Climate Change Strategic Framework
City of Johannesburg

CCSF CoJ

Final Report

Version

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Climate Change Strategic Framework
City of Johannesburg

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In addition, the project team acknowledges various inputs received from stakeholders that made a contribution towards the development of this report, including interviews with city officials from various city departments and entities as well as stakeholders from the private sector.

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Glossary of Terms

AQMP	Air Quality Management Plan
BAU	Business as Usual
BRT	Bus Rapid Transit
C40	C40 Cities Climate Leadership Group
CCI	Clinton Climate Initiative
CCA	Climate Change Adaptation
CCM	Climate Change Mitigation
CCVA	Climate Change Vulnerability Assessment
CDM	Clean Development Mechanism
CCSF	Climate Change Strategic Framework
CEF	Central Energy Fund
CER	Certified Emissions Reduction
CFL	Compact Fluorescent Lamp
CoJ	City of Johannesburg
COP	Conference of Parties
CO_2	Carbon dioxide
CNG	Compressed Natural Gas
CSP	Concentrated Solar Power
DANIDA	Danish International Development Agency
DEAT	Department of Environmental Affairs and Tourism
DEA	Department of Environmental Affairs (former DEAT)
DME	Department of Minerals and Energy
DoE	Department of Energy (former Department of Minerals and Energy)
DPLG	Department of Provincial and Local Government
DSM	Demand-Side Management
DWAF	Department of Water Affairs and Forestry
ECCSAP	Johannesburg Energy and Climate Change Strategy & Action Plan

EISD	Environment and Infrastructure Services Department
GCCRS	Gauteng Climate Change Response Strategy
GCF	Green Climate Fund
GDP	Gross Domestic Product
GDS 2040	Growth and Development Strategy 2040
GEF	Global Environment Facility
GHG	Greenhouse Gas
GHGEI	GHG Emissions Inventory
ICLEI	International Council for Local Environmental Initiatives
IDP	Integrated Development Planning
INDC	Intended Nationally Determined Contributions
PIP	Priority Implementation Plan
JDA	Johannesburg Development Agency
JMPD	Johannesburg Metropolitan Police Department
JOHSCO	Johannesburg Social Housing Company
JPC	City of Joburg Property Company
JRA	Johannesburg Roads Agency
JSE	Johannesburg Stock Exchange
KEI	Key Environmental Indicators
KPI	Key Performance Indicators
LTMS	Long Term Mitigation Scenarios
MFMA	Municipal Finance Management Act, 2003 (Act No. 56 of 2003)
M&E	Monitoring and Evaluation
NCCRP	National Climate Change Response Strategy
NDP	National Development Plan
NMT	Non-Motorised Transport
NGO	Non-Governmental Organisation
OSO	Office Space Optimisation
PV	Photovoltaic

RBM	Results-Based Management
RDP	Reconstruction and Development Programme
SACN	South African Cities Network
SDBIP	Service Delivery and Budget Implementation Plan
SWH	Solar Water Heaters
UNFCCC	United Nations Framework Convention on Climate Change
WMSC	World Mayors Summit on Climate

Executive Summary

Building on the existing Energy and Climate Change Strategy & Action Plan, this Climate Change Strategic Framework (CCSF) is developed with the objective to further institutionalise and mainstream climate change action, strengthen systems, processes and capacity, and work towards an updated Integrated Climate Change Strategy to be implemented by 2017. In this regard, the CCSF focusses on the organisational aspects and considerations rather than climate change content and sets out a roadmap gearing the organisation towards increased climate change action in partnership with business and citizens, mobilising society to realise the City's ambitious climate change goals.

The CCSF does not entail a review and update of existing climate change strategies and action plans or related documents. Instead it is focussed on the organisation of climate change action within the City and improving the effectiveness of the organisation in delivering on existing strategies and plans through the improvement of supporting processes and systems and empowering its human capital in the area of climate change. As such, the CCSF provides recommendations for organisational improvement strengthening climate change service delivery.

Approach taken in developing the CCSF

An organisational analysis has been performed informing the development of this framework, whereby departments and city entities throughout the City have been consulted. The analysis was structured along a set of organisational hard and soft organisational attributes recognised within the field of international strategy development as essential to carry forward a strategy addressing strategic planning, systems, structures, leadership, skills and capacity.

Taking cognisance of the findings, existing strategies and action plans, recommendations have been formulated to further strengthen the organisation in delivering on climate change action. The framework incorporating these organisational recommendations have been structured along an iterative four-step management cycle of strategic planning, implementation, monitoring and verification and improvement (Deming, 1986). A high-level roadmap has been defined to implement organisational recommendations, while working towards an updated integrated strategy by 2017.

City of Johannesburg's Commitment to Climate Change Action

The City's strong commitment to climate change action constitutes the starting point of the CCSF and the mandate to the Environment and Infrastructure Services Department (EISD) to develop climate change strategies and policies, monitor and ensure compliance across the city.

The City's commitment to both climate change adaptation and mitigation is entrenched in the Growth and Development Strategy 2040, which envisions a resilient, liveable and adaptive society that provides sustainability for all its citizens. This commitment, substantiated by EISD in the Energy and

Climate Change Strategy & Action Plan detailing adaptation and mitigation goals, is summarised as follows:

- Reduce Greenhouse Gas (GHG) emissions: a 43% reduction by 2050;
- Minimise exposure to climate change, identifying risks and inform planning;
- Enhance resilience of communities by adapting infrastructure;
- Understand impact and define measures accordingly; and
- Incorporate climate change in all future actions and service delivery.

Proposed introduction of an extended GHG Emissions Target

Taking cognisance of the UNFCCC 21st Conference of Parties (CoP 21) in Paris in December 2015, as well as the City's commitment to the Compact of Mayors calling for more ambitious collaborative sustainable climate action locally, it is proposed to extend the current target of 40% by 2040 to a range of 40% up to 65% by 2040 against the 2007 baseline year, the high-end of the range being an aspirational target to be refined during the first six months of 2016 in consultation with the City's departments and entities, local businesses and its citizens.

Refinement of the extended emission reduction target or target range is proposed to go hand-in-hand with a detailed review and update of the mitigation and adaptation action plan and the revision of sector targets. The proposed target as analysed in this report is more ambitious than the national commitment as submitted to the UNFCCC in preparation to CoP 21 as part of the country's Intended Nationally Determined Contributions (INDC), but in line with City peers, both nationally as well as within the C40 network. In the process of detailing the target, it is proposed to follow South Africa's five-year periods as in the INDC and define intermediate five-year targets up to 2040.

Organisational Analysis

The city as an organisation is well aware of the climate change adaptation and mitigation ambitions, which have resulted in identifiable climate change actions integrated in the regular five-year and annual planning cycles. Climate change action as such is well integrated within the City's planning, implementation and verification cycle. Nevertheless, there are areas which can be further strengthened thereby assisting in a more effective delivery on the City's strong climate change commitments. In summary, there are three main areas in which it is proposed to strengthen the organisation of climate change action within the city:

Mainstreaming of Climate Change – Knowledge and awareness within the City is certainly present and climate change actions are an integral part of service delivery. Nevertheless, the City could benefit by further empowering and motivating staff throughout the organisation from management level down to operational level in all departments and city entities. Moreover, whereas the integration of climate change into service delivery is beneficial, the connection with climate change and addressing climate

change specific requirements in the cycle of planning, implementation, verification and improvement could be further enhanced.

Institutionalisation of Climate Change – The mandate for the coordinating role lies and is executed with EISD, which is acknowledged within the organisation. Mainstreaming climate change together with further allocating and formalizing climate change specific responsibilities and roles within departments and city entities could further increase ownership and optimise performance. An important element in this regard is streamlining of monitoring and verification processes.

Sector Approach to Engage with Citizens and Business driven by their Interests – The City takes cognisance of the balancing act required by a City in a developing world where, more than in general, the direct socio-economic and financial interests of citizens and business need to be linked to climate change action in order to gain momentum in the engagement. The flagship programmes Green & Blue Economy and Jozi@Work substantiate this already. To further strengthen this approach throughout the organisation, a sector-based approach is proposed, geared towards addressing a mix of interests rather than mainly focussing on climate change benefits.

The Organisational Analysis section of this report details and substantiates the aforementioned along the lines of the organisational attributes of strategy, systems, structures, leadership, skills and capacity as well as communication.

Strategic Framework

The framework captures the proposed organisational improvements based on the outcomes of the organisational analysis. The improvements supporting climate change action in the City are of an integrative nature, acknowledging that responding to climate change effectively and sustainably requires the inclusion of robust organisational components supporting climate change action.

The framework aims to provide strategic principles and 'rules of the game' through which the City can realise its Climate Change objectives in an efficient and effective manner. It is organised along an organisational improvement cycle including commonly recognised organisational steps from Strategy, Implementation to Verification and Improvement. To ensure inclusive and structured implementation and operation of the framework, additional emphasis is given to communication and interaction along the organisational improvement cycle.

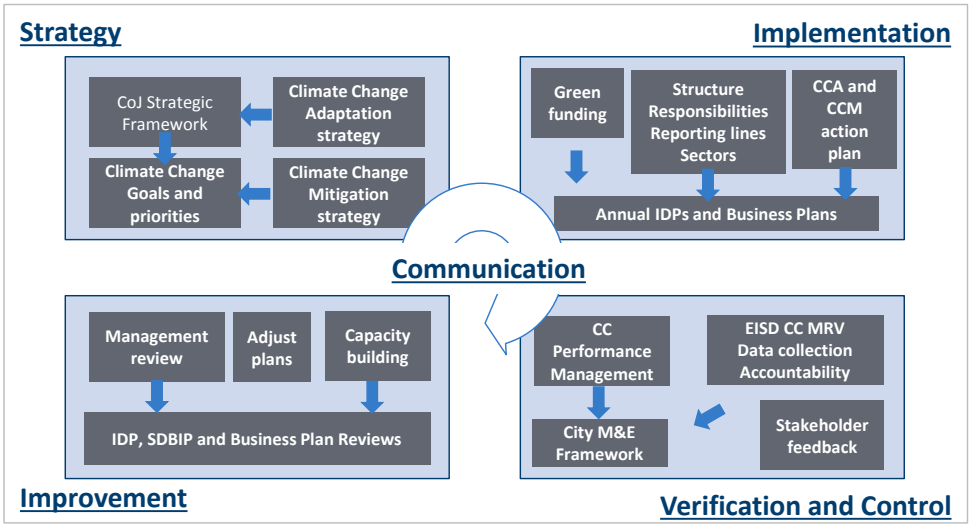


Figure – The strategic framework gearing the organisation to support climate change action

Strategy – Alignment with the five year IDP cycle is proposed, thus suggesting the development of revised strategies and action plans for climate change on a five-year basis such that it can inform the Integrated Development Plan (IDP) of the next term of office. Moreover, one could review and update action plans in line with the annual revision of the SDBIP. Formalizing such a process in alignment with the overall strategic planning cycle contributes to mainstreaming and institutionalising climate change within the City thereby strengthening climate change action.

Strategy – The prioritisation of actions and related investments takes place largely in a qualitative way on the basis of identified priority areas and the impact actions can have addressing the relevant areas. A more quantitative approach is proposed introducing the concept of 'value for money' assessing climate change impact of every action and putting a price on emissions reduced as well as increased by any action whether climate change related or not. For mitigation, the development of a municipal Marginal Abatement Cost Curve (MACC) is proposed, whereas for adaptation it is proposed to include the cost to society and the City in the prioritisation.

Strategy – Target setting is largely performed on the basis of a top-down approach. While this is common to initiate action and ensure alignment, a stronger follow-up by the relevant departments bringing in their specific expertise refining targets and detailing actions is recommended. This also enhances the creation of ownership. Instead of traditional absolute targets one could also consider more growth inclusive targets, which are appropriate for a developing City. A process is suggested to refine the proposed increased overall target and allocate sub-targets to allocate to sectors in collaboration with departments assessing actions on impact and cost.

Implementation – Climate change actions are integrated within the regular strategic planning cycle, but in this process the link with climate change is sometimes lost without having support in place to consult on the original climate change intentions. While preserving the integrated approach, it is proposed to further formalise climate change specific roles and responsibilities in the strategic planning, implementation and monitoring & verification phase. The use of a matrix structure is suggested, mapping relevant sectors with leading and contributing departments.

Verification - For any organisation the measurement and collection of data requires substantial effort. In order to streamline this process, it is suggested to define data sets distinguishing between static data (e.g. number cars), dynamic activity data (e.g. consumption of fuel) and emission factor data (e.g. CO_2 emission per litre diesel) allocating responsibilities in establishing and maintaining these data-sets as well identifying staff within departments to measure and deliver data.

Implementation – In the area of Finance & Funding the city has booked some successes regarding financing like the green bond, the challenge fund and has several new initiatives under development. While the same could be said for funding (e.g. grants), funding is generally achieved for specific projects and is more ad hoc in nature. A programmatic funding and financing approach is proposed, building forward on existing successful initiatives and relationships with funders and financiers aimed at unlocking international funding thereby boosting climate change action in the City.

Verification – The city has several performance control systems in place. With regard to delivery on climate change action, these controls could be made more climate change specific, covering both implementation and monitoring of impact providing a stronger handle to monitor and control performance by EISD as the coordinating department.

Style and Culture – The climate change agenda is strongly driven from the top of the organisation. On department and operational level, one could benefit from more awareness and leadership through the organisation, as well as continuous communication on climate change action and results of climate change actions after implementation and launch. A network of climate change champions throughout the organization would raise additional awareness, instil a sense of urgency and motivate employees to take action.

Staff and Skills – Climate change is known as common knowledge as a subject, but the specifics are complex. A more detailed understanding throughout the organisation would benefit the delivery on climate change action and reporting on impacts. Routine training and skills development sessions should increase the level of knowledge and expertise on the topic within the organisation. There are two types of training are proposed. Generic training on the various climate change themes and

activities with the City, and specific training and skills development programs, dealing with topics that are relevant to a particular sector(s) or department(s.

Shared Values and Stakeholders – Engaging and mobilising business and citizens in an effective manner is not an easy task. Especially in a developing world City, one needs to strike an appropriate balance between people, climate and commercial interest. Focussing on drivers in these areas for citizens and business to engage on climate change action is proposed, while following a sector-based process engaging with the relevant stakeholders per sector.

Communication – Strong communication is essential to get citizens and business on board. This will require a strategic, broad-based and continuous effort. Two dedicated websites, one aimed at citizens and one targeted at business will go a long way in facilitating this. Other communication channels such as social media can serve as a backup to provide more *ad hoc* information, generate website traffic and ensure additional exposure. Priorities should include raising awareness of climate change, inciting climate action, advising on choices, triggering partnerships with the business community and reporting on progress and successes achieved.

Roadmap

The proposed framework aims to make climate change action an integral part of the organisation, bringing in place the core supporting mechanisms for climate change action and where necessary empowering the City in realising its increased ambitions with regard to responding to climate change. The proposed measures take time to implement and require careful planning.

The framework also proposes to initiate communication to bring about awareness and education. Moreover, to deliver on a more ambitious target, it will be key to engage with internal and external stakeholders to gain support and commitment that will result in partnerships and implementation of projects that will benefit the reduction in the GHG footprint and improve the City's resilience against the effects of climate change. As such, a high-level roadmap has been defined as part of the framework, which prioritises the most important measures first, and works forward from there towards the full implementation of a renewed integrated climate change strategy by June 2018.

The roadmap entails the following main items:

- Adopting a more ambitious mitigation aspirational target strengthening the City's positioning in preparation of CoP 21 in Paris;
- Initiation of strategic climate change communication;
- Initiation of stakeholder engagement;
- Indication of value for money screening of Climate Change Adaptation (CCA) / Climate Change Mitigation (CCM) options;

- Institutionalisation of the coordination role of EISD and implementation of a sector approach to climate action;
- Development of a project identification and prioritisation mechanism;
- Determination of Climate Change (CC) budgets based on new priority mechanisms; and
- Finalisation of the Integrated Climate Change Strategy, including budget requirement for approval.

