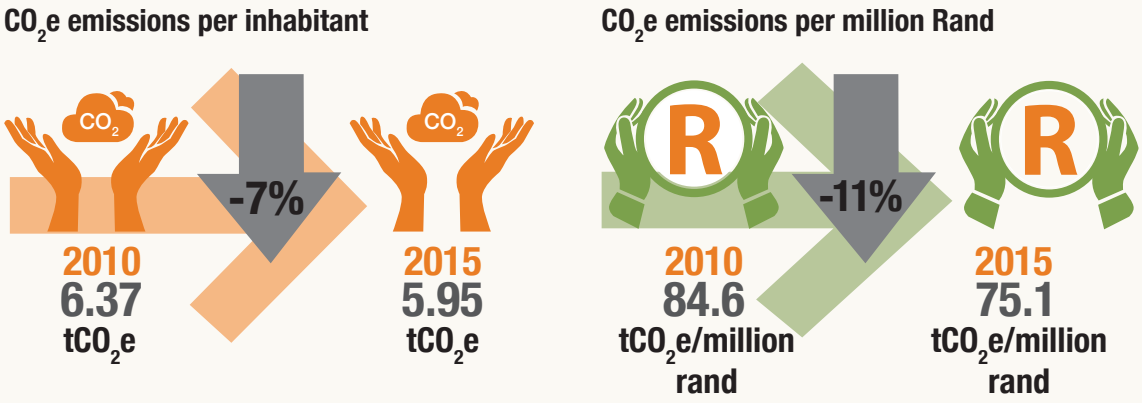


Figure 4: Changes in key emission indicators from 2010 to 2015

Key factors driving a decline in the City's emissions from 2010 to 2015 were national rolling blackouts due to power shortages, and Eskom's obligation to stabilise the grid that prompted the City and many industries to shift toward more energy efficient technologies.

Future predictions

To be consistent with the objectives highlighted in the Paris Agreement and the IPCC SR1.5, to limit global warming to 1.5°C, there needs to be a global shift towards carbon neutrality by 2050. This means that Durban needs to outline a pathway that will get the City to carbon neutrality by 2050.

The mitigation actions identified for the action plan was informed by developing action-based emission scenarios, using the C40 1.5°C Pathways tool. Durban used a multi-stakeholder process to develop and validate future emission scenarios for the City. Two scenarios were developed: a Business as Usual (BAU) Scenario and an Ambitious Action Scenario. Figure 5 outlines the approach that Durban undertook to develop emission scenarios for the City.

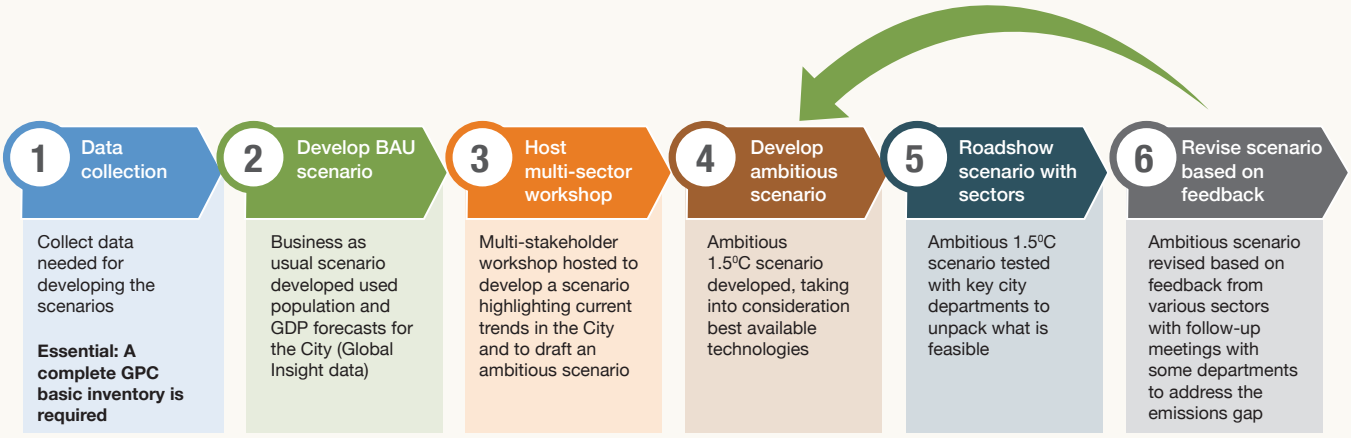


Figure 5: Approach used to develop and finalise Durban's future emission scenarios

BAU scenario

A BAU scenario was developed based on economic and population growth projections for Durban. If the City continues to grow with no climate mitigation measures, emissions will more than double, from 21MtCO_2e in 2015 to 46MtCO_2e in 2050. During the same period, emissions per person will increase from 6tCO_2e per person to 10tCO_2e person, as the economy and income per person increases. As shown in Figure 6, an increase in emissions will primarily come from:

- **Electricity consumption** in the city, as development increases
- **Transport**, as the number of private vehicles grow
- **Industrial and other stationary energy**, which consists primarily of energy used for industrial processes, such as boilers and generators

Ambitious 1.5°C scenario

To determine a pathway for Durban to achieve carbon neutrality, an ambitious 1.5°C scenario was developed. In order to meet the requirements set out in the Paris Agreement, Durban's CAP sets out ambitious, bold actions that will result in an over 80% reduction in emissions from a 2015 base year from 21.2MtCO_2e in 2015 to 3.7MtCO_2e in 2050. This implies a decline in emissions per person from 5.95tCO_2e in 2015 to 0.89tCO_2e in 2050. The target aligns with and is an extension of the target set out in the DCCS, which aims for 40% of Durban's electricity consumption to be met by renewables by 2030. As shown in Figure 6, three key focus areas for emissions reductions are emissions from electricity (including energy efficiency), transport and industrial and other stationary energy. Figure 7 outlines the key focus areas for mitigation actions and 2050 interim targets based on the outcomes from the modelling, existing City targets and consultation. The pathway that Durban will undertake to meet these targets are unpacked in Chapter 6.

NB: A large proportion of Durban's reductions will be from electricity and requires decarbonisation of the grid, which is largely dependent on national government.

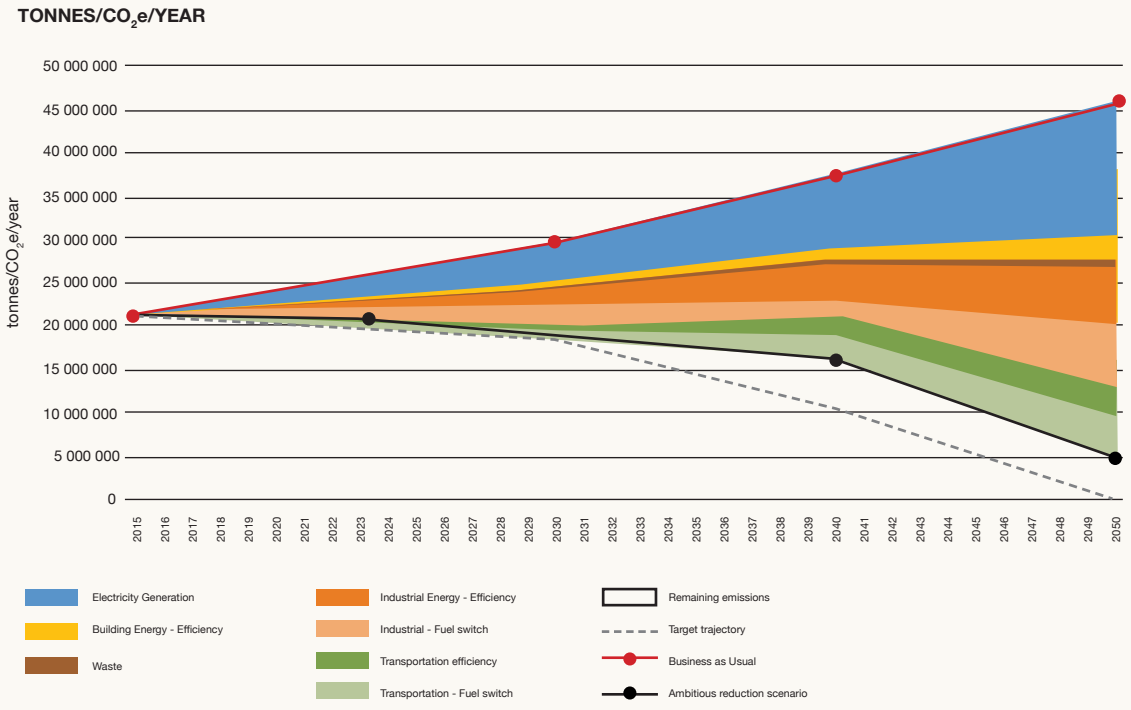


Figure 6: Emission reduction scenario for Durban

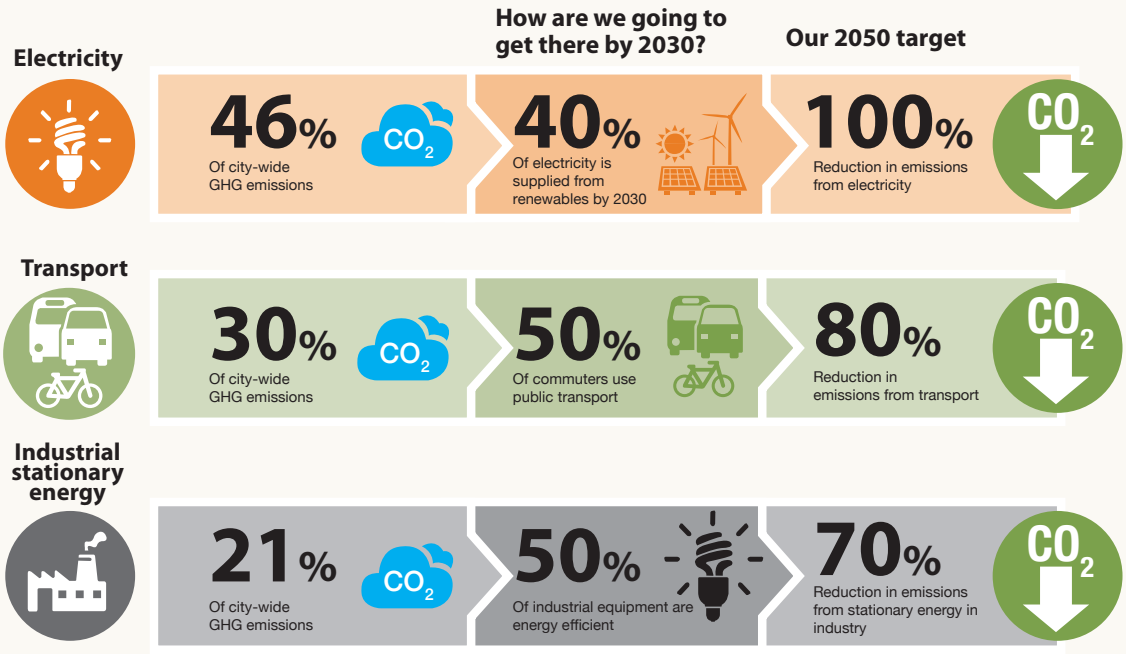


Figure 7: Priority sectors for GHG emission reductions

Addressing residual emissions to achieve carbon neutrality

The Ambitious Reduction Scenario achieves an 80% reduction by 2050 from a 2015 base year. Residual emissions mostly occur in the transport sector from private vehicles, as eThekwini Municipality has limited control over this and would be dependent on lobbying national government to ensure effective transition of private vehicles. Emissions from trucks, in particular, would be a key gap, due to Durban being a port city and transitioning to rail has many limitations. This would be followed by industrial emissions, as there would remain a small percentage of gas and coal still being used for boilers, especially in smaller industries.

The City will aim to achieve carbon neutrality by 2050 through the following measures:

- **Reviewing Durban's Metropolitan Open Space System (D'MOSS) programme and reforestation projects and assessing carbon dioxide (CO_2) stored through these initiatives to partially offset the remaining emissions**
- **Identifying new technologies in future revisions of the CAP and assessing the City's scenario to incorporate these technologies**
- **Identifying other opportunities for offsetting CO_2 emissions, especially through partnerships with the private sector, as the National Carbon Tax gets implemented**

Adapting to a changing climate

Across South Africa, the risks posed by climate change are increasingly observed in the gradually increasing temperatures, prolonged dry periods and droughts, and extreme weather events now occurring with intensities and frequencies never experienced before.

The global commitment to limit temperature increase to 1.5°C will not stop climate change; a level of climate change will still take place even with the implementation of the most ambitious mitigation strategies, with resultant impacts and risks. The city of Durban is faced with this reality in its future. The potential difficulties threaten numerous city sectors, including environmental, social and economic. To make Durban 'the most caring and liveable city in Africa', as stated in the City's overall vision, steps will need to be taken to implement appropriate measures for the benefit of its citizens, the economy as well as developmental and ecological infrastructure.

The time to act is now. Important questions for developing meaningful adaptation plans include:

- What are the local-based climate hazards?
- What is the level of vulnerability to these climate hazards?

Durban's future climate effects are dependent on global current and future greenhouse gas emissions. The IPCC has developed the Representative Concentration Pathways (RCPs) to show a range of possible greenhouse gas emissions concentration pathways. The City has used this as the framework for projecting future scenarios (beyond 2050) of climate impacts to deduce the City's main hazards and vulnerabilities. The City focused on two possible RCP scenarios: a High Emissions Pathway (RCP 8.5) and a Low Emissions Pathway (RCP 2.6). Figure 8 outlines the IPCC emission pathways for the various scenarios.

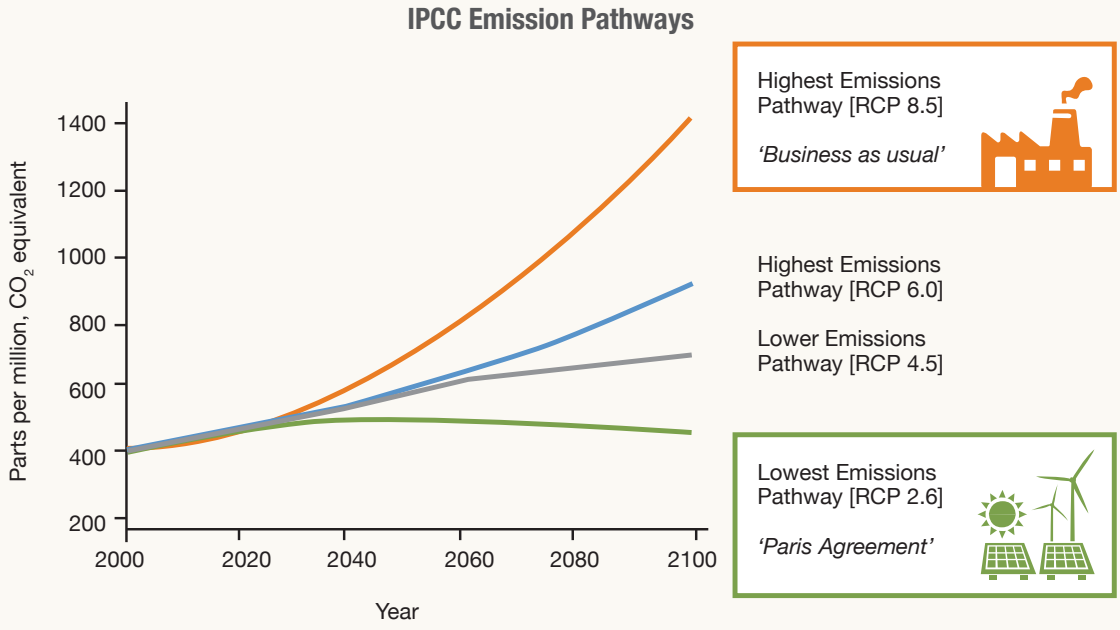


Figure 8: IPCC Greenhouse gas emissions pathways

Note: An interactive Climate Impact Atlas depicting the city's climate risk and vulnerability can be accessed here: https://ethekwini.maps.arcgis.com/apps/MapSeries/index.html?appid=4c59620219d343a1aec468b87aa0ffc5

Temperatures are rising

Observations on Durban Temperature Trends

In South Africa, mean annual temperatures for the past five decades have increased by at least 1.5 times the observed global average of 0.65°C. Maximum and minimum daily temperatures have been increasing annually, and in almost all seasons[ix].