In conclusion, the proposed framework provides the City of Johannesburg with additional structures and guidelines that will enable it to further strengthen its contribution to the global fight against climate change by mainstreaming and institutionalising climate change throughout the organisation.

1 Introduction

EcoMetrix Africa was commissioned by the South African Cities Network (SACN) to undertake the development of a Climate Change Strategic Framework for the City of Johannesburg (CoJ or the City. Building on the existing Energy and Climate Change Strategy & Action Plan (ECCSAP), this Climate Change Strategic Framework (CCSF) has been developed to further institutionalise and mainstream climate change action, strengthen systems, processes and capacity, including working towards an updated Integrated Climate Change Strategy for the CoJ by 2017.

The CCSF focusses on the City organisation rather than climate change content in order to address organisational limitations currently hampering optimal delivery on the City's climate change action goals and ambitions. As such it sets out specific recommendations and a roadmap gearing the organisation towards increased climate change action in partnership with business and citizens, mobilising society to realise the City's ambitious climate change goals and targets.

Building forward on the current ECCSAP, this CCSF will be used to provide support to the development of an updated comprehensive integrated climate change strategy and implementation plan as well as indicate how to institutionalise the implementation and execution of such strategies. Moreover, the framework serves as a technical discussion document for CoJ to engage with city peers and other stakeholders.

1.1 Background to the Project

The City of Johannesburg's commitment to Climate Change Mitigation (CCM) and Adaptation (CCA) is clearly defined in the Growth and Development Strategy 2040 (GDS). The GDS 2040 envisions a City that is resilient, sustainable and liveable, thereby requiring the CoJ to align, integrate, institutionalise and strengthen its climate change action across sectors. This will be facilitated through the preparation of a Climate Change Strategic Framework- CCSF (this document) that acknowledges current and past work in a coherent framework that provides a structured approach towards detailed strategies and action plans for mitigation and adaptation, as well as how to institutionalise the implementation and execution of such strategies.

The CCSF does not entail a review and update of existing climate change strategies and action plans or related documents. Instead it is focussed on the organisation of climate change action within the City and improving the effectiveness of the organisation in delivering on existing strategies and plans through the improvement of supporting processes and systems and empowering its human capital in the area of climate change. As such, the CCSF provides recommendations for organisational improvement strengthening climate change service delivery.

The CCSF has been developed in the run up to the UNFCCC 21st Conference of Parties (CoP 21) which was held in Paris, France, from 30 November to 12 December 2015. As the purpose of this particular conference was to establish a renewed commitment, the CCSF also includes an assessment of the existing GHG mitigation target and the potential to increase this target to a higher level exemplifying the City's ambitions to combat climate change. The results are capture in Section 2.4 of the CCSF.

1.2 Study Objectives

The City of Johannesburg's Environment and Infrastructure Services Department (EISD) is mandated to develop strategies and policies in response to Climate Change, take necessary actions to mitigate and adapt as well as monitor and ensure compliance across the City. The main objective of this study is to assist EISD in establishing a practical framework for climate change strategy development based on a clear understanding of both the internal municipal organisation and local dynamics across the City. As such, the Framework provides a platform and structured approach to develop and implement specific strategies and action plans for mitigation and adaptation. Moreover, it will in particular address the internal organisational requirements and institutional mechanisms required to execute and implement such strategies successfully.

The Climate Change Strategic Framework (CCSF) also serves as a technical document to engage with internal and external stakeholders in the preparation of further detailed strategies and action plans. Stakeholders include the City's relevant departments and entities, national and international city peers, national governmental departments as well as businesses within the city.

The objectives of this Climate Change Strategic Framework (CCSF) are:

- To provide a framework and roadmap towards the development of a comprehensive climate change strategy and implementation plan building on the existing Energy and Climate Change Strategy & Action Plan (ECCSAP) adopted in 2012;
- To provide recommendations and actions on how to embed climate change within the City's organisation;
- To serve as a technical document for CoJ to engage with partners in the field of climate change.

1.2.1 Overall Approach

The approach to analyse the necessary organisational requirements for effective service delivery in response to climate change, is based on the McKinsey 7S framework (Waterman, 1980). The framework acknowledges that structure and strategy alone are not sufficient to enable success. The right people, with the right skills, systems (e.g. monitoring and reporting systems) and style (leadership style and organisational culture) are of equal importance. The model derived from the 7S framework

includes both the internal and external organisational environments with sectors as gateways in-between. Subordinate climate change goals of the City and climate change interests shared with citizens and businesses are the overall drivers behind climate change action.

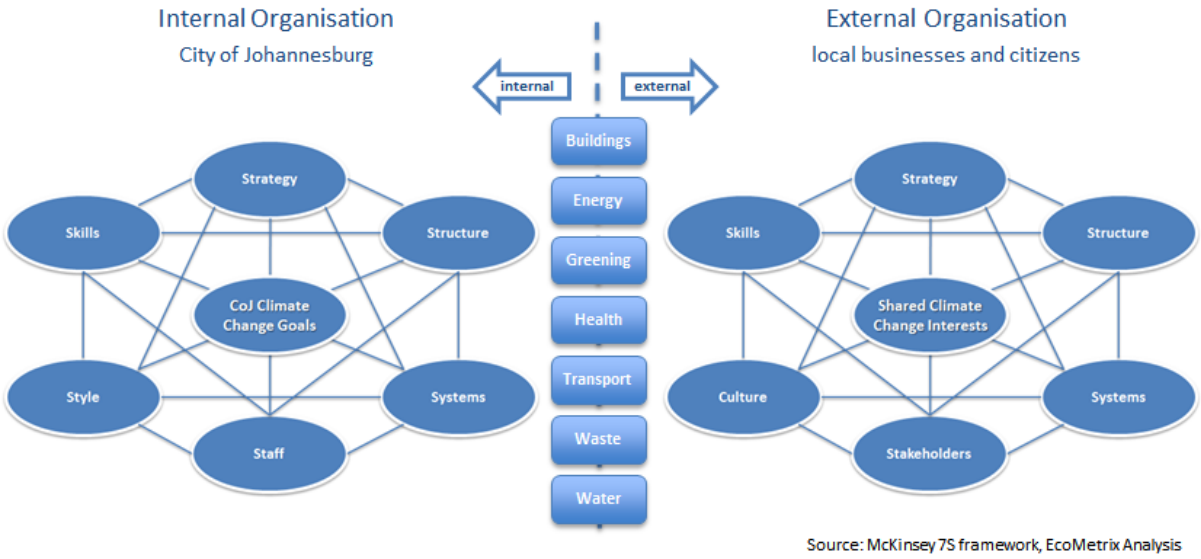


Figure 1.1 – Organisational analysis model

Source: McKinsey 7S framework (Waterman, 1980), EcoMetrix team analysis

The reason for explicitly including the external organisational environment is that the City wishes to further strengthen engagement with its citizens and local businesses to implement climate actions. To facilitate this, a sector approach is chosen to streamline this engagement around shared climate change and related economic interests within the sectors. The seven sectors defined for the City are:

- Buildings – The built environment of the City, public and private.
- Energy – Supply of conventional and renewable energy as well as energy efficiency.
- Greening – Biodiversity and natural resources including city parks.
- Health – Health issues around food, water, waste and diseases.
- Transport – Public and private transport, non-motorised transport, roads and road safety.
- Waste – Collection and disposal as well as minimization, recycling and energy recovery.
- Water – Supply, harvesting and recycling, and storm water management.

In addition to the sectors three additional organisational themes have been defined:

- Finance and Green Economy;
- Public Awareness and Engagement; and
- Spatial planning.

Finance and Green Economy as well as Public Awareness and Engagement are themes for the City to act on in order to achieve a participatory approach on climate action and fund activities outside of the

regular budget. Spatial planning links climate change related activities to development and spatial transformation of the City. Specifically, it connects with the City's flagship "Corridors of Freedom" project that aims to use Transit Oriented Development approaches, plans for alternatives outside of private motorised transport and addresses issues of spatial and social inequalities.

The organisational analysis model has been used to analyse the internal and external organisation, map the status quo of climate actions and identifying options to further strengthen the responses to climate change. Based on the findings of is analysis, a framework has been developed that addresses organizational elements including:

- Goals and Shared Interest: Based on climate change goals/interests set by the City, sectors and their specific climate change related interests need to be defined and addressed in the City strategy in order to guide participation by business and citizens.
- Strategy: A high level approach is defined for categorization, prioritisation and budgeting of climate change measures targeted at realizing these goals/interests.
- Structure: Sectors and related climate change responsibilities need to be matched with, and allocated to the relevant organisational areas (e.g. departments). This is done via a matrix structure mapping the sectors and related responsibilities with the organisation. While organisational structures change and need to be 'remapped', the overall sectoral designations and action plans can remain the same.

  Responsibility gaps are identified and suggestions made how to close these gaps both internally and externally. For the internal organisation an inter-departmental climate change adaptation and mitigation team is proposed.
- Systems:
  - Monitoring, verification and reporting is essential to manage climate change activities. Management information systems need to be aligned to climate related goals. Both internal and external progress has to be monitored. Existing systems were assessed to ensure making use of existing systems as much as possible.
  - A management dashboard with Key Environmental Indicators (KEI) is proposed to support decision making, progress monitoring of adopted strategies and their adjustment. This includes the proposed climate targets and target setting rationale.
  - Adequate funding and financing is essential for investments required to implement mitigation and/or adaptation measures. It is expected that these cannot be fully financed from the regular budget processes and external funding may be required. A design of operations for obtaining external funding and financing both nationally and internationally is defined.

- Style and Culture: The leadership displayed, actions taken, as well as the style and type of communications to staff and stakeholders influences the effectiveness of the organisation to reach its goals. Specific attention is given to the management of public relations and what the most effective ways could be to communicate with citizens and businesses City-wide.
- Staff, Stakeholders and Skills: climate change related responsibilities are preferably an integral part of the day to day functions of the City and its stakeholders. Training and awareness raising among personnel and stakeholders is important as they may not be fully equipped with sufficient knowledge on climate issues in Johannesburg. This CCSF provides guidance on the required skills, training and potential recruitment requirements to fill gaps.

1.3 Guidance to the Structure of this Report

This report is intended to provide organisational recommendations to strengthen service delivery in response to climate change. The structure of the report flows from providing a background on climate change action in the City of Johannesburg (Chapter 2), to an assessment of the organisational requirements for effective service delivery in response to climate change (Chapter 3), followed by the strategic framework (Chapter 4) capturing organisational recommendations. In conclusion, a roadmap is defined (Chapter 5) for the implementation of the framework.

The structure of the report is further detailed as follows:

Chapter 2: 'Climate Change in the City' provides a background on key climate issues in the City of Johannesburg, its ambitions and achievements for climate change.

Chapter 3 provides the results of the organisation analysis conducted using an organisational analysis model capturing seven important organisational attributes as described in the Overall Approach (Section 1.2.1). The findings and recommendations of the analysis formed the basis for the design of the Climate Change Framework.

The design of the strategic framework is presented in Chapter 4 and starts with the presentation of the framework window organised within an organisational improvement cycle. Each of the sections within the chapter deal with the necessary organisational steps and provides the strategic management principles and rules of the game for the City to efficiently and effectively realise its climate change objectives.

This framework study report is concluded with a 'Roadmap' (Chapter 5) detailing the implementation of the framework, institutionalising climate change within the City and strengthening the organisational competencies. The roadmap distinguishes between the long- and short-term. Short term actions include

consideration of the quick-win activities that can build momentum toward the next five-year planning and budget cycle.

Figure 1.2 provides a graphical representation of the structure of the report and will be reflected as an icon across the different chapters to provide the reader with a visual guideline.

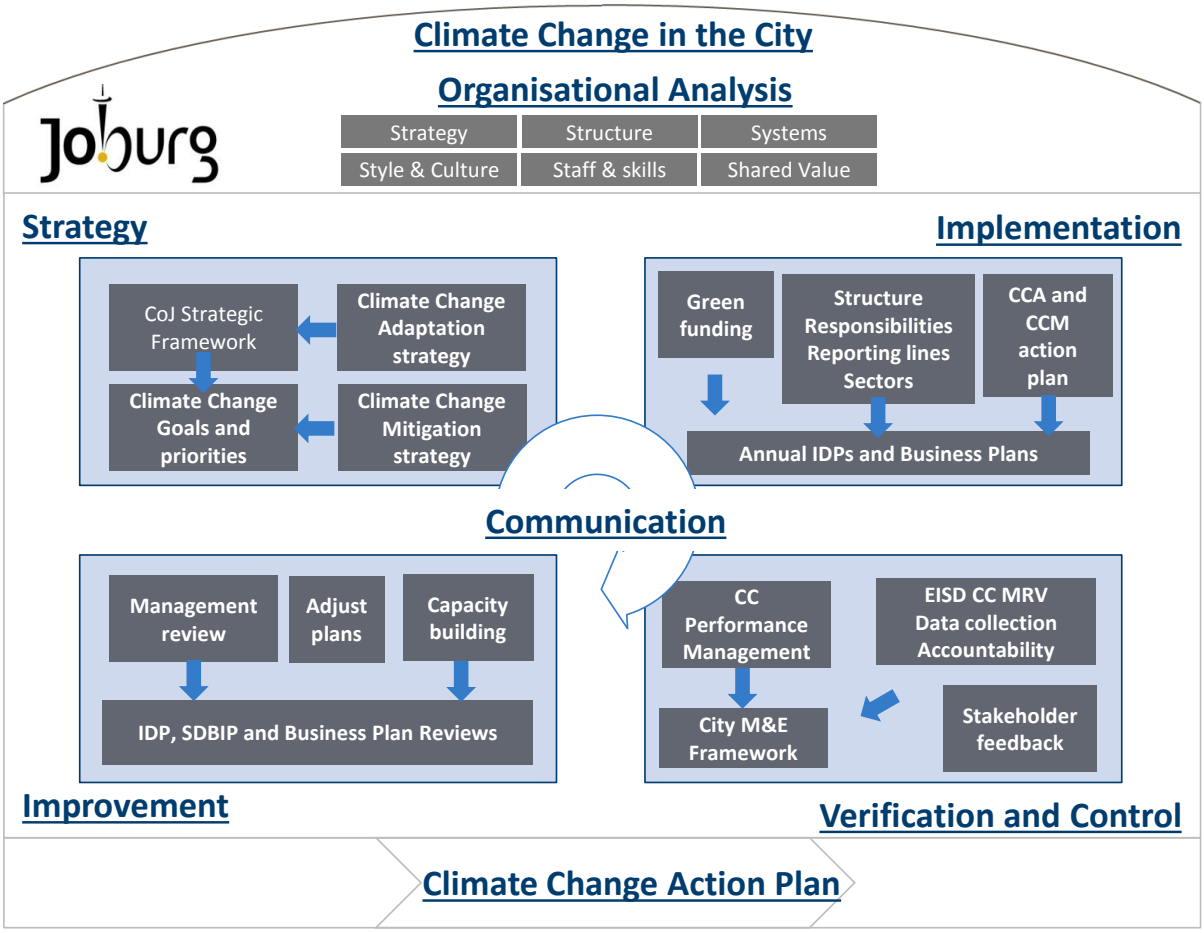
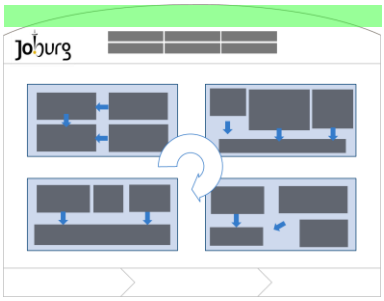


Figure 1.2 CoJ Climate Change Strategic Framework report structure

2 Climate Change and the City



2.1 The City of Johannesburg

The City of Johannesburg was formally established in 1886 with the discovery of gold and the Witwatersrand reef and is the country's largest City. As the economic powerhouse of South Africa, Johannesburg generates 17 percent of the country's gross domestic product, mostly through the manufacturing, retail and service industry sectors. The City of Johannesburg Metropolitan Municipality is a metropolitan municipality that manages the local governance of Johannesburg. The table below provides a summary overview of some of the key demographic and economic facts and figures of the city.

Table 2.1 – The City of Johannesburg in numbers (2011)

Key Element	Fact and Figures	UoM
Demographic		
Size of area (km²)	1,648	km²
Population –Total	4,434,827	People
Population – African	3,388,208	People
Population – White	545,484	People
Population – Coloured	248,350	People
Population – Asian	217,307	People
Population Growth 2013	3%	
Economic		
CoJ Gross domestic product	723	Billion ZAR
CoJ contribution to national GDP	14.98%	
CoJ annual budget (OPEX)	43	Billion ZAR
CoJ Annual budget (3 year, CAPEX)	29	Billion ZAR

Source: Mushayanyama, 2015, Stats SA, 2012, and EcoMetrix team analysis

The City is headed by Executive Mayor, Parks Tau together with the Mayoral Committee. The Mayoral Committee functions like a local cabinet, with individual members having responsibility for different aspects of municipal government. There are ten portfolio committees, which are made up of councillors drawn from all political parties and chaired by a member of the Mayoral Committee. The Executive Mayor is at the centre of the system of governance and the executive powers are vested in him by the Council to manage the daily affairs of the City. This means that he has the overarching strategic and political responsibility. In 2011 the Executive Mayor and the Mayoral Committee adopted the Joburg 2040 - Growth and Development Strategy (GDS 2040). The GDS 2040 provides an

aspirational strategy defining the type of society it aspires to achieve by 2040. The City adopted the following vision to guide it along the path ahead:

"Johannesburg – a World Class African City of the Future – a vibrant, equitable African city, strengthened through its diversity; a city that provides real quality of life; a city that provides sustainability for all its citizens; a resilient and adaptive society."

The GDS 2040 recognises that a successful strategy has to take cognisance of the fast changing reality in a way similar to other city's globally do. The GDS mentions a number of changing paradigms in this regard including; Increasing Migration, Globalisation, Climate Change, Natural Resource Scarcity, Technological Innovation and Inequality.

The Johannesburg is a large metropolitan municipality. The City is divided into several branches and departments in order to deliver services for the City. Some of the key city service functions are supplied by separate, self-contained entities, each run on business lines with its own CEO, each entering into service contracts with the administrative core. These include:[1]

- Utility Companies – The City has ten entities each providing different services. The most important ones within the context of the CCSF are City Power Johannesburg (electricity), Johannesburg Water (water and sanitation) and Pikitup (solid waste management). These utilities are self-funding, receiving no annual City grants, and provide services directly to the public for which households are charged. They are also crucial for revenue generation.
- City Agencies and Entities – The City has a number of entities and agencies that are geared towards and perform services to the public, however, there are no direct charges for these services and are reliant on the City for funding. The agencies include, Johannesburg Development Agency (JDA), Johannesburg Civic theatre, Johannesburg Roads Agency (JRA), Johannesburg City Parks and the Zoo (JCPZ), Johannesburg Property Company (JPC), Johannesburg Metro Bus, Johannesburg Fresh Produce Market. The entities are managed independently, subject to performance contracts. Some subsidies are still provided, which are to be reduced by R100-million in the next five years.

[1] www.joburg.org.za/index.php?option=com_content&id=707&Itemid=9&limitstart=1

2.2 The City and Climate Change

In the GDS 2040 a set of principles are defined among which principle 4 which speaks to the climate change aspirations of the City:

'Ensuring resource security and environmental sustainability: 'The City is committed to transitioning to a low-carbon economy in pursuit of a healthy urban environment and environmental sustainability – where this is considered a critical step in ensuring the well-being of all Johannesburg's residents, and those who work and play in the city' (Principle 4, GDS).

In line with international practice the City views its fight against climate change from an adaptation perspective (addressing the impacts of climate change the will occur over time) as well as a mitigation perspective (manage the emission of man-made greenhouse gas emissions).

From and adaptation perspective the City recognises that changes in temperature and precipitation as a result of climate change will impact all of the City's systems. To get a firm grip on the impacts that climate change might have, a detailed Climate Change Vulnerability Assessment (CCVA) was conducted. Table 2.2 provides an overview of the different climate change phenomenon and how they impact on food, water, health and human settlements.

Table 2.2 - Climate change impact assessment matrix of the City of Johannesburg

Phenomenon and Direction of Trend	Food Production & Biodiversity	Water Resources	Human Health	Human Settlements, Society & Industry
Hot days and nights	Decrease in food production, increase insect outbreaks	Decrease in water availability due to evapo-transpiration	Decreased activity and economic output	Increase in energy demand for cooling, deterioration of air quality
Warm spells/Heat Waves	Decreased food yields due to heat stress, decrease in food security and increased danger of wild fires	Increased water demand and decrease in water quality e.g. algal blooms	Increased risk of heat related mortality, especially for the elderly, chronically sick and socially isolated	Decrease in quality of life especially for those without appropriate housing
Heavy Rainfall	Destruction of biodiversity and flooded agricultural fields	Potential impacts on the quality of surface and groundwater	Increased risk of deaths, injuries and infectious skin and respiratory diseases	Disruption of settlements, commerce, logistics and societies due to flooding. Damage to infrastructure and loss of property
Dry spells and droughts	Loss of biodiversity & decreased food productivity	Decrease in water availability for many essential services and impact on water quality	Increased risk of malnutrition, increase in food and water	Water shortages for human settlements, industry and society, potential for loss of investment competitiveness

Thunderstorms and strong winds	Wind throw/uprooting of trees	Power outages disrupting water supply	Increased risk of death and injuries, Post-traumatic stress disorders	Disruption of economic activity, loss or property, withdrawal of insurance cover for vulnerable areas, migration,
Hot days and nights	Decrease in food production, increase insect outbreaks	Decrease in water availability due to evapo-transpiration	Decreased activity and economic output	Increase in energy demand for cooling, deterioration of air quality

Source: CCVA (CoJ, 2007), SACN team analysis

From a mitigation perspective, the City is amongst the largest GHG emitters in South Africa. The main sources of emissions include sectors such as Industry and Commerce, Transport, Local Authority and Households. The larger part of emissions relate to the consumption of electricity. According to the 2007 GHG Emissions Inventory (GHGEI) as developed for the City in 2011 the industrial sector consumes almost 50% of the total energy generated in South Africa. The low cost of energy has given local industries a competitive advantage and encouraged energy-intensive industries. Commercial and residential energy users are, directly and indirectly, responsible for about 2% of the national greenhouse gas emissions.

When considering the City's climate change aspirations, the following should be taken into account from an international and national alignment perspective:

- International perspective - The United Nations Framework Convention on Climate Change (UNFCCC), signed in 1992, in general, and the Kyoto Protocol, signed in 1997, specifically. The latter represents an international agreement to stabilise GHG concentrations in the atmosphere at 1990 levels. Signatories to the UNFCCC are divided into those countries that take on responsibility for achieving its goal, the Annex I countries (industrialised countries), and those that do not, the non-Annex I countries (developing countries). South Africa is a party to the UNFCCC as a non-Annex I country and ratified the Kyoto protocol;
- National perspective - Like many developing countries, South Africa has a number of competing priorities and combatting climate change is not always at the top of the list. However, the South African government has incorporated its climate change ambitions into a comprehensive National Climate Change Response Strategy and Policy (DEA, 2004; NCCRP, 2011) and its National Development Plan (NDP, 2012). In line with international developments, the South African government has developed an Intended Nationally Determined Contributions (INDC), which have been submitted to the UNFCCC ahead of the international climate negotiations during the 21st Conference of Parties (CoP) in December 2015 in Paris;

- Provincial perspective - the province of Gauteng has followed the national direction and in line with the national policy landscape has developed a Gauteng Climate Change Response Strategy (GCCRS) (GDARD, 2012).

In line with the City's GDS 2040, the City strives to address both the adaptation and mitigation perspective of climate change and for this reason has developed a number of partnerships and alliances. The list below provides a non-exhaustive overview:

C40 is a network of the world's megacities committed to addressing climate change. C40 supports cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change. As a member of the C40 the City of Johannesburg hosted the fifth biennial C40 Cities Climate Leadership Group Mayors Summit in February 2014.

Launched at the 2014 United Nations Climate Summit, the Compact of Mayors is the world's largest coalition of city leaders addressing climate change by pledging to reduce their greenhouse gas emissions, tracking their progress and preparing for the impacts of climate change. The City of Johannesburg is a co-signatory of the Compact.

The Global Cities Covenant on Climate (referred to as 'The Mexico City Pact') is an agreement signed between mayors within the World Mayors Summit on Climate (WMSC) on November 21st, 2010, in Mexico City with the purpose of undertaking firm mitigation and adaptation actions, in the face of climate change. The City of Johannesburg is a co-signatory of the pact.

2.3 Overview of Sectors

The list below provides a summary overview of the seven sectors as defined in the previous chapters of this report in addition to the three organisational themes. Each sector description includes a table containing some of the sectors key statistics:

- Buildings – The City's main activities in the built environment are through Johannesburg Social Housing Company (JOHSCO) and the City of Joburg Property Company (JPC). JOSHCO provides rental accommodation to around 7 600 housholds in the lower income bracket. In line with the GDS 2040 it addresses resource efficiency in buildings. JOSHCO has started installing solar panels, heat pumps for water heating and plans on designing projects which will incorporate rain water harvesting. JPC manages and develops the City's property portfolio, with emphasis on promoting social and commercial opportunities. JPC is recently renovated

the Council Chamber achieving a five green star rating and in the next year will start the roll out of an Office Space Optimisation (OSO) programme with sustainability as a key feature.

Table 2.3 - City of Johannesburg housing statistics

Key Elements	Fact and Figures	UoM
Buildings		
Number of households	1,513,717	Households
JOSHCO facilitated households (renting)	7,600	Households
JPC managed title deeds	5,000	Title deeds
JPC managed land parcels	63,000	Land parcels
Average households size	3.2	Individuals/ household
Households living in informal housing	14%	

Source: Mushayanyama, 2015

- Electricity - Electricity within the City is predominately provided City Power Johannesburg (Pty) Limited, and although a separate company, is fully owned by the City of Johannesburg. City Power does not generate material quantities of electricity itself but rather buys it from major generators such as the national utility Eskom. As part of its climate change action, City Power has developed a number of renewable energy and Demand Side Management initiatives. Table 2.4 below provides and overview of some key electricity statistics within the City:

Table 2.4 – City of Johannesburg electricity statistics

Key Elements	Fact and Figures	UoM
Energy		
Electricity sales	10,129,226	MWh
Number of customers	422,367	Customers
Staff (permanent and contract)	1,643	FTE
Area of supply	885	Km^2

Source: City Power business plan, 2014

- Greening – Johannesburg City Parks and Zoo is tasked with among other things the maintenance of parks, green areas and trees and since 2010 it has been responsible for planting over 350,000 trees. When it comes to climate change, greening is important for adaptation, prevention of the urban heat island effect, providing shade to citizens, conserve biodiversity, managing water catchment areas to cope with heavy rain and prevention of valuable water flushing away.

Table 2.5 – City of Johannesburg greening statistics

Key Elements	Fact and Figures	UoM
Greening		
Number of trees in public spaces	3.2 million	Trees
Hectares of green open space	20,000	ha

Source: City Parks and Zoo website

- Health - The Department of Health operates through seven units, one in each of the City's regions, to provide health care to the public with the following motto: "One City One Health System". The Department is responsible for managing the City's clinics and delivering primary and environmental health services for Joburg's residents. The Department is tasked with the availability of safe, quality medication and is also involved in educational programs, workshops and support for other health care bodies. On an annual basis, some 3 million people visit the City's 96 clinics, including mobile units. Among other things, as part of its adaptation plan, the City is now mapping flood-prone areas, developing early warning systems, erecting flood barriers, and raising awareness in vulnerable communities.

Table 2.6 – City of Johannesburg health statistics

Key elements	Facts and figures	UoM
Health		
Number of clinics	96	Clinics
Number of yearly visits to clinics	3,000,000	Visits

Source: Department of Health

- Transport - Transport in the City is critical for economic growth and development. Transport as a sector is also a major consumer of energy and the largest contributor to GHG emissions. It is important to note the potential impact that climate change can have on infrastructure in the future. The City recognises the close relationship between the concepts of 'sustainable human settlements" and mobility. Accordingly, there is a strong focus on transit-oriented development (ToDs) and the promotion of public transport and access to mobility in support of resilience and sustainable development. A flagship project is the Rea Vaya bus rapid transit system offering fast, safe and affordable public transport on a network of bus routes across Johannesburg. A benefit of the project is the reduction of the City's transport carbon footprint. The bus fleet for the first phase had Euro IV emission standards with particle filters, while the second fleet meets Euro V standards. In addition to this, Metrobus is converting its fleet into dual fuel busses, with the aim of reducing GHG emissions by 10%. To date, 70 of 190 busses have been retrofitted and are operational.

Table 2.7 – City of Johannesburg transport statistics

Key Elements	Fact and Figures	UoM
Transport		
Motorised being car or motorbike*	42%	
Taxis*	40%	
Buses and trains*	8%	
Average time in minutes to work	54	Minutes
Access to public transport within 10 minutes of their home	54%	
Access to public transport within 10 - 30 min. of their home	24%	

Source: Mushayanyama, 2015. * Use as a percentage of total transport movements.

- Waste - Pikitup is the City's fully owned official waste management service provider and is responsible for keeping the city clean and preserving an attractive and hygienic environment for residents and visitors. In an effort to reduce the City's GHG emissions and contribute to tackling the country's electricity constraints, Pikitup is in the process of developing several landfill-gas-to-energy projects on the five landfills it manages (Robinson Deep in Turffontein, Marie Louise in Roodepoort, Goudkoppies in Devland, Linbro Park near Alexandra and Ennerdale in Lawley). The project aims by 2016 to generate 19MW of electricity, enough to power 16 500 homes. The electricity will be generated from methane gas and carbon dioxide extracted from waste at the five landfills –.

Table 2.8 – City of Johannesburg waste statistics

Key element	Fact and figures	UoM
Waste		
Total waste to landfill	1,400,000	Tonnes/year
Recycle some waste	12%	

Source: Stats SA, 2012

- Water - Johannesburg Water (JW), as a fully City owned entity is responsible for potable water supply, management of waste water and maintaining and expanding the City's water infrastructure. There are six wastewater treatment plants across the city, the largest being the Northern Water Works which treats 400 million litres of wastewater daily from around 1.6 million people in the northern suburbs.[2] Facing a steep increase in electricity costs and the

[2] The total processing capacity of Johannesburg water is around 960 million litres per day with the NWW being the largest facility. Source: Johannesburg Water, http://www.joburg.org.za/index2.php?option=com_content&id=35&pop=1&page=0

challenge to become more sustainable, JW upgraded the sludge handling and digestion at the Northern Wastewater Treatment Works including the implementation of a Biogas-to-Electricity project. The electricity generated from the biogas currently covers about 15% or 1.1 MW-e of the works' electricity needs. The City is rolling out similar Biogas-to-Electricity projects at all other water treatment facilities.