Durban temperatures have been on a constant rise: the average annual mean air temperature for the City increased from 19.8 to 21.4°C from 1996 to 2016 (Figure 9). In particular, the years from 2014 have seen significant temperature increases.

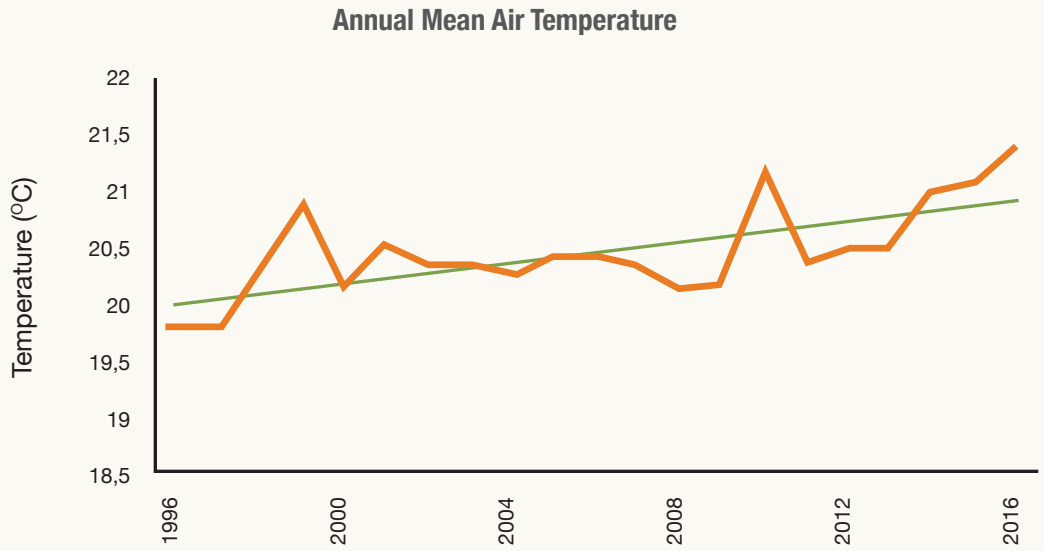


Figure 9: Durban's annual mean air temperature trend in the past 20 years

Now and the future

The average and hottest days temperatures now and projected to 2050 (for the Low and High Emissions Pathway) indicate a steady increase, which is projected to continue beyond 2050 (Figure 10). Key points to note:

- The DCCS states an average annual temperature increase is between 1.5°C and 2.5°C by 2065, and an increase between 3°C and 5°C by 2100.
- Temperatures for the hottest days are expected to increase more rapidly than average

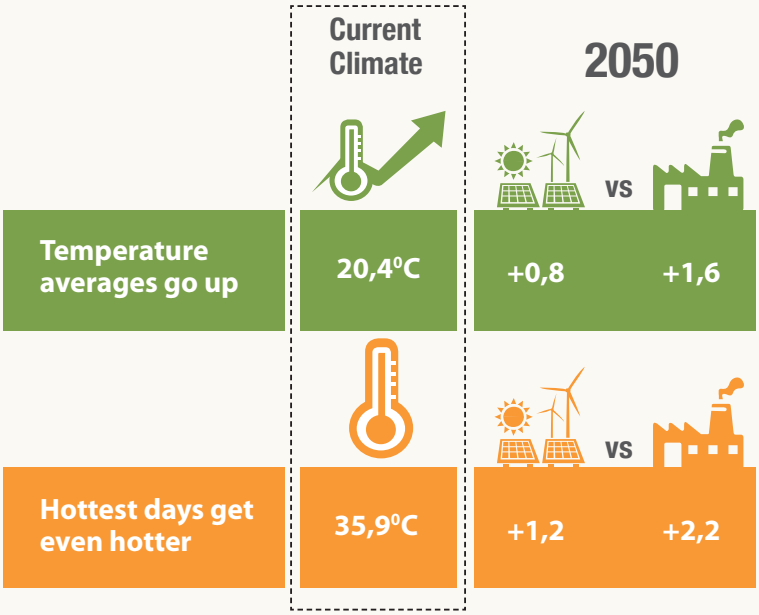


Figure 10: Temperature forecasts under a 1.5°C scenario (RCP 2.5) and a high emissions scenario (RCP 8.5)

temperatures, 1.2°C for the 1.5°C scenario (RCP2.6 scenario) and 2.2°C for the RCP8.5 scenario by 2050.

- The average number of heatwaves under the RCP8.5 scenario will increase three-fold per year by 2050.
- Relative humidity analysis shows a 2% increase from 76% for the historical period to 78% in the future.
- Evaporation rates increases by 3% for the 1.5°C scenario and 6% for the RCP8.5 scenario.

Urban heat island (UHI) effect

The increase in the frequency and intensity of extreme high temperatures, as a result of climate change, will have severe impacts on the City's citizens, particularly vulnerable groups. These vulnerable communities are an important aspect to consider when developing the heat vulnerability index. Durban is already experiencing the UHI effect, with urban areas that are up to 6°C higher than surrounding more rural areas. Figure 11 illustrates the UHI effect for Durban.

Significant UHIs are currently present in:

- KwaMashu and Phoenix areas (in the north of the city), which are more than 3°C warmer than surrounding areas
- Densely urbanised city centre, as well as the coastal belt of the city, which are already experiencing temperature differences of as high as 6°C compared to nearby vegetated lands

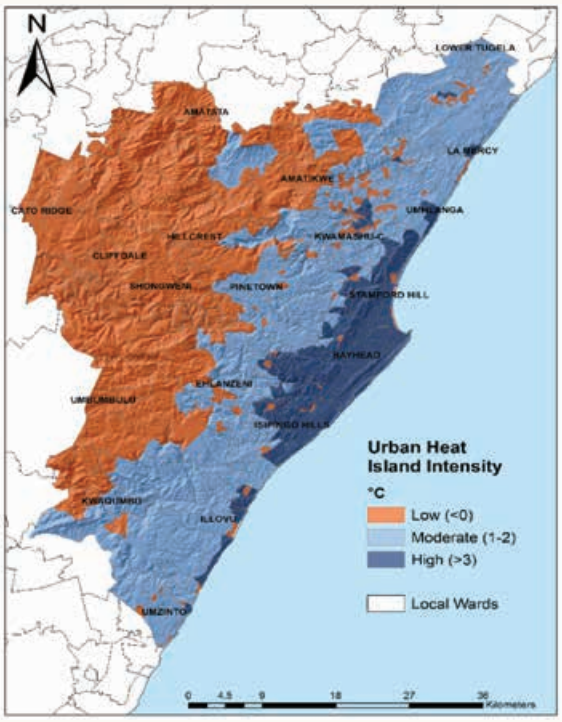


Figure 11: Urban heat island for Durban

Key risks

- Increased population exposed to heat stress
- Declining water quality
- Threats to urban food systems
- Spread of vector-borne illnesses
- Loss of diversity and ecosystems

Periods of drought are going to become more frequent

Observations on the City drought trends

South Africa is recognised as one of the driest countries in the world (20th most water-scarce country in the world). The country's average annual rainfall is about 450mm, which is well below the world's average of about 860mm per year. The average annual rainfall for Durban is 850mm[x], which, although is much higher than the national average, is still affected by periods of drought.

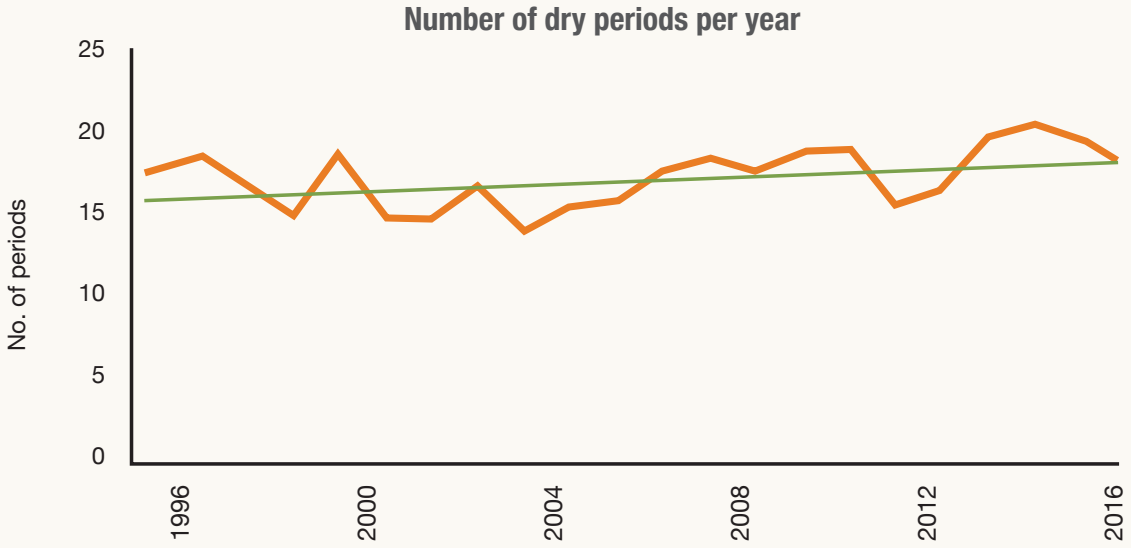


Figure 12: Durban's annual dry periods trend in the past 20 years

Although future predictions regarding rainfall patterns and dry periods are highly uncertain, historical trends indicate a slight increase in the number of dry periods[xi] per year in Durban, with 2015 being the first year 20 dry periods were exceeded (Figure 12).

Now and future

The climate projections for drought is highly uncertain compared with other climatic drivers. There are projections that show a significant decrease in precipitation.

Three factors are important (Figure 13):

- **More severe droughts:** Currently, there is a dry year with less than 700mm of precipitation once every 10 years. Climate change could decrease a dry year by 38mm, making dry years drier.
- **More frequent dry years:** The frequency of dry years can increase to up to three times every 10 years, instead of once.
- **Higher evaporation rates:** With increasing temperatures, evaporation rates go up. This can range between a 3% to 6% increase.

Key risks

- More frequent water restrictions
- Decline in water quality and quantity
- Threatened crop yields and food security
- Economic losses for sectors with high water demand
- Loss of ecosystems

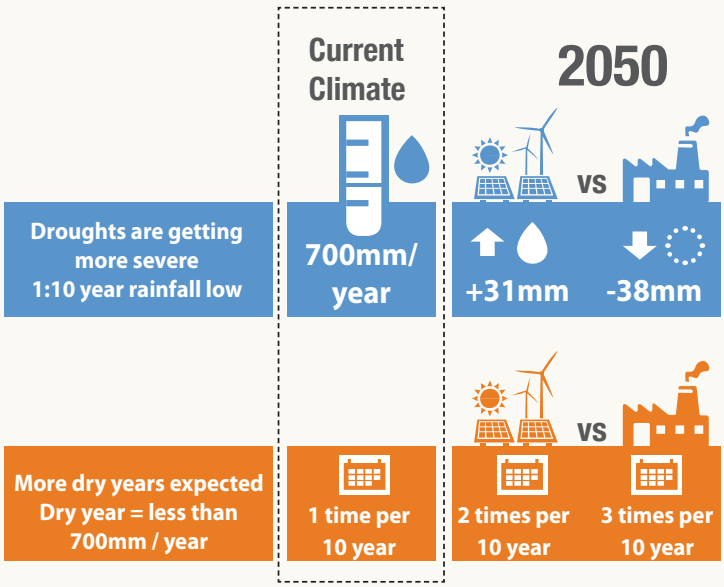


Figure 13: Drought projections for Durban

Storms and flooding are going to become more intense

Climate change is projected to alter rainfall patterns in Durban by intensifying rainfall variability. While average annual rainfall is expected to increase overall, this increased rainfall will generally be experienced through more intense storm events, resulting in more intense and frequent flooding.

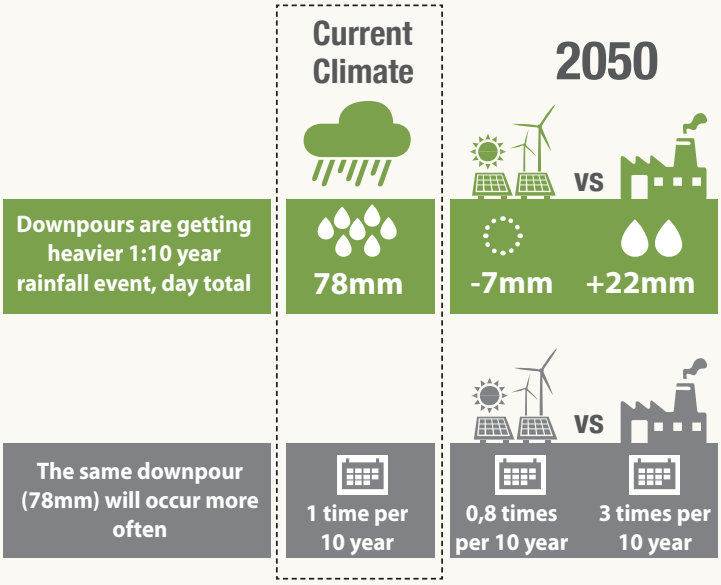


Figure 14: Rainfall projections for Durban

Now and the future

Two effects are expected:

- **More intense downpours:** For extreme rainfall events, the intensity can increase significantly. Figure 14 gives a current intensity of 78mm with a return period of 10 years. This can increase with 22mm in 2050 (Figure 14).
- **More frequent downpours:** The occurrence of these downpours will increase. Existing one-in-10-year events will occur up to three times over a ten year period.

The combination of these two effects gives a much higher flood risk. This also includes sudden flash floods, which are already occurring in Durban.

Sea-levels have been rising steadily

Observations on sea-level rise trends

Sea levels have already begun rising along South Africa's coastline, posing a major threat to coastal cities like Durban[xii]. Being a coastal city, the impact of climate change in relation to sea-level rise and the increase of coastal storms will impact Durban directly on its economy, infrastructure and communities[xiii, xiv]. The increase in the frequency and magnitude of storms will likely erode the shoreline, particularly in low-lying areas and areas weakened by previous erosion. Tidal records of the South African Navy's tide gauge located near Durban's harbour show a linear increase in sea-level for Durban, increasing by 2.7mm per year from 1970[xv].

Now and the future

At the global scale, the IPCC indicates sea level increases up to one metre before the end of the 21st century for the high emission scenario[xvi]. Looking at regional sea-level analysis[xvii] and the most recent IPCC projections, the Durban coastline may face sea-level rise ranging from 0.3-1m, for the low- and high-emissions scenarios respectively (Figure 15).