Table 2.9 – City of Johannesburg water statistics

Key element	Fact and figures	UoM
Water		
Household Access to sanitation	91%	
Household Access to water	98.70%	
Household Water harvesting	2%	
Reuse of water within the house	6%	

Source: Mushayanyama, 2015

2.4 Climate Change Goals

The overall aims and goals of the City in respect to its climate change mitigation and adaptation strategies can be summarised as: [3]

- Long term goal - To reduce man-made GHG emissions through promoting more sustainable activities and the use of resources as well as enhancing resilience of communities and infrastructure to the impacts of climate change in the City;
- To reduce GHG emissions via various mitigation measures while improving data collection for monitoring and reporting purposes. Measured against 2007, the City of Johannesburg set itself a long-term emission reduction target of 43% by 2050. [4]
- Adaptation:
    - Objective one - minimise exposure to risk and vulnerability of communities by informing future planning of hot spots for flooding with the aim of protecting communities, properties, infrastructure from catastrophic impacts resulting from extreme weather events;
    - Objective two - enhance resilience of communities and infrastructure to heatwave events from the anticipated warmer climate;

[3] Low Carbon Waste Management, Joburg Waste Summit, March 2015. EcoMetrix and SACN team analysis.
[4] Energy and Climate Change Strategy & Action Plan (CoJ, 2011). EcoMetrix and SACN team analysis.

- Objective three - understand the impacts of climate change in different sectors an City departments and to determine adaptation measures reducing impact; and
- Objective four - incorporate climate change into all future actions in the City especially service delivery and other developmental issues.

Taking cognisance of the UNFCCC 21st Conference of Parties (CoP 21) in Paris December 2015, an extended and increased long-term (indicative) GHG emissions reduction target range of 40% to 65% by 2040 against the 2007 baseline year is proposed for CoJ. This target is aligned with the GDS 2040 timeframe. An aspirational target of 65% will be refined during 2016 financial year, informed by the new carbon footprint and the emission forecasting work completed for the City.

The proposed aspirational target for Joburg has been benchmarked against other local and international city climate targets. Figure 2.1 shows the City's target visually benchmarked against international and domestic city peers and national aspirational targets.

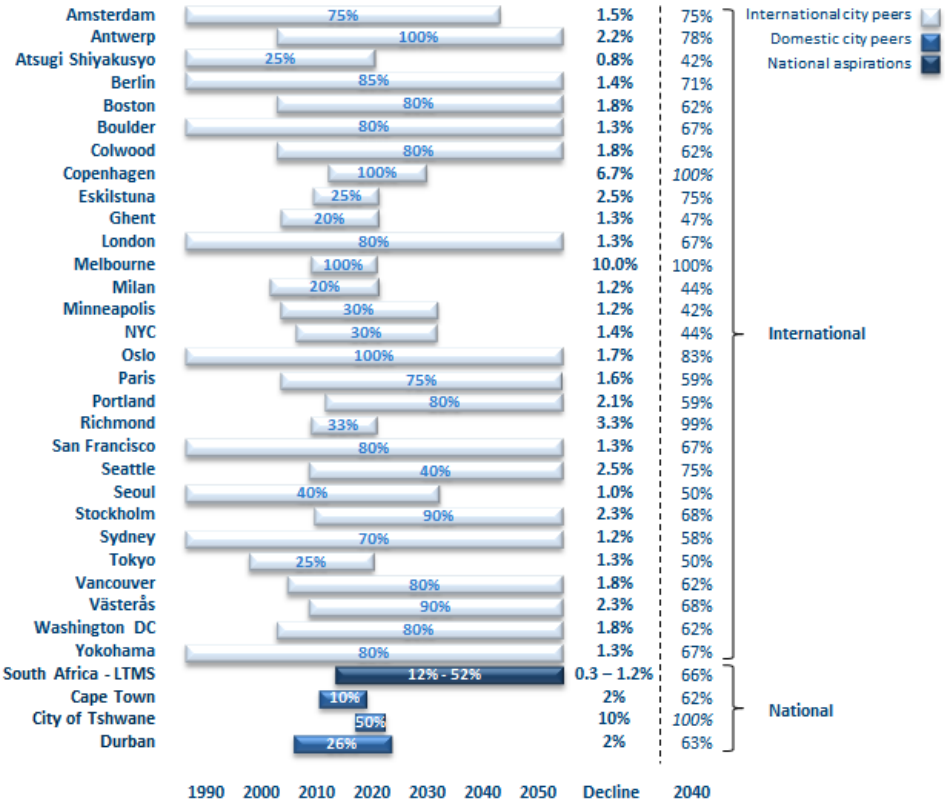


Figure 2.1 – Mitigation target setting and comparison with city peers

Sources: C40, 2015, Carbon*n* 2015, CoP 15, 2009 and EcoMetrix team analysis)

The bar for each city in Figure 2.1 shows the baseline and target year of each city and its absolute target within the bar. The column on the right shows the extrapolated 2040 target in order to benchmark against CoJ as well as the annual emissions decrease per year this implies. Targets that exceed 100% when extrapolated to 2040 are capped at 100%. The national target for South Africa is included and it is important to note that this is not an absolute target, but rather a reduction related to a Business as Usual (BAU) scenario.

Analysis of the targets reveals the following: The average reduction target for the City's international peers extrapolated to 2040 is 66% (average annual decline of 2.2%), whereas this average for other South African cities lies around 62% (average annual decline of 4.6%). The difference in the annual decline is mostly due to the later base year for South African cities and an ambitious City of Tshwane target. Within the context of setting an aspirational target for the City of 65% (average annual decline of 2%) to the existing 40% reduction by 2040, it becomes apparent that the level of ambition is in line with its international peers and is slightly more ambitious than its local peers in absolute terms, but more realistic with an average annual decline of 2%.

In 2012 the CoJ developed a GHGEI for the 2007 baseline year by applying the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). In 2015, ICLEI develop the CoJ's 2014 GHGEI. The 2014 GHGEI that was finalised by ICLEI, using the C40 GPC and was subsequently endorsed by the C40. Overall, the comparison between the two inventories, shows that the City's emissions have reduced by 5.3% between 2007 and 2014 (from around 27.2 million tCO_2-e in 2007). The contribution per sector towards the total reduction during the period 2007 - 2014 are as follows:

- 24% reduction in the Waste and Waste Water Sector;
- 14% reduction in the Residential Sector;
- 18% reduction in the Commercial & Industrial Sector; and
- 26% *increase* in the Transport Sector.

The increase in the Transport emissions can predominately be attributed to road transport and the reliance on private vehicles, which has increased by 26%. Figure 2.2 provides a schematic overview of the City's emission trends over the 2007 – 2014 period.

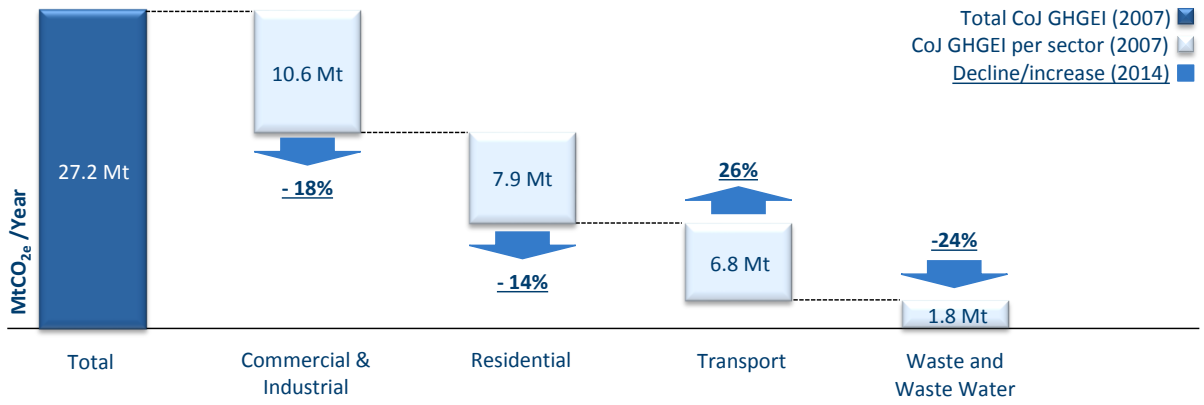


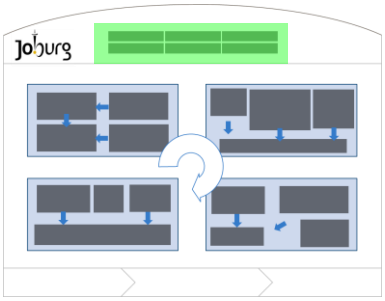
Figure 2.2 – Comparison of the City of Johannesburg 2007 GHGEI with 2014 GHGEI

Sources: Siemens, 2007, ICLEI 2015 and EcoMetrix Team Analysis)

It is important to note that although the City has taken mitigation action as far back as 2005, it takes considerable time before a mitigation activity gains momentum and starts to materially contribute to the reduction of emissions. For this reason, it is assumed that from 2011, the decline in emissions towards 2014 really started to materialise, and show the effects of mitigation action undertaken since 2005. Taking this correction into account, the total emissions as a result of extrapolation of the 2007 and 2014 GHG Emissions Inventories will be approximately 42.2% below the 2007 baseline year by 2040. Extending the existing target of 40% with an aspirational GHG mitigation target of 65% below the 2007 GHG emission by 2040 to be presented at CoP21 in Paris would therefore require the City to increase its mitigation efforts towards realising an additional 22.8 % reduction by 2040.

In summary, a mitigation target range of 40% to 65% (aspirational) by 2040 in comparison to the 2007 baseline year would bring the City's mitigation ambitions in line with its national and international peers. The target range seems reasonable and achievable considering that under the current level of mitigation activity, a reduction of 42.2% is predicted and an additional efforts by the City towards an additional reduction of 22.8% seem realistic.

3 Organisational Analysis



This chapter provides an overview of the organisational analysis that was completed and proposes a number of recommendations in order to strengthen the organisation in responding to climate change. The analysis follows the theoretical model as defined in the introduction of this report and summarizes the findings resulting from various engagements with key City officials.

3.1 Strategy

Strategy in the organisational analysis model represents a plan developed by an entity to achieve sustained organisational strength and successfully fight climate change. A sound strategy articulates a long-term mission, values and its alignment with the other elements of the organisation. For the City, the climate change strategy for both adaptation and mitigation are examined from a target and objective setting perspective, as well as the prioritisation mechanisms to rank and structure the activities along which the targets and objectives are realised.

3.1.1 Strategic Context

This City's long term strategy (GDS 2040) identifies four key outcomes, and a number of related outputs, that intend to realise the City's vision. The City's five-year IDPs then translate these desired outcomes into medium-term programmes for implementation during a particular term of office. On an annual basis, the IDP is reviewed and business plans are developed, detailing short term operational plans. These are linked to annual budgets and the City's annual Service Delivery and Budget Implementation Plan (SDBIP) against which the City is measured.

Joburg 2040 – Growth and Development Strategy

The City's long term strategic plan, the Growth and Development Strategy 2040 (GDS 2040) has outcomes that are aligned with national government. Outcome 2 of the GDS 2040 addresses climate change: "*Provide a resilient, liveable, sustainable urban environment – underpinned by infrastructure supportive of a low-carbon economy*."

The City plans to lead in the establishment of sustainable and eco-efficient infrastructure solutions (e.g. housing, eco-mobility, energy, water, waste, sanitation and information and communications technology), to create a landscape that is liveable, environmentally resilient, sustainable, and supportive of low-carbon economy initiatives.

The GDS programmes under Outcome 2 include:

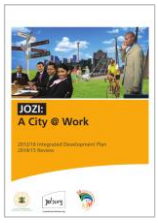
- Sustainable and integrated delivery of water, sanitation, energy and waste;
- Eco-mobility;
- Sustainable Human Settlements; and
- Climate change resilience and environmental protection.

The current ten development Priorities and related Priority Implementation Plans (PIPs) within the GDS include:

- Priority 1: Financial sustainability and resilience
- Priority 2: Agriculture and food security
- Priority 3: Sustainable Human Settlements
- Priorities 4, 8 and 9: Economic Growth – as constituted of:
    - Priority 4: SMME and entrepreneurial support
    - Priority 8: Investment attraction, retention and expansion
    - Priority 9: The green economy
- Priority 5: Engaged and active citizenry
- Priority 6: Resource sustainability
- Priority 7: Smart City
- Priority 10: Safer City

PIPs and related targets concerning the climate change related priorities are captured under Outcome 2 of the GDS and are mainly addressed in Priorities 6 and 7.

City of Johannesburg's Integrated Development Plan (IDP)

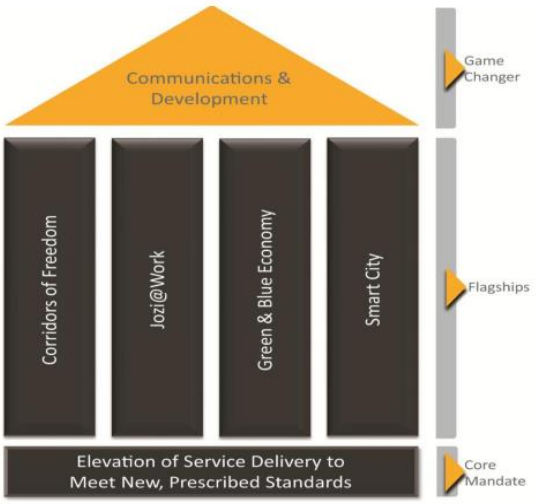


The IDP defines the development and plans of the municipality for a five year period and includes an assessment of the City's level of development, its development priorities, key performance indicators and targets, and operational strategies. In addition the City has adopted Flagship programmes to advance the transformation agenda.

The strategic direction, including priorities and flagship programmes, is geared to focus the organisation on accelerating and consolidating implementation of key programmes towards "changing challenges into opportunities", and is illustrated in Figure 3.1.

The flagship programmes are targeted at 'changing challenges into opportunities'. The flagship programme Corridors of Freedom aims to give residents increased freedom of movement through alternatives other than private motorised transport, as well as economic freedom. Jozi@Work

encourages communities to take charge of their own development, by working with the City to provide basic services. The Green and Blue Economy flagship aims at reaping the rewards of a socio-economic advantageous transition towards alternative energies and cleaner industries. The Smart City flagship aims at growing the City's ability to provide affordable and universal access to communication services to its residents.



The House and Climate Change

It is important to note that the Green and Blue Economy flagship programme has a strong direct link to CCA and CCM specifically targeting socio-economic benefits of a Green and Blue transition.

Other programmes also link to elements of climate change action, for example, the Corridors of Freedom including actions in public and non-motorised transport

Jozi@Work includes around cooperatives taking care of waste minimisation, collection and recycling.

Figure 3.1 – The House

Source: 2015/16 Institutional SDBIP (CoJ, 2015) and EcoMetrix Analysis.

Communication and development illustrates the City's commitment to improving its customer-centric approach, fostering developmental partnerships with our communities, and lastly, building trust and confidence in the City by its residents. In line with this approach the City also aims at a strong engagement of citizens and local businesses on Climate Change city-wide.

Business Plans and Service Delivery and Budget Implementation Plans (SDBIPs)

Departments and City entities have annually updated business plans in place to deliver on their mandate, planned interventions and targets specified in the SDBIP. Business plans are aligned with GDS outputs defined for the Term of Office a particular IDP. The Business plans detail the interventions in the annual SDBIPs and include targets, budget allocations and responsible clusters, departments and/or entities.

Six areas are identified in support of GDS Outcome 2, capturing climate change action translated in the annual SDBIPs. These areas are illustrated Table 3.1.

Table 3.1 – GDS outcome 2 – IDP output-specific delivery in support of the outcome

GDS Output	Output-Specific Delivery for Term of Office
1. Sustainable and integrated delivery of water, sanitation, energy and waste (WASTE)	Promote an integrated waste management system through city-wide separation at source (households, firms, business) – plastics; paper; glass; organics; metals and introducing alternative waste technologies.
1.2 Sustainable and integrated delivery of water, sanitation, energy and waste (WATER)	Repair leaking pipes and invest in technologies for water reclamation, as well as protect rivers and dams, encouraging natural flow which will help with storm water management and cleaning of water.
1.3 Sustainable and integrated delivery of water, sanitation, energy and waste (ENERGY)	Progress toward energy-wise solutions by introducing energy mix that in not solely dependent on coal. The City will continue set a good example by making its own buildings more energy efficient through 'retrofitting'.
2. Eco-mobility (TRANSPORT)	Combine walking, cycling and wheeling with efficient public transport and with vehicles powered by renewable energy. Support sustainable human settlements through promoting non-motorised transport infrastructure and complete streets. Initiate new green transport solutions and continue to roll out good quality road infrastructure.
3. Sustainable Human Settlements (SPATIAL)	Ensure emphasis on spatial integration (Corridors of Freedom) to facilitate economic development and the construction and operations of BRT continues as priority corridors are implemented and delivered. Regeneration of the Inner City and upgrading of marginalised areas.
4. Climate change resilience and environmental protection. (BUILDINGS / TRANSPORT / ENERGY / SPATIAL)	Reduce GHG emissions improving public transport, reducing congestion, and compliance with emissions standards. Invest in 'green infrastructure' like utilities, transport and housing that is less reliant on coal-generated electricity and fossil fuels. Enhance biodiversity and ecological protection, by building a more compact City (Corridors of Freedom).

Source: 2012/16 IDP, 2015/16 Review (CoJ, 2015) and EcoMetrix Team Analysis.

3.1.2 Adaptation and Mitigation Strategies

The Joburg Climate Change Adaptation Plan (CoJ, 2009) categorises the City's adaptation risk according to a four tiered scale (A to D). A key issue is that much of the City's climate change-related vulnerability stems from the fact that several systems considered most likely to be impacted upon by climate change, are already severely stressed, under existing climatic conditions due to poor urban environmental management or a lack of appropriate development controls. Figure 3.2 provides a schematic representation of the likelihood and magnitude adaptation risk matrix.

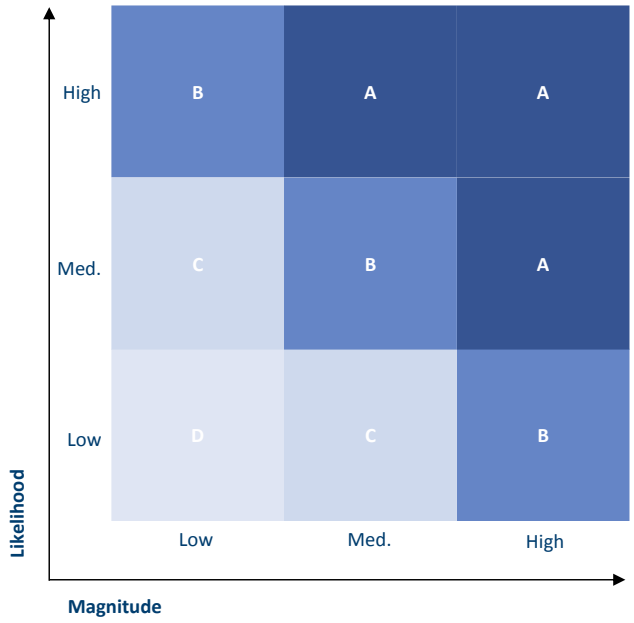


Figure 3.2 – Adaptation likelihood versus magnitude matrix

Source: Climate Change Adaptation Plan (CoJ, 2009) and EcoMetrix team analysis.

Strategic adaptation activities are regarded as fundamental for the City's effort to effectively adapt to the evolving threat of climate change. The strategic adaptations focus on the following areas:

- Integrating climate change adaptation into the City's strategic planning mechanisms, including a review of the management and organisational structures for implementing climate change adaptation (and mitigation) projects;
- Developing alternative financing options to fund of adaptation activities;
- Developing a Climate Change Information Management System to support decision making within the City; and
- Improving stakeholder engagement.

For mitigation, the City's ECCSAP (CoJ, 2012) in conjunction with other key documents identifies a long term 2050 mitigation target of 43% below 2010 emission levels. The City intends to realise these targets over time via the implementation of a mix of mitigation measures covering all the main emitting sectors in the City including:

- Buildings – To date, five municipal buildings have been retrofitted with energy efficient lighting with a total saving of 100 tons of carbon dioxide. A total of 104 municipal buildings have been identified to be retrofitted under a larger energy efficiency building retrofit programme. The building retrofit programme will include lighting, cooling, and heating systems;

- Outdoor Lighting - The Nelson Mandela Bridge as City Power's initiatives has been retrofitted with 60 street lights of 9 watts LEDs which replaced 150 watts metal halide gas lights in order to save energy, and thereby saving costs;
- Human Settlements - Cosmo City Climate Proofing Project involved the provision of low pressure solar water geysers to over 1000 low income households, including the provision of energy efficiency lights and planting of fruit trees. The solar water geyser programme (SWHP) was launched in October 2012 and is aimed at rolling out 110 000 geysers to poor and low income households over three years. It has been extended to other areas of the CoJ through the City Power areas of supply.
- Transport - The Rea Vaya BRT System has displaced over 500 taxis and minibuses and is used by over 50 000 patrons daily. Corridors of Freedom further aims to make public transport more accessible and desirable;
- Waste to Energy - The city's landfill sites, Marie Louise, Robinson Deep, Ennerdale, Linbro Park and Goudkoppies generate electricity from captured landfill gas;

3.1.3 Goals, Targets and Priority Setting

Goals and Targets

The City's ECCSAP sets a long-term mitigation target of 43% by 2050. In light of the City's commitment towards the fight against climate and the establishment of the 2007 GHGEI as the City's baseline year, it is proposed to consider extending this commitment to a range of between 40% and 65% by 2040, in line with the GDS against a 2007 baseline.

In collaboration with ICLEI, the City has completed the 2014 GHGEI to assess in detail its progress with regard to its GHG emission reduction efforts. The next steps are for the proposed 2040 target to be refined and allocated to sector level targets using the detailed information from the 2014 GHGEI. The latter is expected to be completed in 2016.

The CoJ CCSF aims to determine the process and rules along which climate change mitigation and adaptation targets are set, monitored and managed. It is common in the industrialised world to determine an absolute emission reduction target from a baseline year (i.e. a set year with an existing GHGEI) and set the emission reduction target as a percentage reduction below this baseline for a future target year.

From a procedural perspective, such an absolute target is based on a forecast of the systemic growth of the GHGEI due to, for example, population growth, economic activity and changing standards of

living. These are corrected for the mitigation activities already underway that will bear fruit in the period between the baseline year and the target year. Figure 3.3 provides a schematic overview of these dynamics.

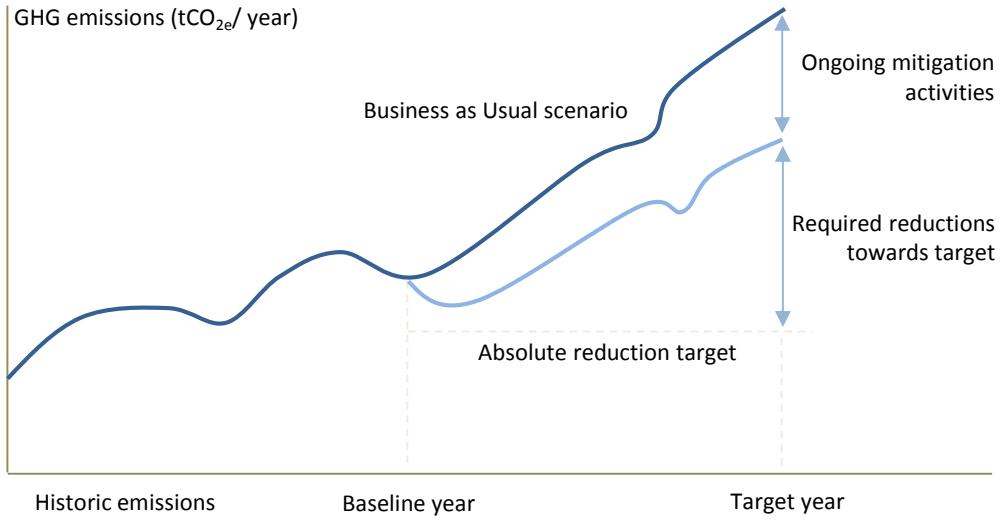


Figure 3.3 – Mitigation target setting dynamics

Considering these dynamics and the City's other priorities that may or may not compete with the City's climate change mitigation ambitions, it is important to consider a range of different types of targets that might be more appropriate for the City:

- Absolute targets - Which indicate the absolute saving as a percentage below a historical baseline year;
- Relative targets - Which indicate the relative saving against a Business as Usual (BAU) scenario to be realised in a specific target year;
- Intensity targets - Targets set against a relevant measure such as emission per capita or Gross Domestic Profit (GDP).

Each of these types of targets has their own application and can be applied in combination with one another. When taking these dynamics into account in relation to the current adaptation and mitigation targets within the City's adaptation Plan (2009) and ECCSAP, it becomes apparent that targets are mostly effort based in nature and the type of target does not take cognisance of the overall dynamics of the developmental stage of the City (i.e. high levels of urbanisation, accelerated economic growth, etc.).

Prioritisation of Activities

The City's adaptation strategy applies a likelihood versus magnitude analysis to identify the priority adaptation risks to be tackled. The City's Adaptation Plan (CoJ, 2009) indicates that this risk-based adaptation prioritisation mechanism provides an adequate method to determine which adaptation activities should be initiated first. However, it is important to note that the mechanism does not factor in the potential costs of actions to the City or society.

The ECCSAP identifies a number of mitigation objectives. These objectives have been informed by policies including the National Energy Efficiency Strategy (DME, 2005), the Gauteng Integrated Energy Strategy (DLGH, 2010) and the national Long Term Mitigation Scenarios – LTMS (DEAT, 2007). Actions have been formulated in several areas to reach the objectives. A thorough quantitative approach with regard to the impact of measures and prioritisation, is however, lacking.

Although, rather common internationally, the main concern with a qualitative and effort based approach, is the ability to measure progress towards the realisation of the anticipated outcome of the specific mitigation component and contribution to the related principle(s) as defined in the GDS 2040. The City could benefit from a more rigorous climate change action prioritisation system to reach its adaptation and mitigation objectives. This is important for strategy development, and implementation specifically regarding budget allocation (see Section 3.3.2).

3.1.4 Findings and Recommendations

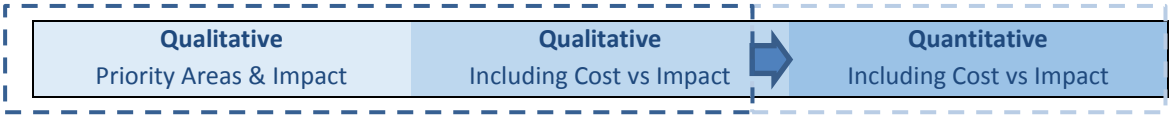
The main findings regarding Strategy on Climate Change can be summarised as:

- Climate Change Adaptation (CCA) and Climate Change Mitigation (CCM) are elements of the overall City strategy and are integrated in core strategic (planning) documents like the GDS and IDP;
- Areas of climate change action as defined in the CCM and CCA strategy (Adaptation Plan - CoJ, 2009; ECCSAP - CoJ, 2012) have been addressed in the IDP to a large extent, however a stronger and more direct link could be established;
- The CCA contains a number of adaptation objectives which are qualitative in nature followed by effort based targets. The inclusion of a more quantitative set of targets could also increase monitoring and therefore management of the City's climate change adaptation risks;
- The CCA provides an adaptation activity prioritisation mechanism which could be strengthened by including a cost component to this mechanism identifying the cost to the City and society of the implementation of a certain adaptation measure;
- The CCM has clearly defined quantitative mitigation targets but could benefit from the inclusion of a mitigation activity prioritisation mechanism allowing the City to identify the low hanging fruit mitigation opportunities for the short, medium and long term.

- Both CCA and CCM strategies could benefit from the inclusion of cost and the best return on Rands invested in certain type of activities. In addition to this, there will be climate change activities and opportunities that reduce budgetary running costs. It will be essential to map these as some will have interesting payback periods.

The following strategic direction is proposed in strengthening climate change action within the city's strategy development and overall planning cycle:

Regarding the prioritisation of overall long-term funding allocation to climate change actions it is suggested to develop, over time, a more quantitative approach and apply quantitative base prioritisation in addition to existing qualitative approaches:



Regarding the type of target setting it is proposed to develop, over time, more growth inclusive targets taking into account population growth (e.g. per capita targets) and socio-economic development (e.g. consumption per electricity user):

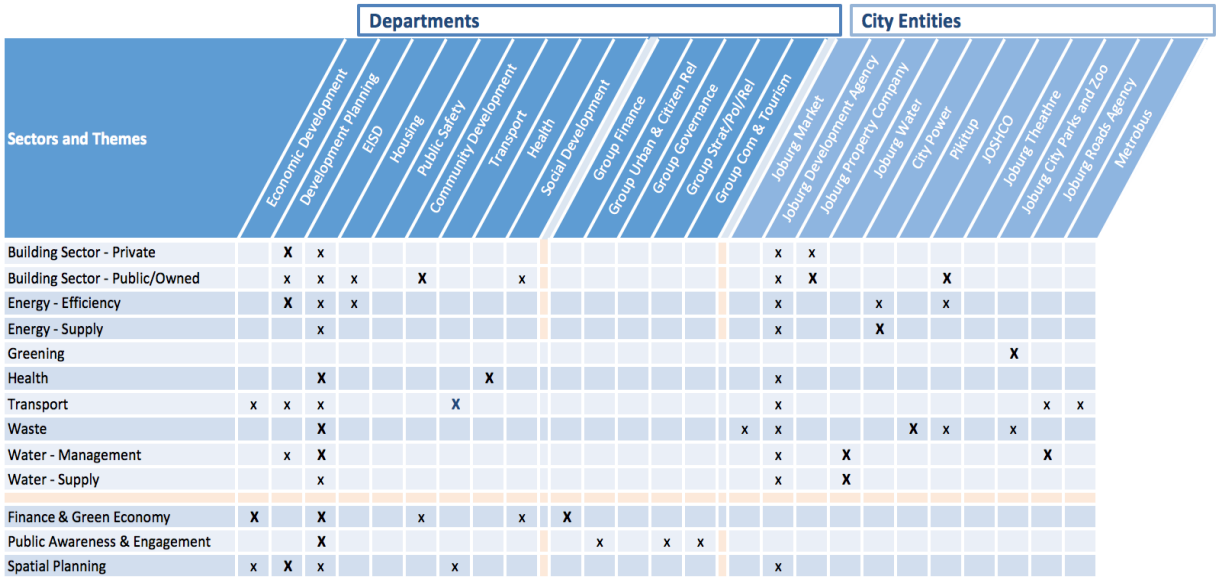
3.2 Structure

Structure represents the way through which the activities of the City are organised. This includes information of who is accountable and reports to whom, and how tasks are both allocated and integrated. In other words, it is the organizational structure of the City. It is often considered one of the more visible and easy to adapt elements of the organisation.

3.2.1 The City's Organisational Structure

The internal organisation of the City, its departments and entities has been mapped with the Sectors defined as gateways for engagement with local businesses and citizens (Figure 3.4). While the city organisation may change, if climate change strategies and action plans are aligned with sectors the responsibilities can be re-mapped to a changed municipal organisation where needed. The matrix below, shows the result of this 'mapping' exercise, indicating the leading department or entity per sector as well as other departments and entities which, although not assumed to be leading activities in the relevant sectors, should be regarded as important internal stakeholders to collaborate with.

In addition to the Sectors, the three important climate action supporting Themes, i.e. Finance and Green Economy, Public Awareness and Engagement, and Spatial Planning are also included.