Key risks

- Threatened coastal infrastructure impacting on the City's tourism industry
- Impact on shipping and sloshing in harbour
- Displacement of people and loss of lives
- Loss of ecological infrastructure and related services along the coast

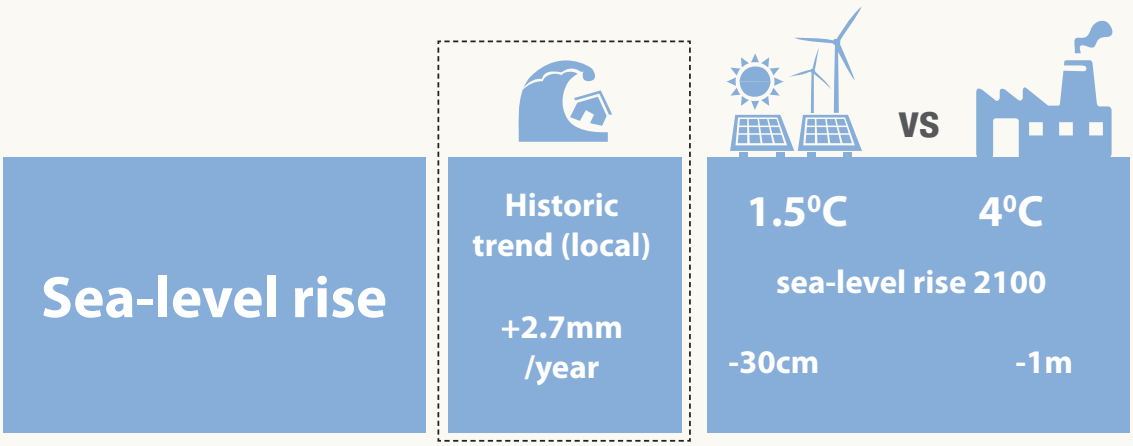


Figure 15: Sea-level rise projections for Durban

6. Vision and targets

The vision of the Durban CAP is:

'by 2050 eThekwini is a sustainable, climate resilient city, where people's needs are prioritised.'

Medium term – 2030

Energy

- **40%** Electricity supplied by renewable energy
- **30%** Energy efficiency in buildings
- **100%** Net carbon zero new buildings
- **100%** Net carbon zero municipal infrastructure

Water and flooding

- **100%** Increase alternative water supply capacity
- **80%** Drainage infrastructure is upgraded
- **3600km** Transform riverine corridors to be climate resilient, clean, safe and healthy

Transport

- **55%** Passengers using public and non-motorised transport
- **20%** Shift vehicles to low emission vehicles

Health

- **NAAQS** Air quality in compliance
- **20.6°C** Maintain urban heat levels at average 2005-2015 temperatures

Waste

- **50%** Diversion from landfill

To achieve this vision, Durban has set out interim and long-term targets, as well as specific actions to enable the City to meet those targets. Achieving these targets would be aligned to the sustainable development principles of economic, social and environmental. The image below provides a snapshot of the interim and long-term targets to achieve the City's vision.

Long term – 2050

Energy

- **100%** Electricity supplied by renewable energy
- **100%** Energy efficiency in buildings
- **100%** Maintain net carbon zero new buildings
- **100%** Maintain net carbon zero municipal infrastructure

Water and flooding

- **100%** Increase alternative water supply capacity
- **100%** Drainage infrastructure is upgraded
- **7400km** Transform riverine corridors to be climate resilient, clean, safe and healthy

Transport

- **70%** Passengers using public and non-motorised transport
- **70%** Shift vehicles to low emission vehicles

Health

- **WHO** Air quality in compliance
- **20.6°C** Maintain urban heat levels at average 2005-2015 temperatures

Waste

- **90%** Diversion from landfill

7. Actions

The actions outlined in this plan were identified using a combination of approaches to ensure that actions respond to priority areas, while at the same time, ensuring consensus across municipal departments. The actions were identified using the following approaches:

- Measures that respond to the outcomes from the scenario modelling and climate risk assessment
- High-level objectives from the Durban Climate Change Strategy (DCCS)
- Spatially relevant climate change responses from the eThekwini Climate Resilience Implementation Plan for Spatial Planning
- Sector level climate action plans
- Extensive one-on-one engagements and a multi-departmental workshop with key sectors

The actions are grouped into nine thematic areas that align with the DCCS (Figure 16). The actions are in most instances high-level strategic objectives that are supported by sub-actions that will enable the City to achieve the strategic objective. As shown in Figure 16, a number of sub-actions align with the priority areas identified for the City. Depending on where the City is for a specific action, the level of detail for the sub-actions differ. The actions provide guidance to where the City and municipal departments need to focus their attention but will require departments to use this as a basis for identifying and prioritising specific projects.

The themes provide a guide for categorising actions, however there are a number of actions that have cross-cutting implications and benefits across various sectors. Furthermore, economic development and knowledge generation and understanding (themes highlighted in the DCCS) are integrated across the action areas and where relevant specific actions have economic development or research implications.

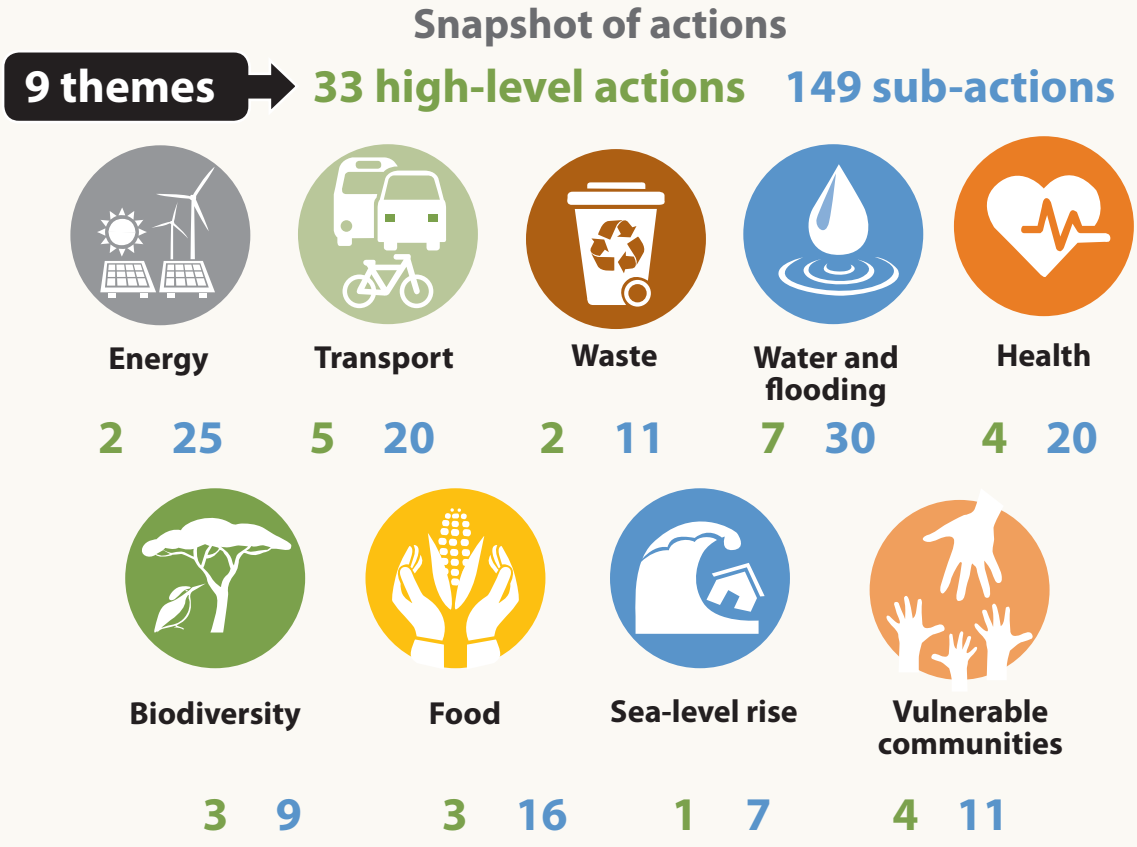


Figure 16: Snapshot of actions

Prioritising actions

It was noted that the list of criteria used for prioritisation should not detract from the intention of the CAP, which was to respond to climate change challenges. The consensus was to use fewer rather than more criteria for prioritisation. The eThekwini CAP Project Management Team (PMT) then agreed on a short-list of criteria to use for prioritisation of the high-level actions. The three criteria agreed to for the high-level actions were:

- whether they significantly reduced greenhouse gases; and/or
- significantly improved resilience; and
- had a high return on investment, socially and economically.

Based on these criteria, an initial list of priority actions was developed (Table 2).

Actions should be prioritised if

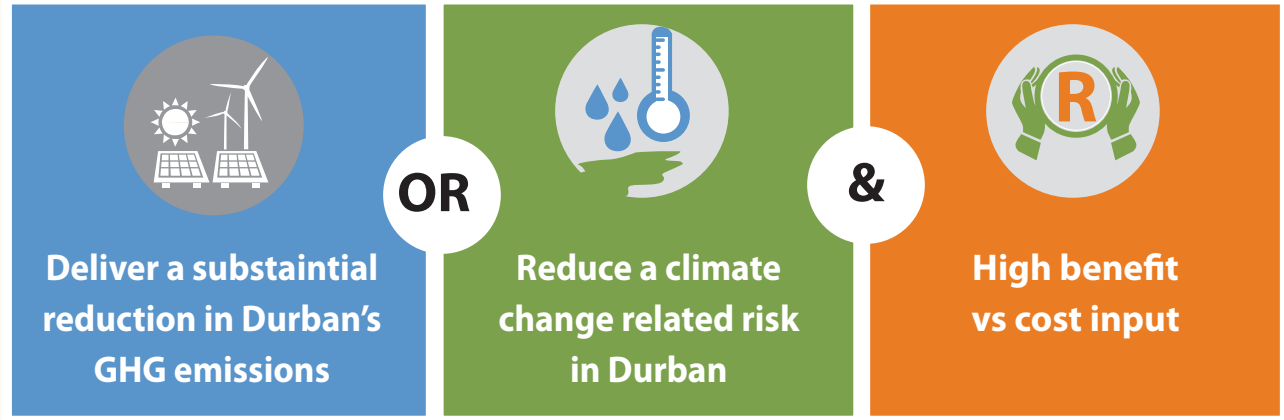


Table 2: Durban CAP Actions with High GHG Reduction OR High Resilience Benefits and Co-benefits

Theme	Action	Potential GHG Reduction	Potential Resilience Benefit	Co-benefits
 **Energy**	Ensure 70% of public and private electricity demand is provided by self-generated Renewable Energy by 2050	Significant GHG Reduction	Significantly Improved Resilience	• Job creation • Cost and resource savings • Economic growth • Improved health • Increased accessibility • Improved resilience
	Ensure 100% of electricity purchased by eThekwini Municipality for resale is produced from Renewable Energy sources by 2050	Significant GHG Reduction	Some Improved Resilience	
	Reduce electricity consumption by 40% by 2050 across residential, commercial and municipal buildings	Significant GHG Reduction	Some Improved Resilience	
	Ensure 40% industrial energy efficiency by 2050	Significant GHG Reduction	Some Improved Resilience	
	Implement a by-law that requires all new buildings to be net zero carbon by 2030	Significant GHG Reduction	Some Improved Resilience	
 **Transport**	Continue to implement and expand the Integrated Rapid Public Transport Network (IRPTN) with a strong focus on Transit Oriented Development (TOD).	Significant GHG Reduction	Some Improved Resilience	• Air quality • Quality of life • Cost and resource savings • Promotes innovation • Improved accessibility
	Implement travel demand measures that will reduce existing private car trips by 50% by 2050	Significant GHG Reduction	Some Improved Resilience	
	Provide and maintain high quality active mobility and non-motorised transport (NMT) systems that will increase the use of NMT to 30% by 2050	Significant GHG Reduction	Some Improved Resilience	
	Facilitate a switch of all vehicles to low-carbon options by 2050	Significant GHG Reduction	Some Improved Resilience	

Theme	Action	Potential GHG Reduction	Potential Resilience Benefit	Co-benefits
 **Waste**	Divert all waste disposed to landfill sites by 50% in year 2023 (Phakisa targets) and by 90% by 2050 through reuse, recycle, recovery and re-engineer	Some GHG Reduction	Significantly Improved Resilience	• Air quality • Cost savings • Improved health • Job creation • Promotes innovation
 **Water**	Increase alternative water supply capacity by 2050 to meet 100% of escalated demand resulting from climate change impacts	Potential Increased GHG Emissions	Significantly Improved Resilience	• Water quality and water security • Long-term reduced costs • Energy savings
	Reduce water demand by 50% by 2050 to protect against drought risks	Some GHG Reduction	Significantly Improved Resilience	
 **Biodiversity**	Increase the area of Durban that is considered protected for conservation areas that has high climate change value	Some GHG Reduction	Significantly Improved Resilience	• Job creation • Flood attenuation • Heat mitigation • Water quality and security • Air quality • Improved health
 **Health**	Promote implementation of heat mitigation measures to maintain urban heat levels at 2018 temperatures to 2050	Some GHG Reduction	Significantly Improved Resilience	• Improved health • Cost savings
 **Protecting vulnerable communities**	Facilitate the transition of 100% of informal settlements towards climate resilience	Some GHG Reduction	Significantly Improved Resilience	• Quality of life • Air quality • Job creation
 **Flooding and sea-level rise**	Support and develop ecological infrastructure that supports protection from flooding and sea-level rise	Minimal or no GHG Reduction	Significantly Improved Resilience	• Flood attenuation • Cost savings • Heat mitigation • Climate resilience • Water quality • Job creation
	Establish protection measures, where possible, for existing development and infrastructure at risk from climate change by 2050	Potential Increased GHG Emissions	Significantly Improved Resilience	

Securing carbon neutral energy for all

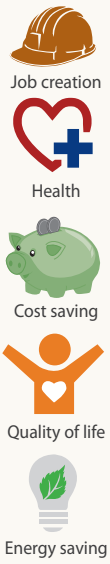
SDGs

Action context

Electricity consumption is the primary source of GHG emissions in Durban and provides the greatest opportunity for transitioning to carbon neutrality. Currently, almost all electricity used in the municipality is produced externally by Eskom. A very small portion of electricity used in the municipality is locally generated renewable energy. This locally generated renewable energy comes from landfill gas to electricity projects at the Bisasar Road and Mariannhill landfill sites and a small contribution from both municipal and private sector rooftop solar projects.

Achieving a transition to 100% renewables will require transformative change in the way that electricity is generated, transmitted and distributed. The global trend in the electricity sector is to move away from centralised electricity generation and monopolistic distribution towards more localised and integrated electricity systems. A future electricity system will be a smart grid that enables bidirectional power flow and includes large-scale renewables from national and locally produced small-scale embedded generation (SSEG) (Figure 17). In support of this, the National Energy Regulator of South Africa (NERSA) has permitted eThekwini Municipality to facilitate SSEG via a bidirectional tariff structure to enable credits where power is exported onto the grid.

Benefits



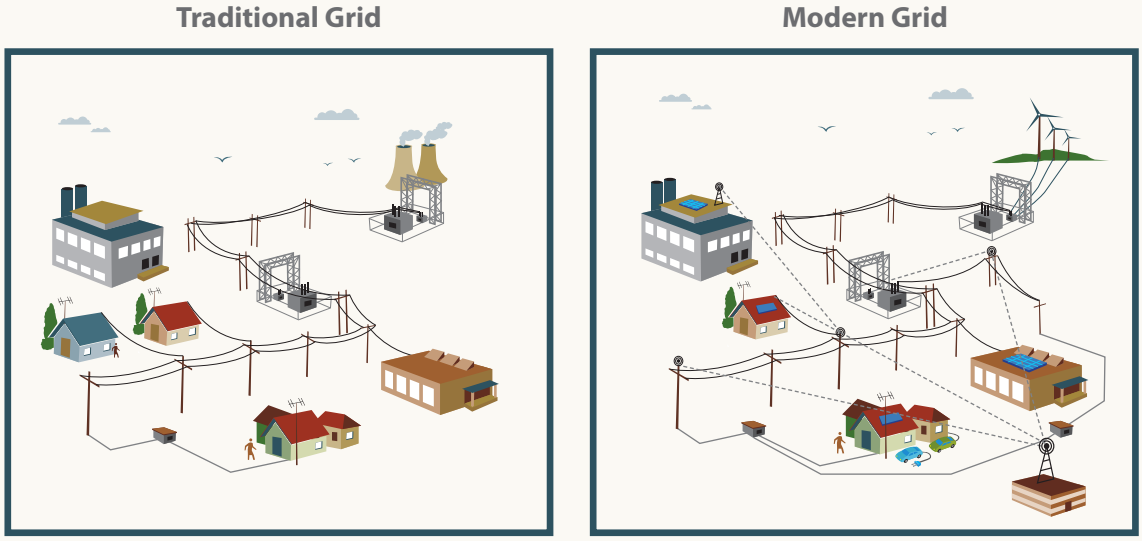


Figure 17: Transformation of the electricity grid towards smart, distributed systems

Departments

Energy Office, eThekwini Electricity, Water and Sanitation, Durban Solid Waste, Architecture, Economic Development and Investment Promotion.