Sectors and Themes	Economic Development	Development Planning	EISD	Housing	Public Safety	Community Development	Transport	Health	Social Development	Group Finance	Group Urban & Citizen Rel	Group Governance	Group Strat/Pol/Rel	Group Com & Tourism	Joburg Market	Joburg Development Agency	Joburg Property Company	Joburg Water	City Power	Pikitup	JOSHCO	Joburg Theatre	Joburg City Parks and Zoo	Joburg Roads Agency	Metrobus
	Departments														City Entities										
Building Sector - Private		X	x												x	x									
Building Sector - Public/Owned		x	x	x		X			x						x	X				X					
Energy - Efficiency		X	x	x											x			x		x					
Energy - Supply			x												x			X							
Greening																						X			
Health			X					X							x										
Transport	x	x	x				X								x								x	x	
Waste			X											x	x				X	x		x			
Water - Management		x	X												x		X						X		
Water - Supply			x												x		X								
Finance & Green Economy	X		X			x			x	X															
Public Awareness & Engagement			X								x		x	x											
Spatial Planning	x	X	x				x								x										

Figure 3.4 – Mapping of Sectors and supporting Themes with the City Organisational Structure

Leading departments indicated with 'X' and other important internal stakeholders indicated with 'x'

The allocation of responsibilities with regard to climate change is arranged via the City organisational structure and is not specific to the issue. Nevertheless, a more formalised allocation of climate change responsibilities aligned with the matrix in Figure 3.4 above may strengthen the response to climate change. Currently, no climate change specific responsibilities are allocated to departments, except for the EISD, mandated to address climate change. Moreover, within departments, the link to climate change of certain actions is often watered down. Sometimes projects and initiatives are undertaken with a clear link to climate change, but without it being explicitly recognised as such.

Various departments acknowledge the coordinating role for EISD when it comes to institutionalizing climate change into the City's organizational structure. This coordinating role could be further strengthened and expanded in the future. While there is ample knowledge and expertise on CCA and CCM within EISD, other departments indicated their capabilities with regard to the subject, are limited. Furthermore, no formal reporting lines (e.g. regarding climate change impact) or collaboration procedures (e.g. involvement EISD in climate change action development) have been formalised.

3.2.2 Engagement with Local Businesses and Citizens

Equally important, will be coordinating and integrating private activities into City structures. Harnessing relations with the private sector will be an essential element of any action plan to get the necessary involvement and support by local businesses and citizens. Under the City's structure,

regions will also have to play a more central role in raising public awareness and motivate action to achieve climate change objectives. In respect of climate change action, both aspects were found to be more or less lacking at the moment, while there are non-climate change specific structures in place one could make use of. Hence, there seems to exist significant opportunity for further strengthening the external structure of the framework.

There are several potential organizations to strengthen relations and enter into Public Private engagement partnerships with on the subject of climate change. Prominent among them are:

- Black Business Council (BBC);
- Business Leadership South Africa (BLSA);
- Black Management Forum (BMF);
- Business Unity South Africa (BUSA);
- Johannesburg Chambers of Commerce and Industry (JCCI); and
- National Business Initiative (NBI).

An excellent opportunity for public engagement with the local business community would exist in the form of the Johannesburg Business Forum (JBF). The forum convenes on a monthly basis and has several sub-committees, such as Trade & Investment and Transport. However, climate change is currently not on the agenda. By organizing regular meetings and setting up project working groups on specific climate change related topics and areas aligned with sectors and related (socio-) economic/financial drivers identified (see Section 3.6), the JBF could serve as a link between the City's Departments and organised business associations. This would facilitate public private engagement from a climate change perspective, with the ultimate aim of promoting economic growth and sustainable development within the City of Johannesburg.

Furthermore, the City's organizational structure currently includes the Department of Urban Management & Citizens Relationship Management. Urban management revolves around coordinating public and private activities and raising sufficient public awareness to tackle major problems that citizens face. To this end, the City of Johannesburg is currently subdivided into seven regions. The Department indicated that public engagement communication varies per region and is dependent on the specific audience and target. It would be ideally positioned to facilitate on-the-ground, hands-on engagement with citizens in the area of climate change.

Regarding the building sector specifically, JOSHCO has regular interactions with residents associations of the estates it manages. These interactions already include climate change action like water conservation and improving energy efficiency and could be further strengthened in bringing across the message around the fight against climate change.

3.2.3 Findings and Recommendations

The key findings with regard to organizational structure and the climate change strategic framework development, can be summarised as follows:

- Climate change is currently integrated into the City's organizational structure, with EISD in a coordinating but largely not formalised role.
- On the Mayoral Committee, Member Mayoral Committee (MMC) for the EISD, Ms Matshidiso Mfikoe, is specifically assigned the topic.
- There are no climate change specific responsibilities formally allocated other than those specified in the IDP, which one reports on through the City's generic M&E framework.
- At the level of the individual departments, the link to climate change mitigation and adaptation is too often lost and skills to evaluate its climate change impact are scarce.
- EISD's role should be institutionalised further (i.e. planning, reporting, accountability and collaboration on optimizing climate change impact during implementation).
- In this regard, departments could benefit from trained departmental staff responsible to liaise and communicate with EISD on climate change.

When it comes to strategic direction and organizational structure, the City is therefore, currently on the left side on the below scale where climate change actions are, as it should, integrated in the overall strategic and planning cycle with the link to climate change often lost, especially in regard to monitoring and verification of impact. Depending on the type of climate change action or initiative under consideration, the ambition should be to move to the middle or right. An "integrated climate change specific" structure would allocate specific roles and responsibilities with regard to climate change mitigation and adaptation and impact evaluation on a city-wide level.

By contrast, “a project-based climate change specific” approach would be reserved for the large projects and programs, such as the BRT, which demand their own separate organisation and approach including the optimisation of climate change mitigation and adaptation benefits.

To optimise the structure driving climate change action, roles and responsibilities should be assigned on a departmental level and at a central level. For example, the responsibility for collecting climate change monitoring and evaluation data would lie at a departmental level, while EISD would be allocated the central task of assessing and evaluating the information. Moreover, formal engagement with local (organised) business is taking place and, as a next step, climate change topics could be added to the agenda or a sub-committee formed, for example, under the auspices of the Johannesburg Business Forum (JBF). Finally, public engagement and citizen’s relations with regard to climate change could be added to the mix through the Department of Urban Management.

3.3 Systems

Systems are the processes and procedures by which the activities of the organization are run and monitored. This includes core processes as well as support systems. With regard to developing a strategic framework for climate action, this typically involves systems for performance management and systems for obtaining funding and financing.

3.3.1 Performance Management

The City has implemented a Monitoring and Evaluation (M&E) Framework (see diagram below), which cascades down through the organisation and encompasses: planning and timeframes, planning mechanisms, M&E periods and the reporting mechanisms.

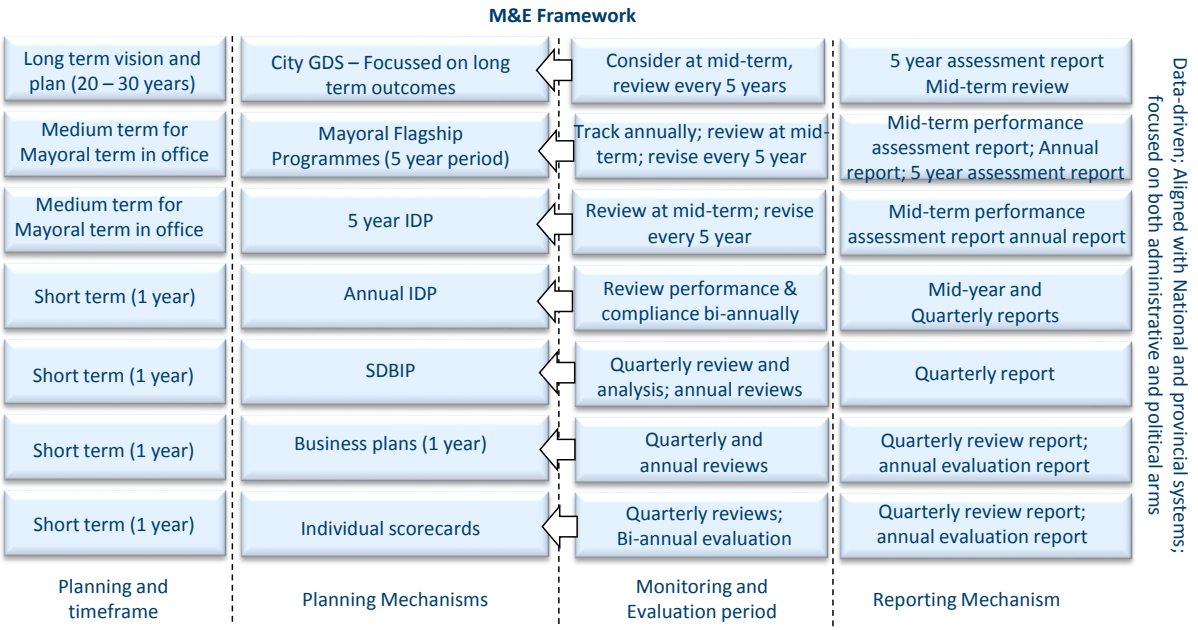


Figure 3.5 – City of Johannesburg monitoring and evaluation framework

At the moment, several sectors within the City have climate change related targets, which cascade down through the organisation. EISD is the department responsible for the monitoring of the realisation of the city's climate change objectives. As such, it has a direct climate change mitigation target, the realisation of which is hampered due to the fact that it is not in direct control, nor exclusively responsible for implementation of mitigation projects. Furthermore, the department depends on the information provided by other departments to monitor the development of the City's emissions over time, and this is done on a voluntary supply basis. This makes the collection of information complex and time consuming and also diminishes the ability of the City to manage the realisation of its climate change targets over time.

Globally, a trend can be seen whereby organisations implement a balanced score card to monitor and report an organisations performance on a number of key aspects. The third generation balanced scorecard is a framework used by government and charitable organisations, where purely financial measures are not the key drivers and there is no competition to benchmark against, such as the United Nations and the International Committee of the Red Cross often referred to as a Results-Based Management (RBM) framework. The City has implemented a scorecard system as part of its M&E structure, however, the City could benefit from the inclusion of a set of Key Environmental Indicators (KEI) that manage the performance of the data capturing, reporting and realisation of the City's climate change objectives.

3.3.2 Funding and Financing

Funding Allocation by the City

The budget allocation process is aligned with the 5-year IDP cycle and annual review and adjustment. Overall plans and budgets for each department and entity are captured for the long-term in the Financial Development Plan (FDP) and adjusted in the annual budget cycle based on changes in the underlying assumptions and key variables. Informed by the GDS and IDP, prioritisation of projects and programmes takes place through a strategic and spatially linked information system, the Capital Investment Management System (CIMS) in the context of a limited capital budget.

The budget allocated across the following clusters:

- Sustainable Services comprises, EISD, Housing, City Power, Pikitup, Johannesburg Water and Johannesburg Social and Housing Company (JOSHCO).
- Human and Social Development comprises, Community Development, Social Development, Health, Public Safety, Emergency Management Services (EMS), Johannesburg Metropolitan Police Department (JMPD), Johannesburg City Parks and Zoo and Joburg City Theatres.
- Economic Growth Cluster comprises, Economic Development, Transportation, Development Planning, Joburg Market, Johannesburg Property Company (JPC), Johannesburg Development agency (JDA), Johannesburg Roads Agency (JRA) and Metrobus.
- Good Governance Cluster comprises, Group Functions, Group Finance, Group Corporate Shared Services and the Legislative Arm of Council (Speaker's Office).

The sustainability cluster is at the centre of climate change action in the City covering five (5) of the seven (7) defined sectors (energy, greening, waste, water and (social) buildings) and has the largest overall capital and operational budget allocated. The Transport sector being one of the largest contributors to the City's carbon footprint, is part of the Economic Growth cluster, with the Health sector, linked to climate change adaptation is part of the Development Cluster.

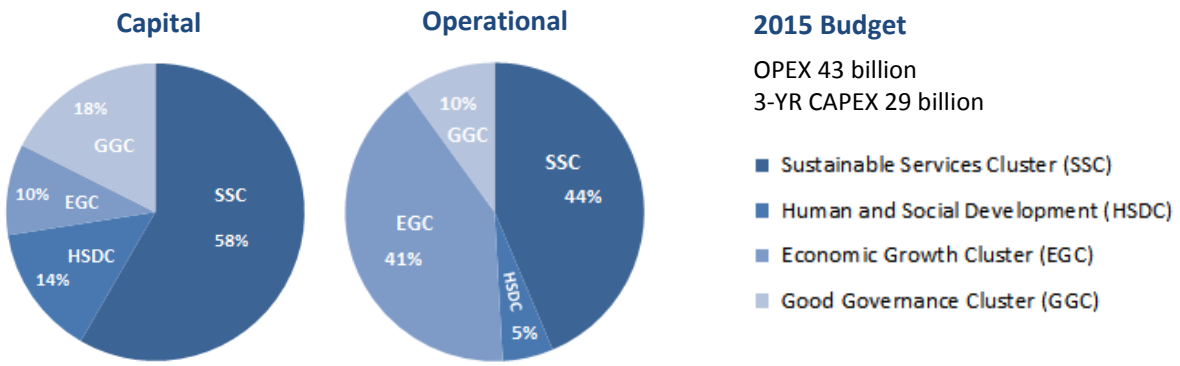


Figure 3.6 – Distribution of the 2015 operational and capital budget of the City (CoJ Budget Speech, 2015)

Climate change actions are an integral part of the budget prioritisation and allocation process. Of this integral budget the larger part is concentrated under the sustainability cluster. There are currently no quantitative processes in place to assess the return in GHG emission reductions on Rand invested. Nevertheless, prioritisation is taking place taking into account the overall (climate and non-climate) impact of actions as well as climate change risk areas as identified in the adaptation plan (CoJ, 2009).

Attraction of External Funds

Provincial and national grants are attracted by the City departments and entities and put forward in their budget applications to expand their budgets. International funding generally takes place on a project or programme basis including collaboration with the specific donor regarding implementation. An example of the latter is the Danish International Development Agency (DANIDA) Urban Environmental Management Programme (UEMP) which included a large scale roll-out of Solar Water Heaters and other climate proofing activities in the townships Cosmo City and Alexandra. There are however many other examples and generally one sees that once a relationship with a certain donor is established this can results in further collaboration and funding of activities.

There remains however a further potential to strategically obtain funding internationally for climate change action in the City. Pending further international negotiations on climate change within the context the United Nations Framework of Climate Change Convention (UNFCCC), additional international funds may become available to assist the developing world in achieving their climate change goals. This may provide an opportunity to the City to gain additional financial strength to finance and expand climate change action in the City.

The City has been successful in collecting monies through the issuance of bonds leveraging its credit worthiness. Following the successful issuance of bonds for general city financing, the City issued the first Green Bond on the Johannesburg Stock Exchange (JSE) in June 2014, which was a first instrument of its nature in the local government sector and South Africa as a whole. The market welcomed this innovation and the ten year Green Bond of R1.5-billion was oversubscribed by 150% at a competitive funding cost. Monies collected have strengthened climate change action in the City but were soft earmarked.

The City is now contemplating the issuance of a new green bond designed as a 'green impact bond' with a more direct link on climate change impact which would gear monies more strongly to climate change mitigation and adaptation results. The City might also consider expanding on this concept internationally, looking for financing opportunities at potentially even more competitive funding cost.

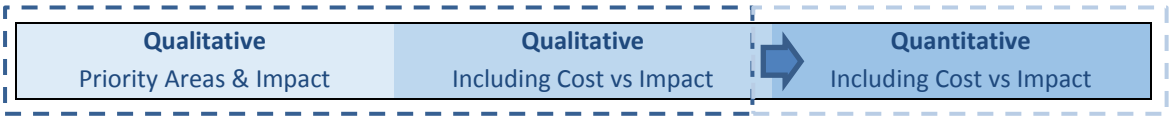
3.3.3 Findings and Recommendations

The main findings regarding Funding and Financing can be summarised as follows:

- The City has systems in place to plan and prioritise investments in climate change actions on a five year (main IDP/FDP), annual (IDP/FDP review) basis.
- The rational for prioritising climate change action could be strengthened by including a quantitative assessment of cost versus impact in particular in relation to CCM for which it is generally easier to quantify impact than for CCA.
- National and provincial funds are structurally integrated by departments in their annual budgets. International funding is generally obtained on a project or programme basis.
- A strategic approach, taking advantage of potentially unlocked international climate change funds following a new global deal, could strengthen international funding potential.
- As already anticipated, the green bond success could be further built on making a stronger link with climate impact and quantification as also suggested for action prioritisation.

The following strategic direction is proposed in strengthening funding and financing of climate change action within the city:

Regarding the prioritisation of annual funding allocation to climate change actions, it is proposed to move from an annual qualitative prioritisation based on priority areas and qualitatively estimated impact, towards a qualitative and subsequently quantitative assessment of impact versus cost [5]:



Regarding the attraction of external funds, it is proposed to move, over time, from event driven and project and program based funding to a more strategic funding raising based on long term relationships with donors:

3.4 Style and Culture

Style and Culture relates to leadership approach within the organization and the way the organization presents itself internally and externally (i.e. the way in which it communicates). How do City officials inspire and how do they behave towards the outside world? Style and culture are essential elements when it comes to motivating climate action.

[5] This strategic direction is similar to what is proposed on a strategic level.

3.4.1 Organizational Leadership

Executive Mayor Parks Tau has taken on a strong role as figurehead, making climate change a high-priority objective for the City. This role was further emphasised during the C40 Cities Climate Leadership Summit, held in February 2014, and hosted by the City. This illustrates, that the City has a clear champion in the effort to tackle climate change and further the green agenda. It is the express intention of this framework, to take the climate action agenda to a next level.

Various stakeholder engagements have indicated that, for the City's green agenda to succeed, there will need to be more champions and supporters of climate change within individual departments and at various levels. Except for EISD, this is currently not the case or only in a very limited sense. There is however a strong need for championing and knowledge sharing. One source indicated that at the moment maybe 5 out of 1000 people within the organizational structure would have the necessary knowledge and skills in this area. In this regard, a "goals down and plans up" approach would seem appropriate.

Firstly, the aim of climate change champions and supporters should be communicating to City employees the main issues pertaining to climate change mitigation and adaptation, and actions the City is taking towards tackling the issue. A sense of urgency will also have to be conveyed. In other words, it is the believed that the rest of the organization will follow, but only to the extent there exists sufficient understanding within the organization as a whole.

As such, a second objective should involve promoting active knowledge sharing among City employees on the topic through various platforms. A good example would be the Johannesburg Innovation and Knowledge Exchange (JIKE). The latter could provide an ideal platform for such interaction, however, stakeholders indicated it is not used as such.

3.4.2 Communication and Climate Action

When it comes to communicating climate change to the public and to external stakeholders, there is strong reporting on successes, but mostly on an *ad hoc* or event-driven basis. A good example of such reporting was the recent C40 Cities Climate Leadership Summit, as mentioned earlier. However, there is a general sense within departments that more people need to become aware of climate change to motivate action. In order to achieve this more and more continuous communication on the topic will have to take place, reaching a broader group of citizens.

There are good communication platforms available within the City. Group Communications indicated that they handle launches, mayoral public engagement, stakeholder-targeted engagements etc. They

also have the tools available to provide more structured and sustained communication towards the public on relevant issues. To give an example, Group Communications indicated that the CoJ website is currently being redesigned. This will provide ample opportunity for use in promoting climate change related information.

Other opportunities include Group Public Engagement & Citizens Relations, which would be able to facilitate a more on-the-ground approach, engaging with the public through the various regional offices through which they are organised. The Department of Community Development could facilitate public engagement through the various sports & recreation facilities and libraries they manage. The Department of Social Development has various active Argi forums and Agri resource centres through with climate change related information could be disseminated. Furthermore, all the institutions mentioned, indicated a readiness to cooperate in such a manner.

Engagement with various external stakeholders such as BUSA, the Black Business Council etc., is also still on an *ad hoc* basis. There are plans within the Group Communications to develop a more structured approach towards external stakeholder engagement in the future, so as to ensure that engagement is not just event based. However, these plans still have to be fleshed out and planned properly. Primary drivers for external stakeholders to engage could include mayoral involvement and/or contact.

A very important point that was repeatedly mentioned, as part of clear communication of the City's green agenda, is making a firm commitment that climate action is undertaken. For example, one warning that was provided was being careful with communication or talking about a project or initiative before it is sufficiently tangible or actually there. In short, the public needs to see it happen, and see it happen successfully.

A second important concern in this regard is following through on projects and initiatives that are undertaken in a more holistic and strategic manner. For example, the BRT was implemented to promote public transport, reduce congestion and improve air quality. However, the busses run on diesel, instead of a hybrid or natural gas engine. This could be a worthwhile next step in developing the system. A further step would involve looking at among others Solar Photo Voltaic (Solar PV) on bus stops rooftops. When it comes to the Jozi@Work flagship program, one could look not only at promoting jobs by increasing the number of people installing Solar Water Heaters, but also to take care of the associated maintenance requirements by training additional people to do the necessary maintenance in the future. Hence, following through fully on climate change initiatives would communicate a stronger message that the issue is high up on the City's agenda.

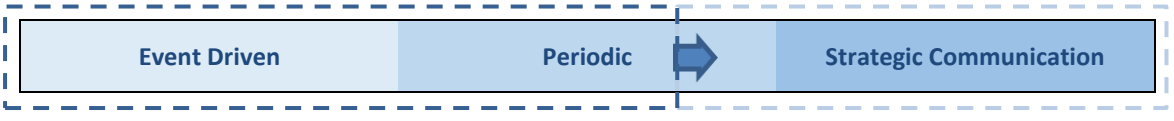
3.4.3 Findings and Recommendations

The main findings regarding Style and Culture can be summarised as follows:

- The Mayor functions as a strong figure head in championing climate change, supported by the MMC of EISD, and the EISD as the lead department.
- More champions are required at different departments / levels to clearly promulgate/drive the green agenda of the city.
- Active knowledge sharing among CoJ employees is required to generate intrinsic motivation on climate change (e.g. JIKE).
- Make a firm commitment that action is taken and follow fully through on projects and initiatives undertaken.
- Communication on climate change needs to evolve from being strong, but event-driven, to more strategic and continuous to keep the issue in people's minds.

In this regard, we propose the following strategic scales. Leadership style should move towards a model of intrinsic motivation to work on climate change. Motivated people are much more likely to take the topic seriously, work together and come up with creative solutions. Obviously, rules and championship would still play an important role. However, self-motivation would be the ultimate goal to drive the green agenda:

Communication will have to evolve from being strong, but event-driven, to having a more structured and continuous approach. Continuous communication would ensure that the topic remains alive in people's minds and attitudes, thus triggering more forceful and sustained climate action among the public:



3.5 Staff and Skills

Staff deals with the number and types of employees required to achieve the identified objectives. By contrast, skills relates to the capabilities and competencies of the employees or of the organization as a whole. How is it distinctive, where does the necessary knowledge and expertise reside and how do we obtain the necessary inputs are important questions.

3.4.4 Knowledge and expertise

Implementation expertise exists at departmental level and within groups, but awareness of climate change angle is not always explicit. As such a large number of projects and initiatives are undertaken in various areas that fall under the City's responsibilities, which link to climate change, but are not labelled as such. A good example of this is found within the Department of Community Development, where a program for the installation of thermal blankets in a number of community pools was implemented, together with a programme to change the traditional light bulbs to fluorescent lamps in community centres and facilities. The programs were initiated for energy saving reasons, which is of course strongly relates to climate change. However, it was not done with that purpose explicitly in mind. Taking climate change expertise into account during the decision making process could have benefitted the ultimate goal of making the City greener.

Furthermore, all departments indicated there is a central role for EISD in assessing the climate impact of projects and initiatives. This refers back to what we earlier discussed. In other words, departments indicated a willingness to collect and make available relevant data, in order to subsequently use EISD's expertise to make the necessary calculations. Structuring data collection, reporting and processing this way, would increase the availability and usefulness of the information, and take the effectiveness of policy responses on the basis of the information to a next level.

In one case, a department indicated it has one city employee available for every three employees it should be allocated according to government rules and regulations. This obviously pushes the climate change agenda to the back. One solution would be tasking one or more people within each department, depending on size and pertinence, specifically with dealings related to the subject of climate change. These people would maintain strong ties with EISD to stay on top of the issue and expedite the required knowledge and expertise sharing.

3.4.5 How to acquire the necessary inputs and support

One important question remaining is how to deal with knowledge gaps. While EISD has a lot of knowledge and capacity, it is no expert in all fields. One example in particular was provided by the Department of Health. EISD is often responsible for enforcement of bylaws, but it has no specific expertise with regard to the Health Department's dealings. On the other hand, there are a lot of health officials in the field with this specific expertise. However, they are unable to enforce when it comes to climate change issues as these responsibilities have been assigned to EISD.

Where the required internal knowledge and skills are not available within EISD, several options exist. One of them is insourcing the expertise by hiring external consultants. Another option is relying on

external PPE working groups, like industry groups, and piggyback on their knowledge. Ideally both options are used to fill knowledge and skills gaps towards the future within the Department. Hence, there is the choice between insourcing, relying on partnerships for instance with industry groups, and lastly building sufficient internal capacity to be able to cope with most issues independently. In all likelihood, some knowledge and skills gaps will always remain, but the option of insourcing would preferably be used with the ultimate aim of building sufficient internal capacity over time, and build up knowledge and skills, so as to have wide-ranging and inclusive capability in the future.

3.4.6 Findings and Recommendations

The key findings regarding Staff and Skills can be summarised as follows:

- Make the climate change angle with regard to projects and initiatives explicit each time to get the most out of it.
- Assign a central role for EISD in assessing the climate impact of projects and initiatives. Departments are responsible for collecting and making available relevant data.
- Task one or more people within each department, specifically with climate change. These people will be responsible for maintaining interaction with EISD on the issues.
- When the necessary knowledge is unavailable internally, the staff and skills can be insourced or obtained through partnerships with the aim of building the necessary capacity over time.

This gives rise to the following strategic scale:

3.5 Shared Values with External Stakeholders

Shared values are the core values, norms and standards that guide behaviour towards a common objective. They are also referred to as the 'superordinate goals' in which the other organisational elements come together. Shared climate change values are often not enough to drive change and engagement with external stakeholders. Together with related (socio-) economic and/or financial interest they generally can however drive engagement with businesses and citizens.

3.5.1 Engagement with Business

The City engages with business on several matters of shared interest. Consultations with business often arise from issues that need to be dealt with and for this can rely on several business associations. Ongoing business engagements are organised by the Economic Development Department which runs

the Johannesburg Business Forum meetings monthly (see Section 3.2.2). Climate change is however not on its agenda, nor are related topics approached via this angle.

Building effective relationships with businesses as a City can take time. It requires a good understanding between partners and the interests that drive the envisaged collaboration among them. Although climate change as part of Corporate Social Responsibility (CSR) is generally on the agenda of businesses, there are often no dedicated persons and budgets. It is therefore proposed to drive the collaboration on the basis of sectors and related specific shared interests.

Table 3.2 – Economic drivers for City-Business Engagement acknowledging risk and opportunity

Sectors	Climate Action	Economic Drivers
Buildings	Energy Efficiency Renewable Energy	Increase in property value Green prestige Energy savings and security Energy access
Energy	Energy Efficiency Renewable Energy	Security of Supply Rising prices
Health	Heat - Shade/cooling Floods - Spatial planning/barriers Diseases - Inform and prevent	Insurance cost/risk Medical cost/risk
Transport	Public Transport Cycling/Walking Decongestion	Congestion in economic hubs like CBD, Rosebank, Sandton, City Deep Socio-economic mobility improvement unlocking townships, socially mixed suburbs
Waste	Recycling Waste to energy Reduce waste generation	Value in waste Diversion from landfilling Waste disposal cost
Water	Water efficiency / recycling Flooding risk	Security of supply / Rising prices Damage to property & safety Insurance cost

It is not surprising that the Economic Development department of CoJ is leading with regard to engagement with business as it addresses economic interests, which are close to the core of what businesses are about. Besides the JBF, the department also focussed on reaping the rewards of a green transition promoting green entrepreneurs via the Green City Start-up initiative in collaboration with Resolution Circle and the University of Johannesburg.

EISD being responsible, could benefit from a close collaboration with the Economic Development department in order to strongly bring economic drivers into the climate change action equation and explore how a reciprocal engagement can be developed whereby both City and business can jointly bring something to the table, whether financial or non-financial.

3.5.2 Engagement with Citizens

If well informed, citizens generally respond well to climate change initiatives in the city and are willing to participate by changing their behaviour (e.g. in case of separation of waste, composting, cycling and lowering electricity consumption, etc.). Nevertheless, also citizens need economic drivers if substantial investments are required (e.g. in case of solar panels and solar water heaters). In addition, there is generally a higher demand for independent information and advice enabling citizens to make the right investment choices and take away risks inhibiting change.

With regard to solar electricity there may be an opportunity for the City to assist citizens in making the right investment choice and assisting in funding. As solar electricity within the residential sector is close to becoming, on par with grid electricity pricewise, the main hurdle for citizens is the upfront cash investment required and a lack of knowledge on solar electricity systems. The City is also investigating what business opportunity residential solar electricity may provide for City power to deliver solar electricity solutions and provide an alternative to current revenue from the distribution and sales of grid based electricity.

The City reaches out to citizens in different ways:

- Residents associations (e.g. in case of JOSHCO);
- Regional multidisciplinary task teams (in case of Urban Management & Citizens Relations)
- Neighbourhoods and associations (e.g. in case of Pikitup's separation of waste initiatives)
- Libraries and recreational facilities (e.g. in case of Community Development)

This citizen outreach is generally not climate change specific but some of this relates to climate change mitigation and adaptation activities like waste recycling, energy efficiency, promotion of cycling. The current ways of citizen outreach provide, however, ample opportunity to expand on in relation to climate change specific action.

3.5.3 Findings and Recommendations

The key findings with regard to organizational structure and the climate change strategic framework, under development can be summarised as follows:

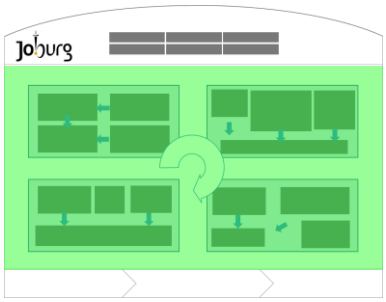
- The City reaches out to businesses and citizens on a structural basis, however this outreach is generally not climate change specific.
- Existing ways of engagement provide ample opportunity to expand to climate change of which some may be more suitable for communication (see Section 3.4) and some more suitable for joint climate change action.
- For engagement with business, the Johannesburg Business Forum is an interesting forum to expand in the direction of climate change action, as it is existing and as the focus is on related economic interests which can mobilise businesses.
- A business engagement strategy is proposed aligned with sectors, defining sector specific actions and related economic interests which can drive the engagement.
- As is also observed in other cities internationally (e.g. Paris and Rotterdam), developing an effective engagement with business and citizens is a process that takes time and can encompass several years to mature.
- Currently, there are few associations with universities with regard to climate change. A structured feedback loop with academia could improve capacity building, initiate research programs (with appropriate funding) and create clusters of innovation working on the topic.

The following strategic direction is proposed in strengthening city-wide participatory action on climate change by citizens and businesses:

Currently the focus is on climate change action driven by the City's agenda. To some extent the City is however already embarking on more collaborative actions like via Pikitup which runs a programme including the mobilisation of communities and establishment of neighbourhood based Cooperatives (Co-ops) to develop businesses in the area of waste collection and recycling. The suggested way forward is to focus initiatives around shared sector based interest dealing with issues and/or opportunities whereby the existing organisation infrastructure is leveraged.

On the right end of the spectrum there are Independent Initiatives which may come to fruition after City intervention but will be run by citizens and businesses independent of the City. City actions in this regard focus on creating the platform and right conditions for these initiatives to emerge.