Driving SSEG in Durban as a component of a decentralised grid currently faces a number of barriers. These include the lack of clear policy and regulatory frameworks, municipal capacity to evaluate applications and technical constraints relating to SSEG technology. However, recent studies have shown that the levelised cost of electricity (LCOE) generated from solar photovoltaic (PV) systems is expected to be lower than Eskom's tariffs in the long run, with a payback of less than seven years. Short payback periods are primarily linked to the low capital cost, free energy resource and the rising cost of Eskom's coal-based electricity [xviii].

An interim measure to reduce GHG emissions from electricity consumption is through the implementation of energy efficiency measures across all the City, while continuing to grow the renewable energy sector to meet growing energy demand. It is internationally recognised that saving one unit of energy is significantly cheaper than producing one unit. Energy efficiency is the quickest,

cheapest and most direct way of addressing the climate change imperative, high electricity costs and the electricity supply constraints. The industrial sector, due to high levels of energy consumption in the city, presents a significant opportunity to improve its energy efficiency through the adoption of energy efficient technologies. The building sector also presents significant opportunities, especially the new building stock.

Moving towards clean energy requires not only technology change, but also equitable access to energy and economic opportunity within the energy sector to ensure a just and fair energy transition. Energy poverty is particularly prevalent in informal settlements, which largely falls through the cracks of municipal service provision since there is no grant funding from national government for such settlements. Poor households are burdened with relatively high energy costs, often in excess of 10% of their income compared to wealthier households, who typically spend 2-3%[xix].

Responding to the challenge

Despite there being a slow uptake of renewables in the City with SSEG at 0.5%, eThekwini Municipality is making strides to drive energy efficiency measures and promote the use of renewable energy across the City. Programmes and policies implemented in eThekwini Municipality to date include:

- The DCCS sets out a target for 40% of Durban's electricity to be supplied from renewable energy by 2030
- Energy efficiency projects such as the Shisa Solar Programme, the National Solar Water Heater Programme for homes and the Energy Efficiency Demand Side Management (EEDSM) Programme
- The development of a GIS-based Durban Solar Map and Framework, which allows users to plan a PV installation on their roof and gather information regarding possible costs and potential savings
- A number of renewable energy projects on municipal infrastructure, including projects at uShaka Marine World, the Moses Mabhida Stadium Sky Car, the People's Park Restaurant as well as the Water and Sanitation Department
- Landfill gas to electricity projects at the Buffelsdraai and Mariannhill Landfill Site
- Developed a Strategic Renewable Energy Roadmap for Durban to advise how the City can achieve its 100% renewable energy target by 2050
- A number of private sector-driven renewable energy initiatives across the City

Role of national government to meet Durban's 100% renewable energy target

The eThekwini Municipality is reliant on the national grid for energy supply. Achieving its 100% renewable energy target will be dependent on a national government commitment to high levels of renewable energy penetration into the national grid.

The draft Integrated Resource Plan (IRP) 2018 for the period ending 2050 has set targets for an increased renewable energy in the national energy mix, which will see penetration of solar photovoltaics, wind and concentrated solar power in the coming years. The Integrated Resource Plan 2018 has several scenarios, one of which is no renewable energy annual build rate (IRP1). Under IRP1, more than 70% of installed capacity will be from renewables by 2050. In order to achieve 100% renewable energy penetration, eThekwini Municipality would need to work closely with national government to ensure that it commits to the IRP1 energy scenario and further seeks to procure renewable energy directly from independent power producers in the long term, as regulation shifts towards supporting a decentralised grid.

Actions

100% of electricity purchased by eThekwini is produced from renewable energy sources

Sub-actions

- Develop an independent power producer support programme to facilitate the diversification of the supply of energy. The programme would include developing and implementing a procurement process for purchasing electricity from energy providers other than Eskom
  - Create an enabling environment for wheeling electricity agreements within the municipal grid that would allow the municipality to cover operational grid costs
  - Lobby national government through the South African Local Government Association (SALGA) and Association of Municipal Electricity Utilities (AMEU), as well as other platforms to allow municipalities to provide structured inputs into the IRP
  - Lobby other municipalities to engage national government with the aim of ensuring a national energy mix that does not artificially limit renewable energy and to secure a mandate for further action at the local level

70% of private demand is supplied by self-generated renewable energy

Sub-actions

- Implement the recommendations from the Strategic Renewable Energy Roadmap, including developing an eThekwini Integrated Resource Plan for renewable energy transition and identifying the best potential energy mix.
- Create an enabling environment through tariff structures, incentives, bylaws and skills development:
  - Develop and implement innovative financial instruments, including international climate finance that encourage electricity users to implement renewable energy technologies and promote the supply of technologies
  - Implement residential, commercial and industrial embedded generation tariffs
  - Develop and implement a by-law requiring 70% of customer electricity consumption to be supplied by renewable energy by 2050
  - Develop a database of SSEG to facilitate the diversification of the supply of energy
- Minimise revenue loss risk through clear funding models, dedicated staff and capacity:
  - Develop a funding model for eThekwini Municipality that seeks to take into account reduced income from electricity sales as a result of the shift to self-generation by customers
  - Establish and capacitate a separate unit within the eThekwini Municipality Electricity Department to accommodate a move from bulk purchase and distribution of electricity to a managed distributed electricity supply system
- Consider opportunities to alleviate energy poverty through the renewable energy transition programme:
  - Explore the implementation of a basket of alternative energy options in informal settlements and low- to middle-income households
- Work with the private sector to achieve a 70% reduction in emissions through fuel switch initiatives from fossil fuels to low carbon and renewable fuels in industrial use by 2050

Reduce electricity consumption by 40% by 2050 across residential, commercial, municipal and industrial consumers

Sub-actions

- Develop a programme to achieve 100% saturation of energy efficiency of the whole building envelope in all new and existing buildings and industries in the City by 2030:
  - Identify pilot neighbourhoods for implementation to develop a replicable, scalable model
  - Develop and implement a by-law that requires all existing residential and commercial municipal buildings to be retrofitted with energy efficient technologies (e.g. insulation, water heating, lighting, space cooling etc.) by 2030
  - Promote the widespread adoption of Energy Management Systems (EnMS) and adherence to national Minimum Energy Performance Standards (MEPS) by the industrial sector to ensure energy efficiency
  - Work with the private sector to develop and roll out a package of energy efficiency services for the industrial and commercial sectors that include targeted advice, training, assistance and subsidised energy audits
  - Develop and implement innovative financial instruments, including internationally available climate finance that encourages electricity users to implement energy efficiency interventions
  - Expand on existing electricity saving awareness campaigns to promote behaviour change through marketing of technologies, communication and education programmes
- Roll out smart grids, including bidirectional metering across eThekwini Municipality by 2030, as part of a broader Smart City programme that aligns to the national Smart Grid Vision 2030 and explore opportunities for electric vehicles to form part of the Smart Grid System.
- Develop and implement a by-law by 2020 that requires all new buildings (residential, commercial, industrial and municipal) to be net zero carbon by 2030, aligned to Durban's commitment to the C40 Net Zero Carbon Buildings Declaration[xx]

eThekwini Municipality infrastructure is net zero carbon

Sub-actions

- Develop a coordinated programme to outline a pathway to achieve net zero carbon in all municipal infrastructure
- Conduct energy audits on all municipal buildings
- Retrofit all municipal buildings with efficiency measures based on the outcomes of the energy audits
- Follow through on existing municipal SSEG initiatives and develop new avenues for deployment, including solar, wind, hydropower, biogas, biomass and waste water initiatives
- Raise awareness and build capacity in all municipal departments to collaboratively improve energy efficiency and renewable energy use in municipal infrastructure

SDGs

Moving towards clean, efficient and affordable transport

Action context

Transport is a major contributor to air pollution and GHG emissions, including nitrogen oxides and particulates, which have a significant impact on health in cities. As the demand in the transport sector continues to grow, so do impacts on land resources, water quality, air quality and biodiversity.

The transport sector is the second highest contributor to Durban's emissions, contributing 30% to city-wide emissions. Private vehicles make up 54% of passenger transport . As the middle-class grows, it is expected that there will be a continued increase in private car ownership and associated carbon emissions. Shifting residents to use public transport is a major challenge due to a number of barriers, including urban sprawl, car ownership aspirations and access to and safety of public transport. High private transport emissions are also due to a large number of trucks transporting goods in and out of the city, due to Durban's port. Trucks are high consumers of diesel, contributing to poor air quality in the port area.

A combination of public and non-motorised transport (NMT) in Durban is used by 46% of residents in the form of minibus taxis, buses, rail, walking and cycling. Approximately 200 bus operators and 110 taxi associations provide transport services to Durban residents. However, due to the legacy of apartheid planning and urban sprawl, most residents who use public transport services have to travel far distances, spend a lot of time and a high percentage of their income on transport. NMT trips in eThekwini Municipality are dominated by walking, with 32% of households (41% of low-income households) making at least one walking trip on a typical travel day[xxii]. Walking is often the mode of transport for last mile journeys, the movement of people from public transport hubs to their final destination. Cycling in eThekwini Municipality makes up a very small component of commuter trips (0.05%) and is mostly done on a recreational level.

There is a significant movement of goods over short distances, such as recyclable materials, and other goods traded informally, using barrows and trolleys in the Durban and Pinetown Central Business Districts (CBDs).

EThekwini Municipality is developing robust plans to transform the city's fleet to low emission vehicles, focusing on electric vehicles and hybrids. While the long-term goal is to shift all vehicles across the City to zero-emission vehicles, given the current context and extent of change needed we will move incrementally towards achieving this target. Furthermore, eThekwini Municipality has limited authority over private vehicles, which are accountable for the majority of transport emissions. Transforming private vehicles will require strong engagement with national government to enable ambitious legislation enabling a shift of private vehicles to zero carbon alternatives. The private sector will also play an important role in supporting the provision of the necessary infrastructure for this transition.

Benefits


Cost savings


Promotes innovation

Departments

EThekwini Transport Authority (ETA), City Fleet and Spatial Planning.

National framework

Nationally, the Green Transport Strategy, produced by the Department of Transport, and the South Africa's Greenhouse Gas Mitigation Potential Analysis Mitigation Report (2014), highlight measures to minimise the adverse impacts of transport on the environment while addressing current and future transport demands, while contributing towards South Africa's GHG reduction targets by 2050, which include:

- Implement the 'modal shift' notion
- Demand reduction measures
- Adopt more efficient vehicle technologies
- Adopt more efficient operations
- Use alternative lower-carbon fuels

Responding to the challenge

- EThekwini Municipality 2015-2035 Transport Master Plan prioritises the use of public transport and has set a public/private modal split target of 51:49 by 2035. The current public/private modal split is 46:54.
- The Integrated Rapid Public Transport Network (IRPTN) – Go!Durban, which is being implemented, aims to provide safe, affordable, and carbon efficient transport to its residents. The network is designed to be within a 10-15 minute walk for 85% of eThekwini Municipality residents. The IRPTN has four phases and is scheduled for completion by 2030.
- All new IRPTN buses that are being purchased are low emission buses.
- EThekwini Municipality has developed an NMT Plan with a goal 'To increase NMT utilisation in eThekwini by the development of high-quality pedestrian and bicycle networks that connect people and places', and is part of the IRTPN.

Actions

Expand the Integrated Rapid Public Transport Network (IRPTN) with a strong focus on Transit Oriented Development (TOD)

Sub-actions

- ▶ Continue to roll out the IRPTN, as per the eThekwini Municipality's 2015-2035 Transport Master Plan
- ▶ Revise and implement the IRPTN to accommodate 70% of all user trip requirements by 2050, depending on technical and financial feasibility
- ▶ Promote TOD to achieve spatial transformation, economic and social opportunities, and public transport efficiencies (in line with the Built Environment Performance Plan targets) by
  - Identifying priority transport nodes, priority feeder routes, priority stations and transport corridors and
  - Promoting densification around these transport nodes and stations

Actions

Implement travel demand measures that will reduce existing private car trips by 50%

Sub-actions

- Establish ultra low emission zones by limiting the entrance of vehicles using fossil fuels
- Implement and update the Durban's Densification Strategy to encourage the development of a more spatially compact city structure
- Implement a programme to promote and reward ride-sharing and public transport use
- Establish a dedicated unit in the Metro police to enforce compliance to demarcated zones
- Increase awareness raising campaigns and other outreach programmes on low-carbon and fuel efficiency programmes

Provide and maintain high quality active mobility and NMT systems that will increase their use to 30%

Sub-actions

- Provide, manage and maintain appropriate and safe pedestrian and cycling networks and supporting infrastructure at key nodes
- Facilitate the human-powered transport of goods within key commercial nodes
- Implement a spatial transformation programme that promotes equity in use of transport infrastructure

Facilitate a shift of 30% of freight transportation to rail

Sub-actions

- Lobby national government and Transnet to improve and maintain freight rail infrastructure in order to improve haulage cost efficiencies and maximise carbon efficiency
- Lobby national government and Transnet to identify ways to increase and expand rail infrastructure in an environmentally sustainable manner
- Lobby national government to increase the number of routes covered by heavy haul railway lines
- Develop inland intermodal hubs on the major transport routes to allow for the transport of cargo from the Port of Durban by rail instead of on the currently congested roads around the Port

Facilitate a switch of all vehicles to low-carbon options

Sub-actions

- Facilitate the transition of 100% of vehicle-based feeder trips to low-carbon options by 2050
- Convert all municipal vehicles (owned and procured) to low-carbon options by 2050
- Enable the supply of low-carbon energy through the implementation of appropriate infrastructure (e.g. battery storage, electric vehicle charging stations)
- Provide training programmes for small, medium and micro-enterprise businesses (SMMEs) in the motor service industry to enable them to provide services to zero and low emission vehicles
- Develop and implement innovative financial instruments (financed through international climate finance) that help consumers transition to low-carbon transport options
- Lobby national government to enforce the switch of all vehicles to zero-emission vehicles by 2050

Striving towards zero waste

Action context

EThekwini Municipality provides waste management services to the City's households and businesses. The exponentially growing population in the municipality results in increasing urbanisation and consumption, which contributes to the increasing volumes of solid waste experienced by the municipality. The main solid waste disposal sites in the eThekwini Municipality are the Bisasar Road, Mariannhill and Buffelsdraai landfills, with the Bisasar Road landfill being the largest in the municipal area.

Currently, the municipality is faced with challenges regarding inadequate landfill space that has further necessitated reviewing the current waste minimisation activities. A reduction in the amount of paper, plastic, food and garden waste sent to landfill is challenged by operational difficulties within the municipality and the need for behavioural change of municipal residents. Furthermore, there remains significant opportunities to reduce the quantity of waste produced through engagement and partnerships with the private sector.

While waste disposal contributes a small percentage of city-wide emissions, the sector presents a number of opportunities to reduce emissions in other sectors while improving local water and air quality, fostering entrepreneurship and creating jobs and innovative sectors in the economy. Furthermore, an emphasis on reusing, reducing and recycling has significant benefits in the carbon emissions embedded in products' supply chain in addition to direct benefits in reduced costs, energy intensity and emissions compared with manufacturing from new resources.

The new recycling and waste minimisation models advocate the diversion and recycling of waste in order to increase the lifespan of landfills, reduce emissions and provide jobs. Development of markets and empowerment of SMMEs and communities will ensure continuity and sustainability of the waste sector. Public-private partnerships (PPPs) will play a key role in providing financial and non-financial support.

SDGs

Benefits


Air quality


Water quality and security


Cost savings


Improved health


Job creation

Departments

Durban Cleansing and Solid Waste, Business Support Markets and Durban Tourism, Economic Development and Investment Promotion.

National framework

Municipal waste management services are governed by the South African Constitution (Act 108 of 1996), which provides the foundation of environmental regulation and policy. The right to environmental protection and to live in an environment that is not harmful to health or well-being is set out in the Bill of Rights (section 24 of Chapter 2). In addition, the National Environmental Management Waste Act (Act no. 59 of 2008) reforms the law regulating waste management and provides a legislative framework addressing all the steps in the waste management hierarchy. The act is implemented through the National Waste Management Strategy and Operation Phakisa: Chemicals and Waste Economy. Convened by the Department of Environmental Affairs (DEA), Operation Phakisa engaged extensively with stakeholders to provide enabling legislation to promote waste beneficiation, economic transformation and job creation through the waste sector.

Responding to the challenge

EThekwini Municipality has implemented a range of measures to improve efficiencies in the waste sector, including:

- Waste separation at source by adopting the use of specialised refuse bags for each waste type
- Durban Solid Waste (DSW) currently has about 23 recycling centres in the municipality that are easily accessible by residents
- Education and awareness programmes to promote the reduction, recycling and reuse of waste
- Two landfill gas-to-energy projects at Bisasar Road and Mariannhill landfill sites

Actions

Divert waste disposed to landfill sites by 50% in year 2023 (Phakisa targets) and by 90% by 2050 through reuse, recycle, recovery and re-engineering

Sub-actions

- Expand existing infrastructure to enable scaling up of recycling in the City, including:
  - Refurbishment of buy-back centres and upgrade existing recycling processing equipment
  - Procure suitable recycling machinery and equipment for existing municipal facilities
  - Increase the number of drop-off centres
  - Convert Bisasar Landfill Site to a waste park
  - Establish composting plants at suitable landfill sites
- Simplify recycling for communities by:
  - Expanding the waste separation at source programme city-wide
  - Introducing smart recycling bins for hire by businesses, complexes and private institutions
  - Placing temporary on-site recycling containers in high-density areas
  - Devising construction waste management plan and programmes, including reducing waste strategies such as redesigning, reusing and recycling
  - Introducing a recycling facility for builders' rubble that accepts waste free-of-charge to reduce illegal dumping
  - Integrate a sustainable waste pickers programme as an economic and social development initiative to further separate waste at source
  - Regularly conduct community awareness and outreach programmes to facilitate the reduction and reuse of waste and uptake of recycling
- Engage, support and partner with the private sector to:
  - Establish waste recovery centres
  - Facilitate innovative waste sector start-up companies
  - Facilitate a transition to a circular economy
  - Progressively reduce and eliminate non-recyclable and single-use items and supply sustainable and cost-competitive alternatives
  - Drive manufacturing waste reduction programmes
  - Facilitate consumer waste reduction, especially in the retail sector
- Construct a new waste-to-energy facility in the eThekwini Municipal Area

Providing sustainable water services and protection from flooding

Action context

As the population in eThekwini Municipality continues to grow, so has the density of development of municipal and private infrastructure. In addition to population growth, continuous urban migration has resulted in a sprawling city and development of areas that require water and sanitation, and in some instances, are also prone to flooding. Water resources are inextricably interlinked with land resources and are essential to continued economic development of Durban and to the sustainable livelihoods of its people.

The City is faced with aging infrastructure in a number of sectors and areas. With the City facing high rates of urban migration, this aging infrastructure can be compromised and easily impacted by the devastation of flooding. Climate change predictions indicate that there is a high risk of more frequent and severe storms. It is expected that flooding will further increase, exacerbating existing infrastructural challenges, thus requiring the need for urgent response measures. Critically, municipal infrastructure at risk includes:

- Water supply, sanitation and stormwater infrastructure
- Electricity sub-stations and power lines
- Roads, bridges and pedestrian pathways
- Public transport infrastructure
- Coastal infrastructure

In addition to aging infrastructure, it is expected that the frequency of dry years and droughts will increase water shortages. At the same time, the demand for water is predicted to increase due to population growth, increases in the number of households and industrial development. Therefore, with existing infrastructure, the demand for water is expected to outstrip the supply within the next 10 years[xxiii]. Critical to ensuring sustainability in the City's water supply is the provision of alternative water supply capacity and the reduction of non-revenue water (water purchased from Umgeni Water that is not billed).

Water connections to communities that are vulnerable to projected climate change impacts, such as water scarcity and health risks, are a priority. According to the IDP, in 2017, an estimated 95% of households had access to at least a basic level of water provision.

Climate change also poses a risk to declining water quality. While other factors such as urbanisation, industrial effluent and agriculture are primary causes of poor water quality, this is exacerbated by higher water temperatures. This adds pressure to requirements for water treatment facilities.

These challenges compromise the City, making it more vulnerable to the impacts of severe drought and flooding that will be brought about by climate change.

SDGs

Benefits

Departments

Department of Water and Sanitation, Engineering, EPCPD, Parks, Recreation and Culture, Umgeni Water, eThekwini Treasury, Human Settlements and eThekwini Health.

Responding to the challenge

- Durban's Water and Sanitation Department has detailed several actions to increase its 'alternative' water supply capacity. Additionally, in eThekwini Municipality's 10-year Water Security Plan for the City, one of its broad objectives is to increase water reuse to 100 million litres of water per day by 2022. The City has achieved a number of successes in ensuring water supply to all its citizens. Critical accomplishments to date include:
  - Provision of water and sanitation to many poor, previously disadvantaged people
  - Installation of 80 000 Urine Diversion Toilets that act as an interim solution in rural parts of the City where traditional sanitation is too costly
  - Successful water recycling facility to augment declining water supply
  - An ongoing programme to reduce water loss. This programme focuses on the early detection and repair of leaks, water pressure reductions, the improvement of water metering and the reduction in illegal water connections
- EThekwini Municipality's Engineering Unit has developed, and is in the process of rolling out, a Forecast Early Warning System (FEWS) for the eThekwini Municipality. FEWS is a model integration software that enables the city to forecast floods to ensure effective and efficient response measures.
- The eThekwini Municipality's Engineering Unit has prepared one-in-100-year flood lines for planning and management of floods and flood risks, incorporating climate change projections. It has also prohibited any development within the one-in-100-year flood lines.
- EThekwini Municipality is a partner of the uMngeni Ecological Infrastructure Partnership, which focuses on using ecological infrastructure solutions to support built infrastructure to address the challenges of water security in the uMngeni catchment. The partnership is made up of partners from provincial and national government, Umgeni Water, the South African National Biodiversity Institute (SANBI) and other local municipalities.

National policy framework

The availability and adequacy of potable water supply to residents of Durban is a Constitutional mandate bestowed on the municipality. The National Development Plan advocates for efficient water resource utilisation and reduction of water losses. This will ensure water business financial viability, environmental sustainability, community social equity and economic development.

Furthermore, the Water and Sanitation Unit of eThekwini Municipality is designated as the Water Services Authority and Water Service Provider as was Gazetted by the MEC of the Department of Cooperative Governance and Traditional Affairs (COGTA) in accordance with the Water Services Act. This designation makes it imperative for the municipality to ensure security of water supply to its consumers. The Water Services Act also requires municipalities that have been given 'Water Services Provider' status to provide measures to promote Water Conservation and Demand Management.

In order to provide an affordable and sustainable water service delivery, the management of water resources by the municipality is crucial.

Actions

Increase alternative water supply capacity to meet 100% of demand resulting from climate change impacts

Sub-actions

- Ensure that bulk water purchase agreements take into account the projected impacts of climate change on rainfall and runoff – Bulk water for the City is purchased from Umgeni Water. To ensure long-term security of water supply, climate change considerations need to be factored into purchase agreements that consider potential upstream impacts that are out of eThekwini's operating boundary
- Implement water reuse and remix (waste and seawater) programmes at wastewater treatment works – Implement a programme that rolls out direct reuse processes for treated effluent from municipal sanitation facilities, starting with the KwaMashu and Northern Wastewater Treatment Works. The city is also exploring water remix facilities to increase water security. A remix water system consists of a combination of seawater and treated effluent from a wastewater treatment that is energy efficient and environmentally friendly. Based on the outcomes from a demonstration project at the Central Wastewater Treatment Works, this project will be scaled up to increase capacity
- Support Umgeni Water to implement large desalination projects (e.g. East Coast Large Desalination Project), if feasible. Desalination plants are very costly and are highly energy intensive so desalination will only be pursued as a long-term option in the absence of alternative solutions
- Promulgate a water services bylaw to incorporate climate change response measures and review (and update as required) alternative water policies (e.g. rainwater harvesting policy) linked to the by-law by 2025
- Implement a city-wide rainwater harvesting programme to capture and store rainwater on-site for reuse

Actions

Reduce water demand by 50% to protect against drought risks

Sub-actions

- Develop an overarching water use strategy. As part of this strategy, develop a funding model for eThekwini Municipality that takes into account reduced income from water sales, through the implementation of measures to reduce water demand
- Continue to implement programmes to reduce non-revenue water losses
- Roll out dual domestic water systems in all new developments by 2050, to reduce the demand for potable water in buildings
- Expand on existing water-saving awareness campaigns to promote behavioural change through marketing of technologies, communication and education programmes
- Develop and facilitate a programme to convert 50% of municipal-owned buildings and all new households to low-flush toilets by 2030
- Work with other metros in South Africa to implement a water services auditing programme (e.g. no drop, blue drop, green drop)
- Continuous commitment to nurture the governance within Umgeni Water's Catchment Management Programme to protect water source catchments. Scientifically influence the programme by providing relevant and current data and, therefore, ensure maximum benefits

Improve the quality of effluent being discharged to water bodies

Sub-actions

- Design new wastewater treatment works and extensions to existing works to stricter standards, to improve the quality of effluent being discharged to the rivers
- Research and pilot the implementation of alternative, cleaner disinfection technologies such as ultra-violet light, ozone and thermal hydrolysis
- Impose stringent controls on water polluting land uses and activities to ensure that the impacts of climate change are not exacerbated

Establish protection measures, where possible, for existing development and infrastructure at risk from flooding

Sub-actions

- Continue to conduct detailed analyses of the latest rainfall/runoff projections and modelling of climate systems, and communicate these results to municipal line departments to identify and protect municipal infrastructure located in zones at high risk of flooding
- Ensure that Municipal Asset Management Plans consider rainfall projections and flood mitigation actions by including:
  - Revised rainfall/runoff data in assessment of the condition of stormwater and catchment management assets
  - Flood protection measures for existing developments and infrastructure, including retrofitting and modification where possible and relocation over the long term
- Develop and implement an early warning system for stormwater management
- Develop a programme to convert 10% of residential and commercial hardened surfaces to porous surfaces by 2030 to reduce surface runoff
- Implement public awareness campaigns to raise awareness of the benefits of stormwater runoff reduction techniques (e.g. green roofs, retention/wet basin, detention/dry basin, infiltration basins, rainwater harvesters, etc.) to reduce runoff from existing developments and other flood protection measures

Locate all new non-essential infrastructure outside high risk climate change areas and discourage further essential development

Sub-actions

- Reduce risk to developments on flood plains through the amendment of by-law 5.2 (2) (iii) to require developments within the one-in-100-year flood line within eThekwini boundaries to comply with the eThekwini Municipality Flood Assessment Information Requirements
- Ensure flood lines that take climate change risks into consideration are incorporated into the eThekwini Municipality's Spatial Development Framework and other spatial plans, as well as strategic (e.g. Strategic Environmental Assessment) planning processes
- Amend the Town Planning 'Scheme Controls' to incorporate a standard clause in each zone to reduce stormwater runoff from new developments
- Continue to implement and enforce updated standards and policies (e.g. flood lines) that take climate change risks into consideration for the planning and construction of future developments and infrastructure

Actions

Support and develop ecological infrastructure that supports protection from climate change impacts

Sub-actions

- Identify and manage public open spaces that can play a strategic role in flood attenuation, storm damage and cooling services
- Integrate sustainable urban drainage systems (SUDS) into the planning and development policies of the City. SUDS uses natural systems to support surface water runoff through storage and cleaning before slowly releasing runoff to waterways
- Ensure all lower order plans (Local Area, Functional Area, Precinct Plans and Draft Schemes) have at least 10% public green open space allocation to assist with ecosystem services such as flood attenuation and cooling services from 2018
- Develop master drainage plans for all river catchments within eThekwini municipal boundaries

Establish a transformative urban riverine corridor management programme

Sub-actions

- Work in partnership with all affected stakeholders to collectively rehabilitate and sustainably manage 7 400km of riverine corridors within the municipal area through transformative community adaptation initiatives by:
  - Conducting a baseline assessment and vulnerability analysis of the City's rivers and streams
  - Conducting a cost-benefit analysis of transformative river management options in light of climate change and social inclusion
  - Formulating a funding business case for public, private and inGonyama Trust Land
  - Fundraising at local, provincial, national and global levels for implementation

Prioritising the health of communities in the face of a changing climate

Action context

The municipal health services are aimed at treating and preventing diseases and promoting public health. These functions are provided through four units, namely, communicable diseases, environmental health services, social health services and clinical services. The health system is faced with a number of challenges and constraints. Climate change projections indicate negative health impacts for the City and as a consequence, would increase demand in the health system. This is expected to affect all aspects of the health system, including clinics, emergency rooms, hospitals, mortuaries and crematoria.

Three areas of concern were highlighted as critical for the City to action in the short, medium and long term, which are impacts of increased heat on the population, poor air quality and disease reduction and control.

Heat in Durban

EThekwini Municipality's climate risk story map indicates that temperatures in Durban have increased by 1.6°C in the last 20 years. The DCCS indicates that these temperatures are expected to further increase as a result of climate change by between 1.5°C and 2.5°C by 2065. Increased temperatures pose numerous health risks for the City. To effectively respond to this risk, the City needs to promote the implementation of heat mitigation measures, making use of a multitude of approaches that encourage transformation of the City's policy and institutional structures.

Air quality in Durban

The 2016 eThekwini Municipality GHG Emissions Inventory reported that the industrial sector is responsible for the largest percentage of community emissions. Coupled with GHG emissions are also high levels of air pollutants, including particulates, sulphur oxides (SOx) and nitrogen oxides (NOx). If air pollution and GHG emissions are not controlled, the resulting consequences on human health and the environment could be dire. The City has perceived air pollution as a priority, identifying the need to enforce legislation as imperative to assist with regulating large emitters.

Disease reduction and control in Durban

Infectious diseases and more importantly water and vector borne diseases, are a health priority for the city of Durban. Increased temperatures due to climate change, combined with wet conditions and poor waste management, creates viable conditions for vector breeding and microbial organisms, thus increasing infection incidences. The implementation of control measures to decrease possible primary infections and further transmission will need to be improved, including the monitoring efforts by City departments.

EThekwini responding to the challenge

Cool Durban Project – Identified the urban heat islands for Durban, projecting into the future and taking into consideration the impacts of climate change. The study identified areas vulnerable to heat and recommended solutions to reduce the heat island effect.

SDGs

Benefits

Water quality and security

Improved health

Cost savings

Departments

EThekwini Health Unit, Development Planning, Environment and Management, Human Settlements, ETA and Water and Sanitation.

Actions

Maintain urban heat levels at average 2005-2015 temperatures

Sub-actions

- Develop relevant policy frameworks to guide the implementation of heat mitigation strategies, for integration into the City's strategic plans and objectives
- Undertake a comprehensive socio-economic vulnerability assessment at a ward level to understand the needs of City communities to ensure the implementation of appropriate programmes in response to the reduction of heat related risk
- Use the findings from the Cool Durban project to develop comprehensive heat mitigation programmes for the City that incorporate the securing of climate resilient health support infrastructure
- Implement a cooling pilot in a vulnerable area (including cooling centres and cool roofs and strategic greening in vulnerable areas such as trees, rooftop gardening and green buildings)
- Facilitate the cooperation and information-sharing between private and public healthcare facilities and community-based communication and awareness raising efforts
- Develop guidelines for the incorporation of heat mitigation measures into the City's developments, urban design, and urban land-use schemes

Achieve World Health Organization (WHO) standards for air quality across the city

Sub-actions

Develop strong policy and legislation accountability measures and enforcement mechanisms to control emissions.

- Use the Atmosphere Emission Licence tool to enforce and reduce emissions from large industry
- Require municipal buses to shift to Euro V or VI buses (short term) and electric buses over the long term
- Enforce vehicle emission testing in areas with poor air quality linked to road transportation
- Incorporate air quality requirements when developing low emissions zones
- Upgrade ambient air quality monitoring equipment in the municipality to ensure that AELs are enforced
- Work with Transnet to maintain high levels of air quality in the harbour

Achieve a 100% reduction in water and vector-borne diseases linked to climate change impacts

Sub-actions

Policy and institutional approach

- Provide capacity to the eThekwini Health Department managing vector borne diseases to take climate change into account
- Provide capacity to expand coverage of water quality monitoring points to include all (100% of) large rivers and major tributaries in the eThekwini Municipal Area

Infrastructure approach

- Develop and adopt improved maintenance and asset management plans of stormwater systems and wastewater treatment works, to ensure optimum function
- Develop appropriate and efficient data capturing systems for health services in eThekwini Municipality

Research

- Develop an integrated climate and health research agenda for eThekwini Municipality, focusing on:
  - Identifying and profiling the risk and needs of the most vulnerable population groups
  - Determining and quantifying the types, nature, magnitude and distribution of current and potential health impacts

SDGs

Benefits


Job creation


Flood attenuation


Improved health


Heat migration


Water quality and security

Departments

Environmental Planning and Climate Protection Department, Parks, Recreation and Culture, and Area Based Management.

Protecting Durban's biodiversity to build climate resilience

Action context

Durban is situated in the Maputaland-Pondoland-Albany region, one of 34 global biodiversity hotspots. The City is located at the centre of a transitional zone between the warm tropical and cooler temperate elements. This is a unique biogeographical position, resulting in a wide range of terrestrial and aquatic ecosystems that provide habitat for a rich diversity of organisms. With increasing pressure from development and land use change practices, approximately 53% of the Municipal Area has been irreversibly transformed with only 29% of the original vegetation remaining. The Durban Metropolitan Open Space System (D'MOSS), employed as an environmental planning tool, has identified approximately 95 000 hectares (equal to a third of the total Municipal area) in the eThekwini Municipal Area as having biodiversity importance (Figure 18).

DURBAN IS LOCATED IN A GLOBAL BIODIVERSITY HOTSPOT AND SUPPORTS:

2270 plant species,
379 are endemic to South Africa
526 bird species
82 mammal species
69 reptile species

18 river catchments
4000 km of rivers
16 estuaries, with
76 invertebrate species and
44 fish species

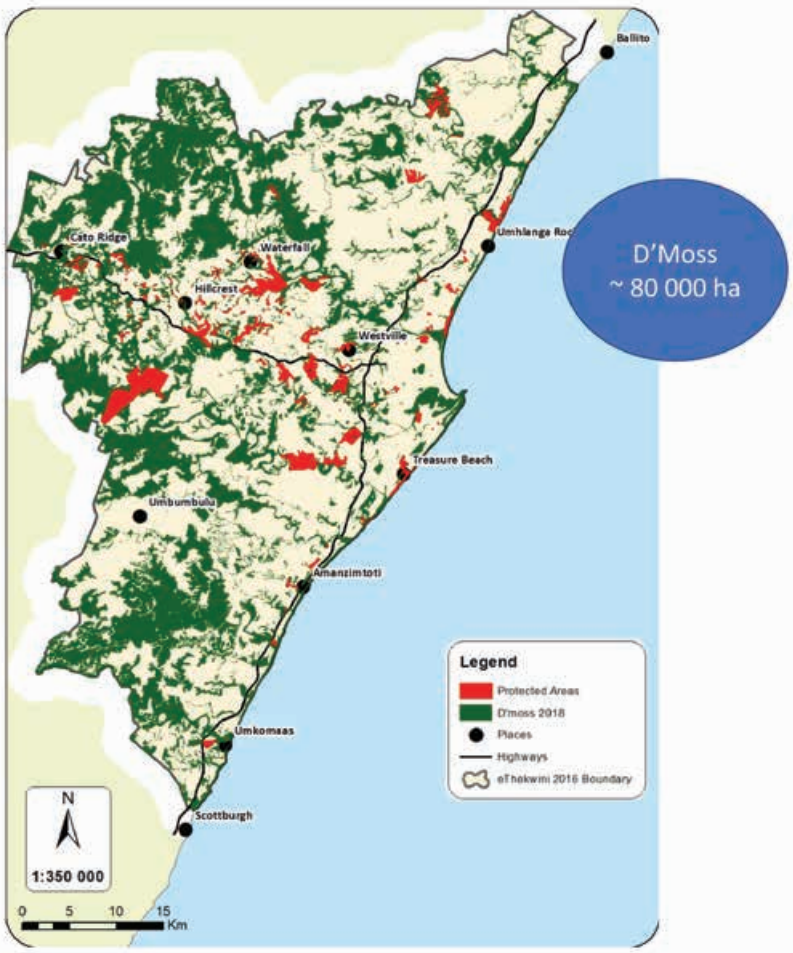


Figure 18: Biodiversity snapshot for Durban

EThekwini responding to the challenge

The eThekwini Municipality, through the Environmental Planning and Climate Protection Department (EPCPD), utilises a number of innovative approaches for the protection of biodiversity, including:

- **Spatial planning tools:** Through the application and periodical update of the D'MOSS as a layer within the Spatial Development Plan. Approximately 9% of the D'MOSS area currently has legal protection (this is equal to roughly 3% of the total eThekwini Municipal Area)
- **Land acquisition:** A process used for the purchase of land in areas identified to have critical biodiversity importance. In the 2017/2018 municipal financial year, the EPCPD acquired 38 hectares of land with biodiversity importance, offering long-term legal protection of these natural resources
- **Collaborative governance:**
  - Work with relevant provincial authorities (e.g. Ezemvelo KZN Wildlife) to offer legal protection to areas of environmental significance
  - Work with landowners, traditional authorities and communities to offer protection of the natural environment through stewardship programmes
- **Investment in novel ecosystems:** Making use of restoration management strategies such as Community Ecosystem Based Adaptation (CEBA) for the recovery and enhancement of degraded systems and associated ecosystem services

The Parks and Recreation Unit, through the Parks and Nature Reserve Programmes, helps maintain and safeguard the City's natural assets as well as supports the City's implementation efforts for environmental protection and management.

Actions

Identify biodiversity priority areas and incorporate into spatial and strategic planning

Sub-actions

- Secure approval for updated D'MOSS layer based on an updated Systematic Conservation Assessment (SCA) that, where possible, takes the impact of climate change on biodiversity into account
- Continue to embed biodiversity considerations, including the D'MOSS layer into the eThekwini Municipality Spatial Development Framework and other spatial plans, as well as strategic planning processes (e.g. Strategic Environmental Assessment)

Increase the protection of areas in Durban that has high climate change value

Sub-actions

- Assess and quantify the climate change (mitigation and adaptation) value of the D'MOSS layer
- Acquire additional land parcels with biodiversity and climate change value through stewardship programmes with private landowners and in traditional authority areas, in accordance with the Biodiversity Stewardship Policy
- Identify and implement additional innovative environmental protection tools and collaborative governance approaches to protect areas of environmental significance (e.g. special rating areas, payment for ecosystem services, conservation banking, etc.)
- Strengthen institutional capacity

Increase the management effectiveness of biodiversity conservation areas under the management of the eThekwini Municipality

Sub-actions

- Draft and implement effective management plans for all nature reserves and other sites considered important for biodiversity conservation that fall under the management of eThekwini Municipality
- Undertake the necessary enforcement action when notified of illegal activities on sites that have biodiversity and ecosystem service value (e.g. as identified by the D'MOSS layer)
- Undertake effective control of biological invasions by preventing new invasions and managing existing invaded areas

Provide a robust and resilient food system for Durban

Action context

Approximately 20% of households in the eThekwini Municipal Area live on or below the food poverty line and, therefore, hunger and food security is a critical issue. Climate change, particularly the increased frequency and duration of droughts, is projected to have a direct impact on local food production, affecting access to food, thus exacerbating food insecurity in the city. EThekwini Municipality encourages local food production (crops and livestock) through the promotion and support of small-scale community farming projects and food gardens. In light of climate change projections, sustainable farming will require innovative and adaptive practices, which are coupled with smart food production, strategic distribution network and investment in research and education of food waste management.

EThekwini responding to the challenge

Rapid urbanisation, high poverty and unemployment rates are socio-economic realities that heighten the concerns around human nutrition and food security. The City, as a result, is implementing a number of programmes in order to support local communities to address issues associated with food access and insecurity.

The City has established the **Agro-Ecology Unit**, which is structured to provide support to community farmers in the form of co-operatives by:

- Providing basic agricultural training and resources (e.g. tools, water collection tanks and seedlings)
- Setting up agro-ecology zones (with seven currently established) across the municipality to assist with the distribution of support and resources to small-scale farmers

The eThekwini **Agri-Business Programme** was launched in March 2018 with the aim to:

- Provide support to small-scale farmers to be able to access formal agricultural markets
- Enable small-scale farmers to participate in various stages of the food value chain, including production, processing and distribution

The eThekwini Municipality forms part of a transdisciplinary research partnership with the University of KwaZulu-Natal on **Sustainable and Healthy Food Systems (SHEFS)**. The programme aims to develop integrated understandings of the links between environment, food systems and health (Figure 19) to provide policy makers with scientific evidence to define future sustainable and inclusive food systems policies.

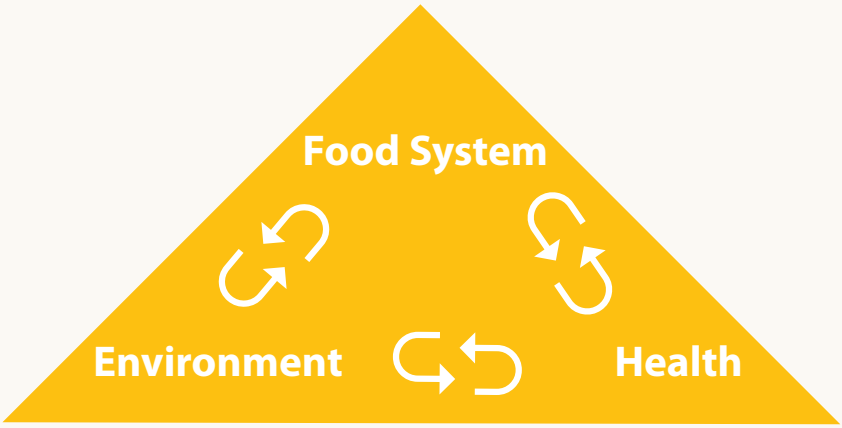


Figure 19: Food system-environment-health nexus for policy influence

SDGs

Benefits

Improved health

Food security

Economic growth

Cost savings

Departments

Agro-ecology Unit and Business Support Tourism and Markets Unit.

Actions

Achieve a 50% increase in locally produced food

Sub-actions

- Develop and update an Agricultural Policy for the City that clearly articulates strategies for dealing with food security and the added pressures posed by climate change
- Establish a comprehensive programme to promote and encourage home-grown food in all Living Standards Measure (LSM) groups through a range of initiatives (such as supplying seeds and fruit trees to poor communities, education on innovative urban gardening, the One Home One Garden campaign and the schools' food growing programme)
- Provide support to at least 900 cooperatives that focus on small-scale local community farming by 2030
- Ensure at least 25 residential parks each have a food garden included as part of their park area by 2030
- Ensure 50% of all unused and non-D'MOSS, brown and grey spaces and municipal-owned open spaces are converted to multi-use spaces (including sustainable agriculture with irrigation) by 2030
- Develop a programme to promote the use of urban unused spaces, such as abandoned buildings, rooftops and parking lots, and innovative technologies such as indoor vertical farms that use ultraviolet (UV) lights, to grow food in urban areas

Reduce the volume of good quality leftover food waste by 80%

Sub-actions

- Develop policy frameworks to guide the implementation and coordination of food waste management programmes within the municipality
- Develop mechanisms to link retail stores with city social development programmes, to promote the distribution of excess foods and address food insecurity concerns in communities
- Promote circular economy activities, i.e. support of local entrepreneurs in developing a composting system, making use of food waste from residential and business developments
- Design and implement an awareness-raising programme for the public and businesses regarding the reduction of food waste

Support food distribution and marketing networks to be able to adapt to climate change

Sub-actions

- Upgrade existing and situate new agricultural farmer support units close to where farms are located
- Facilitate farmers in joining appropriate commodity associations to ensure a continuous supply of different types of food to residents of Durban
- Facilitate access for informal small-scale agricultural growers to formal trading nodes and markets by providing storage facilities and transportation of produce

SDGs

Protecting our City from sea-level rise

Action context

EThekwini Municipality has 98km of coast. Being a coastal city, the impact of climate change related sea-level rise and the increase of coastal storms will have a negative bearing on the City's infrastructure, economy and communities[xxiv,xxv]. The increase in the frequency and magnitude of storms will likely erode the shoreline, particularly in low-lying areas and areas weakened by previous erosion.

The implications of sea-level rise and storms will have far reaching impacts beyond coastal erosion[xxvi]. Without any adaptation interventions, the Durban beachfront may see the loss of significant development and infrastructure. This could be exacerbated due to considerable demand for further development and densification on the coast. In order to assess Durban's climate risk, the likelihood of the climate impacts to occur and the damage in terms of severity related to these impacts need to be considered. Based on a 2018 risk assessment, the City will be exposed to various risks due to sea-level rise (Figure 20).

Benefits

Improved health

Cost savings

Water quality and security

Departments

Engineering, EPCPD, Parks, Recreation and Culture, Spatial Planning

Threatened tourism industry and events — VERY HIGH

Climate change is predicted to threaten the tourism industry as rising sea levels will reduce beach widths and damage tourism infrastructure.

Impact on the shipping / sloshing in the harbour — VERY HIGH

The rise in sea level and storm tide combined threatens port operation. The impact of increased wind speed has impact on sloshing in harbour mouths: resulting in loading and unloading backlogs and thus longer port entry queues.

Displacement of people & loss of life — HIGH

Flooding may displace people and perpetuate cycles of poverty.

Loss of primary dunes / threatened dune infrastructure — HIGH

Durban's key buffering ecosystems, beaches, dunes, estuaries, mangroves and wetlands, are extremely sensitive to current rising sea levels caused by global warming and climate change.

Loss of ecosystem & biodiversity — MEDIUM

Along the coastline mangroves do not survive when exposed to direct wave action and so when this occurs the mangroves will start to die off. The combined impacts of sea level rise and increased storms are likely to have severe consequences in terms of coastal erosion, threatening coastal ecosystems.

Figure 20: Durban's key risks for sea-level rise

The actions proposed use a range of measures aimed to ensure that all existing developments and infrastructure that are at risk from flooding are protected in the future through careful site selection, retrofits, modifications, relocations and the development of stormwater management systems.

Responding to the challenge

- EThekwini has modelled sea-level rise for three scenarios: low, medium and high risk. In response to these modelled projections, the municipality is implementing a dune rehabilitation programme to support the natural protection function of coastal dunes.

Figure 21 shows the current high water mark (in black) and the positions of these marks around the year 2100 for both the high-emission scenario (1 000mm, in red) and low-emission scenario (300mm, in yellow). It also shows vulnerable infrastructure along the coastline and major hazard installations vulnerable to coastal flooding.

Figure 21: Current and future high watermarks for Durban's CBD

Actions

Identify, protect and relocate existing municipal infrastructure currently located in high risk coastal areas

Sub-actions

- Continue to conduct detailed analyses of the latest coastal storm and sea-level rise projections, including high water marks and KwaZulu-Natal established setback lines to identify coastal areas at highest risk from coastal storm damage and flooding
- Protect existing municipal infrastructure currently located in high risk coastal areas
  - Develop guidelines for the modification and retrofitting of infrastructure and development in high risk zones to reduce damage from coastal storms
  - Ensure Municipal Asset Management Plans consider the revised coastal storm and sea-level rise projections when the condition of coastal assets is assessed and include modification and retrofitting of high risk municipal infrastructure
  - Make information on the coastal erosion and setback lines available to all municipal departments responsible for municipal infrastructure and development, and educate relevant officials to ensure that no new non-essential infrastructure is located in the designated high risk zones
  - Prioritise the conservation and restoration of all dunes and other natural coastal defences, where possible
- Relocate existing infrastructure that is located in high risk areas over the long-term, where necessary
  - Identify areas where coastal municipal infrastructure currently located in high risk coastal areas could be relocated to in the long term.
  - Relocate existing municipal infrastructure in the high risk coastal areas to areas of lower risk at the end of their economic life or when severely damaged by storms

Building resilience in the City's vulnerable communities

Action context

Climate change is going to increase the frequency and severity of extreme events and other climate change related disasters. While everyone will be negatively affected by these events, it is the poor and the vulnerable that are most likely to be impacted the most as they have the least ability to adapt to and protect themselves from extreme events. It is important for the City to effectively protect its citizens from increased climate related risks and to build resilient communities.

EThekwini Municipality recognises that people living in informal settlements are the most vulnerable communities in the City. Many informal settlements are situated in environmentally sensitive areas, including floodplains, low-lying areas or on land with steep slopes or unstable soils. Currently, about a quarter of the City's population reside in over 550 known informal settlements, of which 164 settlements are located, or partially located, in a one-in-100-year floodplain. Furthermore, houses in informal settlements are often made of materials that are not resistant to extreme weather conditions, and are unable to cope under these conditions. There is a need to implement a range of measures to protect and build resilience in informal settlements across the City[xxvii].

Apart from informal settlements, previously disadvantaged communities such as townships and rural areas are also recognised as vulnerable communities. Rural areas in eThekwini are sprawling and are becoming peri-urban, resulting in losses of environmentally sensitive areas that provide protection from extreme events. There has also been a decline in productive agricultural land that has implications on the rural poor who are dependent on small-scale agriculture for food[xxviii]. Townships are also vulnerable areas that are located long distances from commercial hubs and lack adequate infrastructure to cope with extreme events. Furthermore, the UHI effect is higher in township areas, making those communities more vulnerable to heat related impacts.

Responding to the challenge

- The eThekwini Municipality has an **Incremental Services Programme and Resilience Strategy** that focuses on upgrading existing informal settlements and 'Collaborate Informal Settlement Action'. Through these initiatives, high risk informal settlements have been identified and prioritised for relocation
- The establishment of the **Municipal Adaptation Planning Task Team**, under the Disaster Management Advisory Forum, is to facilitate the incorporation of climate change adaptation and resilience into municipal line department disaster management plans

SDGs

10 REDUCED INEQUALITIES

11 SUSTAINABLE CITIES AND COMMUNITIES

13 CLIMATE ACTION

Benefits

Quality of life

Improved health

Flood attenuation

Economic growth

Departments

Disaster Management, Human Settlements, Area-Based Management, EPCPD and Engineering Unit.

Actions

Facilitate the transition of all informal settlements towards climate resilience

Sub-actions

- As per the IDP, relocate high risk informal settlements to suitable alternative available sites
- Informal settlements that are at high flood risk that are not being relocated, prioritise for expansion of the community-based flood early warning system initiative
- Facilitate the adoption of resilient building designs and materials that promote heat mitigation and resilience to flooding in informal settlements
- Facilitate communities to put in place systems to assist in the management of stormwater
- Promote and facilitate the greening of informal settlements to act as natural flood attenuation solutions and cooling
- Formalise the informal settlements by lobbying and facilitating for improvement of accessibility to ensure effective, quick responses to climate change related impacts
- Create awareness and implement a basket of alternative energy options in informal settlements

Facilitate the transition of all previously disadvantaged communities towards climate resilience

Sub-actions

- Conduct community vulnerability assessments to identify and prioritise township and rural areas at risk
- Develop a climate resilient township, using mitigation and adaptation solutions such as passive cooling, rainwater harvesting and solar energy, to improve livelihoods and well-being
- Develop and implement a pilot programme to build climate resilience in vulnerable rural areas (incorporate actions highlighted in the Flooding and Health thematic areas)
- Facilitate a climate resilience programme in all identified vulnerable townships, rural areas and other vulnerable human settlements

Integrate and align disaster management with climate change resilience

Sub-actions

- Continue to integrate climate change risks into disaster management plans by requiring climate risks to be accounted for in municipal line departments' disaster management plans to facilitate effective disaster risk assessment, reduction and response
- Facilitate multi-departmental disaster management forums that prioritise climate change related risks and extreme events
- Implement an early warning systems for extreme events
- Develop a contingency plan that responds to more extreme and high impact storms and flooding events

8. Action Timeframe and Summary Table

Table 3 provides a summary of priority actions, including the timeframe for the actions and estimated costs at nominal prices.

Table 3: Priority action timeframe and summary

Action	Lead Departments and Sectors	Status	Short-Term 2020	Medium-Term 2021 – 2030	Long-Term 2031 – 2050
ENERGY					
100% of Durban's electricity is supplied by renewable energy					
100% of Durban's electricity is supplied by renewable energy	EThekwini Electricity, Energy Office, Strategy Office	New	✔	✔	
Implement a revised funding model for future electricity sales	Energy Office, eThekwini Electricity	Planned	✔		
Develop a renewable energy policy in eThekwini Municipality	EThekwini Electricity	New		✔	
Develop an Independent Power Producer Support Programme	EThekwini Electricity	In progress	✔	✔	
Implement embedded generation tariffs	Energy Office, eThekwini Electricity, Private Sector	New	✔	✔	✔
100% of all buildings are energy efficient					
Develop a 100% saturation energy efficiency programme in all the building envelopes	Energy Office, Economic Development, Engineering	New	✔	✔	
Roll out smart grids, including bidirectional metering across eThekwini Municipality	EThekwini Electricity	New		✔	
Implement a new buildings net zero carbon by-law	Energy Office, Engineering	In progress	✔	✔	✔
All municipal infrastructure to be net zero carbon					
Outline a net zero carbon pathway in all municipal infrastructure	Energy Office	New	✔		
Conduct energy audits and retrofit all municipal infrastructure with efficiency measures	Energy Office	In progress	✔	✔	
Coordinate all existing municipal SSEG initiatives and identify more opportunities for deployment	Energy Office, Water and Sanitation, Durban Solid Waste, eThekwini Electricity, Engineering	In progress	✔	✔	

Action	Lead Departments and Sectors	Status	Short-Term 2020	Medium-Term 2021 – 2030	Long-Term 2031 – 2050
 **TRANSPORT**					
70% of all passengers use public and non-motorised transport (NMT)					
Continue to roll out and expand the IRPTN	EThekwini Transport Authority	In progress	✔	✔	
Promote TOD to achieve spatial transformation	EThekwini Transport Authority, Development Planning, Environment and Management	In progress	✔	✔	✔
Establish low emission zones	EThekwini Transport Authority, Development Planning, Environment and Management, eThekwini Health	New		✔	✔
Implement and promote a reward ride sharing programme and public transport use	EThekwini Transport Authority, Town Planning, Private Sector, Development Planning, Environment and Management	New		✔	✔
Provide and maintain safe pedestrian and cycling networks and supporting infrastructure	EThekwini Transport Authority	In progress	✔	✔	✔
Shift 70% of vehicles to low emission vehicles					
Convert all municipal vehicles to low-carbon options	City Fleet, Durban Cleansing and Solid Waste, EThekwini Electricity, Metro Police	Planned	✔	✔	✔
Provide appropriate infrastructure to enable the uptake of electric vehicles	EThekwini Transport Authority, EThekwini Electricity, City Fleet, Private Sector	New	✔	✔	
Develop and implement innovative financial instruments for low-carbon transport options	eThekwini Treasury, eThekwini Transport Authority	New	✔	✔	
Lobby national government to accelerate the switch of all vehicles to zero-emission vehicles	Energy Office, eThekwini Transport Authority, City Fleet, South African Local Government Association	New	✔	✔	
Lobby national government to expand rail infrastructure in a sustainable manner	Energy Office, eThekwini Transport Authority	New		✔	

Action	Lead Departments and Sectors	Status	Short-Term 2020	Medium-Term 2021 – 2030	Long-Term 2031 – 2050
WASTE					
Divert 90% of waste from landfill					
Expand existing infrastructure to up-scale recycling in the City	Durban Solid Waste	New	✔	✔	
Simplify recycling for communities	Durban Solid Waste, Private Sector	In progress	✔	✔	
Engage and partner with the private sector to promote a circular economy	Durban Solid Waste, Economic Development, Private Sector	New	✔	✔	
WATER , SANITATION AND FLOODING					
Increase alternative water supply capacity to meet 100% of escalated demand					
Bulk water purchase agreements take into account the projected impacts of climate change on rainfall and runoff	EThekwini Water and Sanitation	In progress	✔		
Implement water reuse and remix programmes at wastewater treatment works	EThekwini Water and Sanitation, Private Sector	In progress	✔	✔	✔
Promulgate water services by-law to incorporate climate change response measures	EThekwini Water and Sanitation	In progress	✔		
Implement a city-wide rainwater harvesting programme	EThekwini Water and Sanitation, Human Settlements	New	✔	✔	
Reduce water demand by 50% by 2050 to protect against drought risks					
Develop an overarching water use strategy with a funding model	EThekwini Water and Sanitation	New	✔	✔	
Continue implementing non-revenue water losses reduction programmes	EThekwini Water and Sanitation	In progress	✔	✔	
Develop and facilitate a low-flush toilet programme in municipal-owned buildings and all new buildings	EThekwini Water and Sanitation, Engineering	New		✔	✔
Improve the quality of effluent being discharged to water bodies					
Ensure compliance to stricter effluent standards for new wastewater treatment works and extensions	EThekwini Water and Sanitation, City Health	New		✔	

Action	Lead Departments and Sectors	Status	Short-Term 2020	Medium-Term 2021 – 2030	Long-Term 2031 – 2050
Establish protection measures, where possible, for existing development and infrastructure at risk from flooding					
Ensure that Municipal Asset Management Plans consider rainfall projections and flood mitigation actions	Coastal Engineering Stormwater Catchment Management and Development Planning, Environment and Management	In progress	✔	✔	✔
Develop a programme to convert 10% of residential and commercial hardened surfaces to porous surfaces	Engineering, Development Planning, Environment and Management	New	✔	✔	
Develop and implement an early warning system for stormwater management	Disaster Management, Coastal Engineering Stormwater Catchment	New		✔	
Support and develop ecological infrastructure that supports protection from climate change impacts					
Identify and manage public open spaces that play a strategic role in flood attenuation and cooling services	Development Planning, Environment and Management, Parks and Recreation, Engineering	In progress	✔	✔	✔
Integrate sustainable urban drainage systems (SUDS) into the planning and development policies	Engineering, Development Planning, Environment and Management	Planned	✔	✔	
Implement a transformative urban riverine corridor management program					
Work with all affected stakeholders to collectively rehabilitate and manage 7400 km of riverine corridors	Development Planning, Environment and Management, Parks and Recreation, Engineering	In progress	✔	✔	✔
HEALTH					
Promote implementation of heat mitigation measures to maintain urban heat levels at average 2005-2015 temperatures to 2050					
Develop and implement a comprehensive heat mitigation programme	EThekwini Health, Development Planning, Environment and Management, Area-Based Management	New	✔		
Achieve WHO standards for air quality across the city					
Develop strong policy and legislation accountability measures and enforcement mechanisms to control emissions	City Health, Energy Office	New		✔	
Upgrade ambient air quality monitoring equipment in the municipality to ensure that AELs are enforced	City Health	In progress	✔		
Achieve a 100% reduction in water and vector- borne diseases linked to climate change impacts					
Develop an integrated climate and health research agenda for eThekwini Municipality to inform policy	Development Planning, Environment and Management, City Health	New	✔	✔	

Action	Lead Departments and Sectors	Status	Short-Term 2020	Medium-Term 2021 – 2030	Long-Term 2031 – 2050
FOOD					
Achieve a 50% increase in locally produced food					
Develop a city-wide Agricultural Policy that addresses food security and climate change	Agro-ecology Unit, Economic Development, Development Planning, Environment and Management	In progress	✔		
Provide support to small-scale local community farming	Agro-ecology Unit, Rural Area-Based Management Department	In progress	✔	✔	
Promote the use of unused spaces and innovative technologies to grow food in urban areas	Business Support Tourism and Markets Unit, Economic Development, Agro-Ecology Unit, Parks and Recreation	New		✔	✔
Reduce the volume of good quality leftover food waste by 80%					
Facilitate a link between perishables suppliers and producers with city social development programmes	Business Support Tourism and Markets Unit, Economic Development, Private Sector	New		✔	
SEA-LEVEL RISE					
Establish protection measures, where possible, for existing and new at-risk coastal development and infrastructure					
Identify existing municipal infrastructure currently located in high risk coastal areas	Engineering, Development Planning, Environment and Management	In progress	✔	✔	
Protect existing municipal infrastructure currently located in high risk coastal areas	Engineering	In progress	✔	✔	✔
Relocate existing municipal high risk infrastructure, where necessary	Engineering	New		✔	✔

Action	Lead Departments and Sectors	Status	Short- Term 2020	Medium- Term 2021 – 2030	Long- Term 2031 – 2050
VULNERABLE COMMUNITIES					
Facilitate the transition of 100% of informal settlements towards climate resilience					
Relocate high risk informal settlements to suitable alternative sites	Human Settlements, Land Invasion Control Unit	In progress	✔	✔	
Expand the community-based adaptation and flood early warning system initiatives in informal settlements	Human Settlements, Development Planning, Environment and Management Unit, Engineering, Disaster Management	New	✔	✔	
Facilitate the transition of all previously disadvantaged communities towards climate resilience					
Develop climate resilient townships	Human Settlements, Development Planning, Environment and Management Unit, Engineering, Strategy Office	New		✔	
Integrate and align disaster management with climate change resilience					
Integrate climate change risks into disaster management plans	Disaster Management, all infrastructure departments	In progress	✔	✔	

9.
Sisonke: Together we can

Context

EThekwini Municipality contributes only 6% of Durban's community-wide GHG emissions. A pathway towards becoming a carbon neutral and resilient city by 2050 will, therefore, require the City to engage and partner with a range of stakeholders through a number of initiatives with a focus on sustainability.

The City recognises a need to build social cohesion and inclusivity around climate change issues to inspire behavioural change and motivate personal accountability to sustainable living. Importantly, the City recognises that building trust and partnerships with Durban's citizens is essential.

EThekwini Municipality has a long history of awareness raising and education initiatives to encourage change in local understanding of, and responses to, climate change and to inform decision-making. While these engagements play a vital role in driving behavioural change in Durban, the municipality recognises that more needs to be done to actively engage its citizens.

Responding to the challenge

- Durban launched the Switch Off, Unplug and Save Campaign in 2008. The campaign was used as a platform for other climate change mitigation awareness programmes to illustrate how energy efficiency and renewable energy are viable solutions to to curb greenhouse gas emissions.
  - Visited 250 schools with Climate Mitigation Education Campaign
  - Visited 15 shopping malls – interacted with approximately 10 000 residents
  - Beach campaigns – approximately 5 000 interactions
- Collaborations with stakeholders with a passion for sustainability has seen the formation of the eThekwini Environmental Team. The team actively visits schools and communities in Durban to inspire behavioural change through education and awareness on a range of sustainability issues. The team is committed to climate change education and understands it is not

SDGs

just about teaching the science of climate change, but about reaching the hearts and minds of people.

- The city utilises technology and social media as additional communication tools to engage with stakeholders and citizens to raise awareness:
  - The Durban Solar Map is a web-based interactive tool that allows residents to calculate the financial viability of a PV installation on their roof based on solar radiation and other data
  - A city partnership with uShaka Marine World saw the development of the first voice interactive recycling station in Durban that encourages Durbanites to be aware of the environmental dangers of littering
  - The city's social media marketing includes popular social media sites such as Facebook, Google+, Twitter, Instagram, and Pinterest that deliver the desired messages to the public at large
  - Greening our events facilities – Various initiatives to reduce energy consumption and carbon emissions were identified and implemented at Durban's International Conference Centre and Moses Mabhida Stadium, which also created public awareness
  - The municipality implemented climate change mitigation awareness programmes aimed at behavioural change of energy users at tertiary institutions. Approximately 25 000 students from the University of KwaZulu-Natal and Durban University of Technology were recipients of the campaign
  - Community adaptation projects – The city implemented a range of projects to drive conservation, rehabilitation and restoration of natural systems through active community engagement and response to increase resilience in vulnerable areas. Examples included: Palmiet Road Rehabilitation Project, Sihlanzimvelo Programme, and Buffelsdraai Community Reforestation Project
- In 2018, Durban emerged as the national winner in the World Wide Fund for Nature's (WWF) 'One Planet City Challenge', as well as the Greenest Municipality Competition, hosted by the national Department of Environmental Affairs. The City was evaluated in areas that included waste management, energy efficiency, conservation, water management, public participation and community empowerment.

Together we can

Despite the fact that climate change has been identified globally as one of the key challenges of this century, the full scale of the likely impacts at the global, regional and local levels and what will be required to adapt to these impacts, are poorly translated and understood by Durban communities. As a result, residents are unsure about how they contribute to climate change and what steps they should take to adapt to and mitigate climate change impacts. The actions below highlight key additional areas that the City will focus on to facilitate city-wide ownership and response to climate change:

Private sector collaboration – The quality of infrastructure, environment and liveability are some key aspects that attract investors and the private sector to cities. Durban will have to embark on planning with the private sector through continuous engagements led by the City Manager and Durban Chamber of Business. The City Manager will need to work jointly with the Mayor to reassure the investors that Durban is secured and climate proof to attract further investment and potential Public Private Partnerships on climate change actions. Investors capitalising on the green sustainable economy should be given first preference in securing opportunities within the municipality to enable accelerated transitioning.

The City's 2016 GHG inventory and the GHG emissions scenarios show that industrial and commercial emissions account for 52% of city-wide emissions. At the same time, many companies that have head offices and/or operations in the City, have set ambitious GHG reduction targets and have implemented a range of innovate solutions to mitigate GHG emissions. Therefore, to achieve carbon neutrality, engagement and partnerships with the private sector is critical. The private sector in the City is heterogeneous, ranging from lead companies who recognise climate change as a significant risk, to companies with limited knowledge and understanding of climate change. Therefore, the City will embark on initiatives that will enable companies to learn from each other, but also to support and partner with it. Specific actions include:

- **Climate change masterclass** – Work with the Durban Chamber of Commerce to develop and host a practical training on climate change for the private sector so that the necessary tools and skills are provided to enable effective response measures
- **Continuous engagement with the private sector** – Develop a platform to ensure continuous engagement with the private sector, focusing on key climate change issues and solutions in the City
- Identify and implement partnerships with the private sector in high priority, transformative climate action areas

Active citizen participation – Durban is a cultural melting pot and is home for descendants from three global regions (Africa, Asia and Europe). Given the diversity of its citizens, the way people understand and interpret climate change is varied. This provides the City with historical, philosophical, linguistic, cultural, belief systems, gendered and environmental resources from across cultures and indigenous knowledge systems. Lessons from previous attempts to engage the community on climate change show a mismatch between scientific views and people's practicalities and knowledge systems. Furthermore, communities have their own understanding and knowledge of climate change and it is important to recognise and harness this knowledge as they prioritise climate change implementation in eThekwini. Therefore, the municipality has partnered with the Department of Science and Technology and National Research Foundation (DST-NRF) Centre in Indigenous Knowledge Systems (IKS) to use an IKS approach to engage Durban's citizens on climate change through the following initiatives:

- Build shared ownership and understanding of climate change between eThekwini Municipality and local communities to drive social cohesion
- Showcase the application and relevance of rural youth migrants innovative community-based knowledge systems, skills and values on climate change in an urban setting
- Demonstrate the holistic understanding of climate change in the context of food in an urban environment

- Identify and scale up sustainable IKS climate change solutions in the city to facilitate understanding and update of response measures at lower costs than conventional approaches

Establish a green training centre – Transforming the city to align with a 1.5°C pathway will require new skills. We cannot mitigate or adapt to what we do not understand. Identifying and building the necessary skills is essential. One way to promote this at the local level is through lifelong learning programmes that impart new knowledge, skills and attitudes to learners. The city, over the medium to long term, will establish a Green Training Centre to provide low and unskilled citizens with skills needed in a low-carbon society. The training centre will prioritise women and the youth, as they often face higher risks and impacts of climate change.

10.
Financing the transition

A transition towards a carbon neutral, climate resilient Durban by 2050 will require a shift from the existing BAU approach to budgeting and project finance. Achieving the large infrastructural actions set out in the Climate Action Plan is dependent on the City's ability to access the necessary finance.

Given that climate change is an unfunded mandate in Durban's budgeting structure, finance has been highlighted as a significant barrier to implementation in many departments. Furthermore, the City prioritises the provision of basic services, having limited resources to incorporate climate change actions and measures. The high capital costs of sustainable infrastructure, uncertainty around new technologies and existing City structures that lock in traditional infrastructure are additional barriers. Lastly, while there are a number of avenues to access grant funding through Development Finance Institutions (DFIs) and dedicated green, climate funds, Durban lacks sufficient capacity and resources to develop suitable bankable projects. Accessing grant funding requires a new set of skills, including an understanding of legal structures, finance and budgeting as well as proposal writing, which were traditionally not required for technical staff.

Therefore, financing the CAP will be accomplished through various mechanisms, depending on the action type and finance needed. The points below highlight the measures that the City will undertake to access the finance required for a sustainable transition.

Fund climate change action through the City's existing budget

- Mainstream climate change to incorporate into the City's existing budgetary framework through the development of a Green Procurement Policy ensures that replacement of old infrastructure incorporates low carbon, climate resilient alternatives and to establish climate change requirements for new infrastructure
- Develop innovative funding models, especially for electricity, to account for increases in revenue losses as consumers shift towards small-scale embedded generation
- Work with other cities to address the transition of South African municipalities to new funding models

Access international and local funding opportunites

- Develop a shared database of local and international funding opportunities to keep abreast of eligibility, requirements and deadlines for funds. This includes national funds, such as the Municipal Infrastructure Grant, the EEDSM Programme, as well as international funding such as Development Finance Institutions
- Develop a clear project dashboard and workflow: prioritising high impact projects for funding
- Build capacity to train relevant officials to identify funding mechanisms and package project proposals to enable bankability
- Work with sector technical experts to identify bankable projects and develop proposals that are specific to the funding available, whilst prioritising the City's needs
- Access opportunities from international organisations such as the Cities' Finance Facility to provide support for project proposal development

Build on and leverage PPPs to fund projects

- Use the private sector engagement process to identify projects suitable for PPPs
- Build on existing PPPs in the Water and Sanitation and Waste sectors and apply lessons learned to other sectors in the City

11. Monitoring and updating the CAP

Durban's CAP has set ambitious actions and targets to achieve a carbon neutral, climate resilient city. These targets are to be monitored to measure the success of the CAP implementation. Monitoring and Evaluation (M&E) is a fundamental pillar of climate planning and implementation, as it enables the transparent tracking and reporting of activities and their impacts, typically across emissions, mitigation actions, finance and adaptation. Therefore, going forward, it is a priority for the City to establish an M&E system to support effective implementation and monitoring, transparency of actions, and credibility of targets.

M&E systems for the CAP will link closely to the Durban Climate Change Strategy Implementation Framework and also retain links, where appropriate, to the National Climate Change Response Policy M&E System in order to facilitate ease of reporting and vertical integration. Similar to the National Climate Change Response M&E Framework in 2015, the M&E system will be guided by the following objectives:

- Tracking the city's transition to a carbon neutral city
- Tracking the city's transition to a climate-resilient society
- Tracking climate finance to support the transition
- Tracking communication and learning

EThekwini is committed to monitoring and evaluating progress of the CAP and will build on existing platforms. These existing platforms will form part of a broader M&E strategy.

Existing structures

- **The Climate Change Technical Task Team (TTT):** The Climate Change TTT is made up of Heads of Departments. The team meet bimonthly to discuss climate change issues. The CAP development is a standing item on the agenda. Progress regarding action implementation for both climate change mitigation and adaptation actions will be reported on this platform on a quarterly basis. The platform will also be used to track climate finance from external funders and city finance.
- **EThekwini GHG Inventory:** From a mitigation perspective, the City produces a GHG inventory annually, which tracks changes in GHG emissions from the previous year. The GHG inventory will be expanded to track against the City's CAP targets and the results will be used to inform future planning. The GHG inventory and progress is reported annually in the City's reporting structures including the Integrated Development Plan by the Energy Office.
- **CDP reporting:** EThekwini Municipality reports annually on the CDP platform and uses this as a basis to publicly disclose the City's GHG emissions, climate change risks and mitigation and adaptation strategies used to respond to these risks. The CAP will be incorporated into the CDP response and will be used as a measure to track progress.

Developing a CAP Monitoring and Evaluation Framework

The City is developing an approach, methods and indicators to effectively monitor CAP progress. The areas must provide technically accurate and useful information for decision-making and CAP improvement. During the initial phases of implementation, the City will focus on priority actions and ensure that these actions are regularly monitored. This will then be expanded to broader action areas.

Areas and indicators that will be focused on include:

- **Strategy and direction** – The CAP will be regarded as a dynamic document and will be updated every five years to incorporate significant changes in policy and legislation, the climate science and city structures,

as well as to incorporate actual emission reductions achieved, new technologies and actions implemented.

- **Learning and communication** – Communication of the CAP is crucial for implementation among various sectors and stakeholders. Skills development, communication and knowledge sharing will be critical components that will be monitored to ensure that relevant sectors are equipped with the necessary skills to implement the plan.
- **Governance and management** – Governance and management of the CAP is crucial for implementation. The recommendations outlined in the governance chapter will be tracked to further drive mainstreaming across the City. The M&E Framework will outline a process to mainstream monitoring and evaluation of the CAP, including timelines and roles and responsibilities for relevant departments to submit relevant data to track progress.
- For the M&E Framework to be effective, **indicators must be developed**. Indicators can include the following:
  - Overall performance indicators to show the percentage of plan that has been implemented in the set timelines. This enables a quantitative, objective evaluation of the state of the plan
  - Impact indicators, which measure the result achieved by the actions taken, the level of goal achievement (e.g. the reduction in GHG emissions). In addition, absolute emission reductions, intensity or performance indicators will be used to track progress against specific metrics
  - Resource indicators, which measure the resources allocated to carrying out the various actions (e.g. renovation grants, human capacity)
  - Environmental indicators, which measure the conditions of external elements that have a link with the plan's actions (e.g. the number of hot days)
  - Incident indicators, which will be built on existing disaster management data, to track specific initiatives that respond to extreme events.

A monitoring report will be completed every two years through the development of a **State of Climate Change Report**, the outcomes of which will feed into updating and revising the CAP every five years. All this information will be made public via the eThekwini website.

List of acronyms

AEL	Atmospheric Emission Licences
AMEU	Association of Municipal Electricity Utilities
BAU	Business as Usual
C40	C40 Cities Climate Leadership Group
CAP	Climate Action Plan
CBDs	Central Business Districts
CCP	Cities for Climate Protection
CEBA	Community Ecosystem-based Adaptation
CFF	Cities Finance Facility
CO_2	Carbon Dioxide
COGTA	Department of Cooperative Governance and Traditional Affairs
DAC	Durban Adaption Charter
DCCS	Durban Climate Change Strategy
DEA	Department of Environmental Affairs
DM Amend Act	Disaster Management Amendment Act 16 of 2015
D'MOSS	Durban's Metropolitan Open Space System
DST-NRF	Department of Science and Technology and National Research Foundation
DSW	Durban Solid Waste
DUT	Durban University of Technology
EEDSM	Energy Efficiency Demand Side Management
EO	Energy Office
EnMS	Energy Management Systems
EPCPD	Environmental Planning and Climate Protection Department
EMCCC	EThekwini Municipality Climate Change Committee
ETA	EThekwini Transport Authority
FEWS	Forecast Early Warning System
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GTS	Green Transport Strategy
ICLEI	Local Governments for Sustainability
IDP	Integrated Development Plan
IKS	Indigenous Knowledge Systems
INDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change

IPPs	Independent Power Producers
IRP	Integrated Resource Plan
IRPTN	Integrated Rapid Public Transport Network
KPA	Key Performance Areas
LCOE	Levelised Cost of Electricity
M&E	Monitoring and Evaluation
MCCC	Municipal Climate Change Committee
MCPP	Municipal Climate Protection Programme
MEPS	Minimum Energy Performance Standards
MIG	Municipal Infrastructure Grant
MPI-ESM-LR	Max Planck Institute for Meteorology Earth System Model LR
NAAQs	National Ambient Air Quality Standards
NAS	National Adaptation Strategy
NCCRP	National Climate Change Response Policy
NDP	National Development Plan
NERSA	National Energy Regulator of South Africa
NMT	Non-motorised Transport
NOx	Nitrogen Oxides
PMT	Project Management Team
PPP	Public-private Partnerships
PV	Photovoltaic
RCPs	Representative Concentration Pathways
SACN	South Africa Cities Network
SALGA	South African Local Government Association
SANBI	South African National Biodiversity Institute
SDGs	Sustainable Development Goals
SDF	Spatial Development Framework
SLR	Sea-level Rise
SMMEs	Small, Medium and Micro-sized Enterprises
SSEG	Small Scale Embedded Generation
TTT	Technical Task Team
UHI	Urban Heat Island
WHO	World Health Organisation

Endnotes

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