4 Strategic Framework



The strategic framework captures the proposed organisational improvements based on the outcomes of the organisational analysis in Section 3 of this report. The proposed improvements supporting climate change action in the City are of an integrative nature, acknowledging that responding to climate change effectively and sustainably can only be achieved by means of the inclusion of robust organisational components supporting climate change action.

The suggested improvements relate to the organisation components of strategy, structure, systems, style, skills and staff, which were used as a basis for the organisational analysis. In Section 4.1, the proposed improvements have been repositioned in a more mainstream organisational model derived from the Deming cycle (Deming, 1986), an iterative four-step management method used in organisations for the control and continuous improvement of processes and, in this case, service delivery.

The integrated approach is in line with how the City currently deals with other priority areas being implemented via Priority Implementation Plans throughout the organisation and its different departments and entities. Moreover, a substantial advantage of an integrated approach is that one can take the benefits of leveraging existing systems and processes as much as possible, only introducing climate change specific processes if and when required.

4.1 Framework Window

The Climate Change Strategic Framework for the City of Johannesburg aims at providing the City with the strategic principles and 'rules of the game' via which it can realise its Climate Change objectives in an efficient and effective manner. The framework is organised along an organisational improvement cycle including commonly recognised organisational steps from Strategy, Implementation, Verification. To ensure inclusive and structured implementation and operation of the framework additional emphasis is given to communication and interaction along the organisational improvement cycle. The framework therefore contains the following five segments:

- Strategic;
- Implementation;
- Verification and Control;
- Improvement; and
- Communication.

The diagram below presents the framework as a window that encompasses the generic and Climate Change specific activities and undertakings by the CoJ.

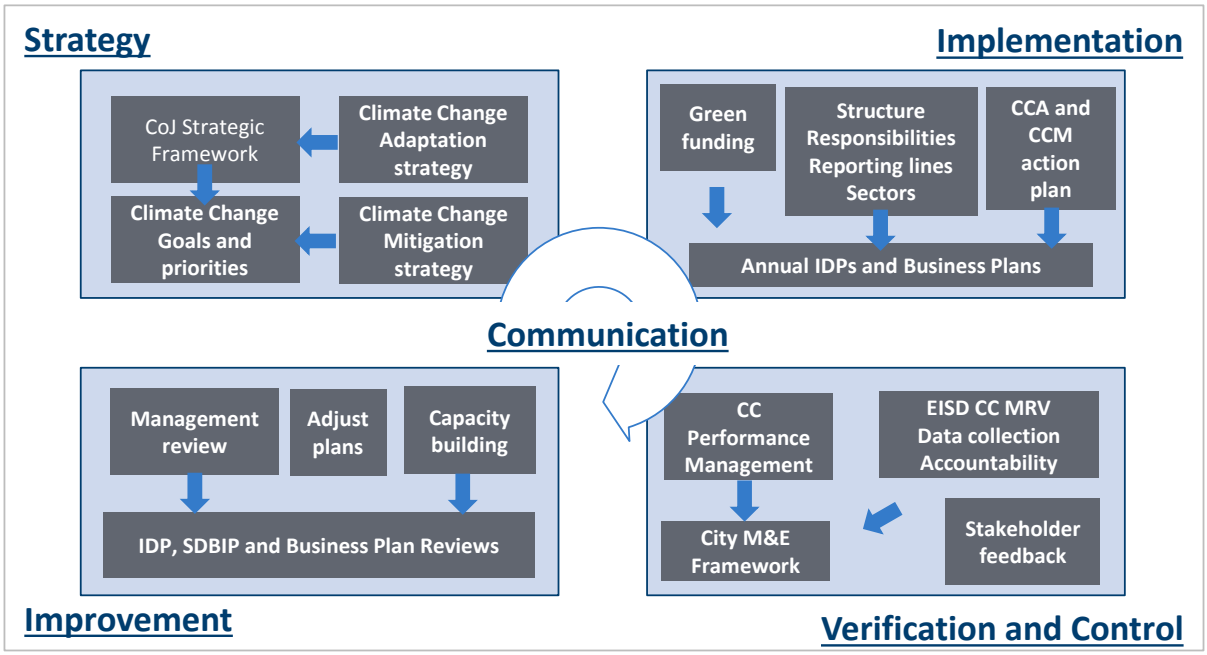
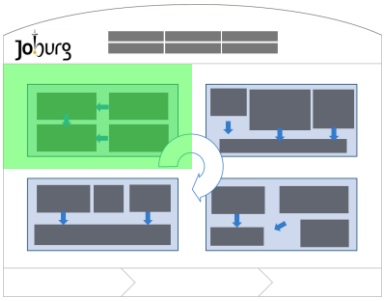


Figure 4.1– The strategic framework gearing the organisation to support climate change action

In the remainder of this chapter the Climate Change Strategic Framework will be described along the five segment. The specific segment at hand is indicated within the overall report structure pictogram.

4.2 Strategy



4.2.1 Alignment of Strategic Processes

Climate Change Adaptation (CCA) and Climate Change Mitigation (CCM) are elements of the overall City strategy and are integrated in core strategic (planning) documents like the GDS and IDP. As such, areas of climate change action as defined in the Adaptation Plan and the ECCSAP (CoJ, 2009 and CoJ, 2012, respectively) have been addressed in the IDP to a large extent. However, it was found that a stronger and more direct link could be established. Especially at a department level, the climate change link is often weakened and the feedback loop reporting on climate change impact is often not established.

It is therefore proposed to further align the climate change specific strategic processes with the overall five-year IDP cycle, ensuring that strategic insights identified in the (updated) climate change strategies, and identified specific actions required to reach the City's climate change goals, can be incorporated in the overall strategy and budget prioritisation.

Planning & Timeframe	Planning Mechanisms
Long term vision and plan (20 – 30 years)	GDS - Growth Development Strategy – Focussed on long term outcomes
Medium term for Mayoral term of office	Mayoral Flagship Programmes for each five year period
Medium term for Mayoral term of office	Five year IDP with cluster specific priorities and plans
Short term - 1 year	IDP - Annual Integrated Development Plan
Short term - 1 year	SDBIP - Service Delivery and Budget Implementation Plan
Short term - 1 year	Annual Business Plans
Short term - 1 year	Individual Scorecards

Figure 4.2 – Planning and timeframe of strategic documents and link to the annual cycle

When updating the Climate Change strategy (to be consolidated from existing) on a five year basis, ensuring that these strategies are completed well before the five year IDP, this would enable the effective incorporation and integration of climate change actions for the mayoral term. From there

on, the climate change strategies and five year IDP can inform the annual Strategic Departmental Business Implementation Plan (SDBIP), Annual Business Plans and Individual Score Cards making climate change action an integral part of the City organisational planning cycle.

The five-year Climate Change Strategy, dubbed CCA and CCM strategy will need to include a long-term perspective, putting short-term and medium-term activities in context with the City's long-term goals and mitigation target as proposed for 2040. In this way, the CCA and CCM strategy will also inform the next update of the Growth Development Strategy (GDS).

4.2.2 Target Setting

In section 2.4 of this report, an aspirational mitigation target range of between 40% and 65% below the 2007 baseline by 2040 is proposed. The aspirational target is an updated target (ECCSAP, 2012) and based on a review of the aspirations as announced by the CoJ's international and domestic peers as well as an analysis of the City's emission trend during the 2007 and 2014 period. This top down target setting approach does not take into account the contribution of current mitigation activities over time nor does it provide insight into future mitigation alternatives and the costs associated with them. The strategic framework therefore proposes a three stage process in which the City moves from the top down approach towards a bottom up target-setting approach, enabling the City to monitor and manage the realisation of its target in a decentralised and costs efficient manner. The following two stages are proposed:

- Develop sector specific targets - Looking at the verified version of the 2014 GHGEI, the current mitigation activities and the development of the City into the future, ICLEI will amend the aspirational target and distribute it within the CoJ's emitting sectors. This analysis will take into account systemic growth of the City's emission resulting from a range of factors such as urbanisation, economic upliftment, etc. This work will be undertaken in the first half of 2016;
- Manage and refine the overall City and sector targets - Via the implementation of an effective emission monitoring and reporting system, the progress towards the realisation of the City's climate change mitigation targets can be realised. The implementation of a number of 'value-for-money based' mitigation prioritisation mechanisms will ensure that the City can identify least costs options for implementation towards the realisation of its targets and thereby manage and realise them a cost efficient manner.

As alluded to in Section 3.1, it is also important to consider that an absolute emission reduction target might not be the most effective and efficient type of target for the City as it could conflict with other priorities within the City. At a later stage in this report, a distinction between an absolute target at City level, in line with the City's partners within the C40, and different types of targets at sector level will be defined.

4.2.3 Activity Prioritisation

As identified during the organisational analysis, both the ECCSAP and Adaptation Plan, most especially the suggested mitigation projects and action plan, would benefit from the introduction of a set of prioritisation mechanisms. Globally, the prioritisation of potential mitigation projects is done according to a so called Marginal Abatement Cost curve (MAC curve), which aims at quantifying the mitigation potential of different activities as well as their costs per tCO_{2e} not emitted. Expanding the climate change adaptation magnitude versus likelihood risk matrix to incorporate the costs to society and the City of the different adaptation measures, can provide the CoJ with a prioritisation mechanism in a similar manner as a MAC curve will do for mitigation measures.

The Marginal Abatement Costs Curve as a Mitigation Prioritisation Mechanism

A MAC curve is defined as a graph that indicates the marginal costs (the costs of the last unit) of emission abatement for varying amounts of emissions. The height of the vertical or y-axis of the graph represents the cost of each of the potential mitigation measures, while the width of the horizontal or x-axis represents the total GHG abatement potential for each option. The principal idea of a MAC curve is that options that appear below the horizontal axis, i.e. the business-as-usual (BAU) baseline, offer the potential for financial savings even after the upfront costs of implementing them have been factored in. These typically include low-cost activities such as behaviour change initiatives and energy efficiency measures. The diagram below provides a simplified example of a city specific MAC curve.

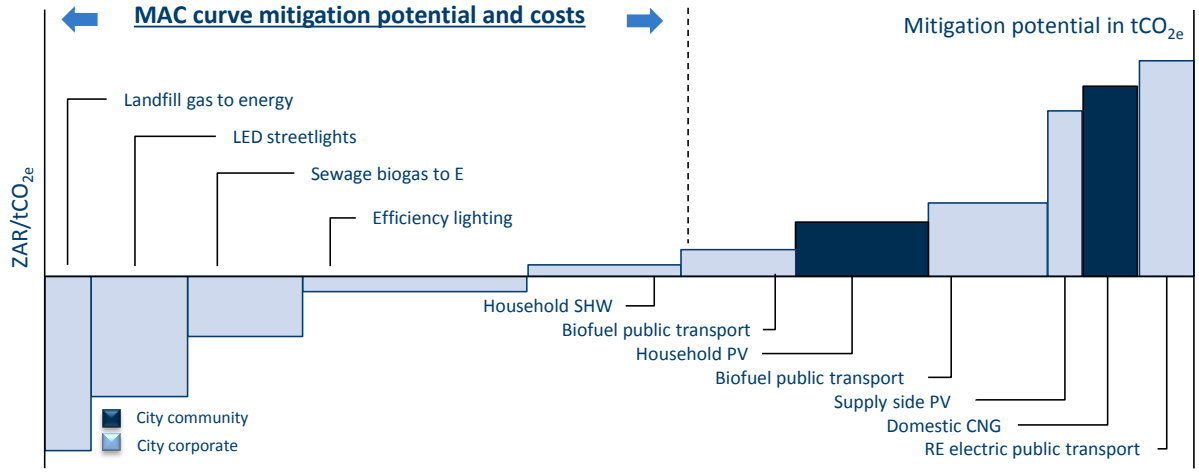


Figure 4.3 – An example of a Marginal Abatement Costs curve

Source: Naucler and Enkvist, 2009 and EcoMetrix Team analysis

How much money an organisation can save, or how much it will have to spend to realise a set mitigation target, is calculated by multiplying the ZAR/tCO_{2e} with the total number of tonnes of CO_{2e}

avoided. The CoJ Strategic Climate Change Framework proposes that a MAC curve is calculated at City wide level and per sector within the City. This will allow the City as a whole to determine what its least costs mitigation options are and how they are distributed across the sectors. This distribution of least cost mitigation options across the different sectors can then inform how the City-wide target can be distributed across the different sectors in the most cost effective manner.

A sector level MAC curve (e.g. transport) would provide the transport department with an overview of its mitigation options and their total potential. Taking into account the systemic emission growth factors (i.e. an increase in the number of cars within the City) and the mitigation contribution of its existing mitigation measures (e.g. Rea Vaya) the transport department can identify the different mitigation measures it still has to implement to realise it's part of the City wide target and schedule the implementation of the measures over time as well as request the appropriate budget allocation to realise these measures over time.

It is important to consider that a MAC curve provides guidance and insight into the mitigation potential and its costs, but as is the case with most statistics, some challenges emerge can emerge when interpreting outputs. Perhaps most importantly, uncertainty exists about the future state of technology. MAC curves are based on known technologies that are currently economically viable or will be in the near future. Yet innovation is an on-going process. Over time, existing technologies will become more efficient and new low-carbon options will be discovered or experimental technologies get elevated to commercially proven technologies. The framework therefore recommends that the City wide and sector MAC curves are developed with a medium (e.g. up to 10 years) and long-term horizon (e.g. up to 30 years).

Community and City adaptation cost based prioritisation mechanism

The Adaptation Strategy for the City contains a magnitude versus likelihood matrix to identify the risk mitigation effect of the different adaptation measures. Although this provides the CoJ with insight into the most pressing events to adapt to and which adaptation measures to apply, it does not prioritise these adaptations according to their cost to society or the City itself. The Strategic framework aims at identifying the costs to the community and the City of the different adaptation measures and plot these into the adaptation magnitude versus likelihood matrix with the aim of providing the City with an adaptation measure implementation prioritisation mechanism as well as (for the City component) costing and budgeting approach. The diagram below provides a schematic overview of this proposed adaptation measure implementation prioritisation mechanism.

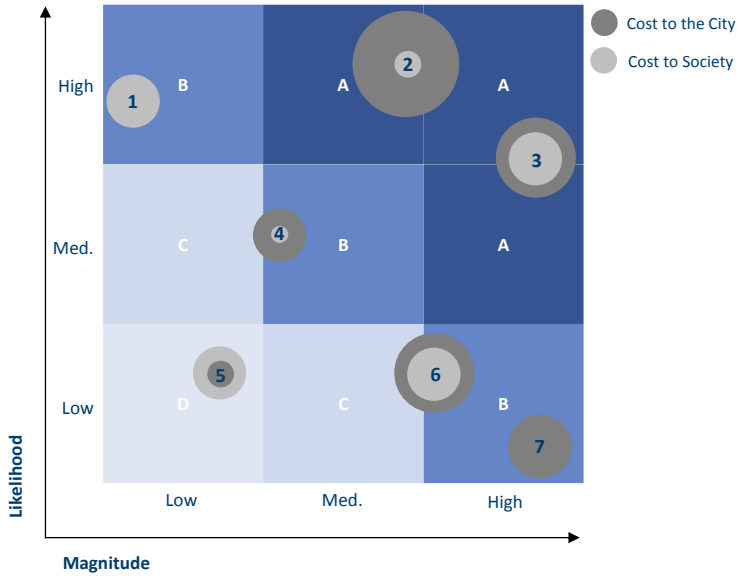


Figure 4.4 – Adaptation measure Community and City costing prioritisation mechanism

For the development of the adaptation measure prioritisation mechanism, a three-stage process is proposed applying the new approach to existing potential and proposed measures:

- Review identified adaptation measures - The CoJ Climate Change Adaptation Plan (2009) and the ECCSAP (2012), contain a number of potential and proposed adaptation measures. To increase and improve on these options at the disposal of the City, it is proposed that the set of potential adaptation measures is reviewed and where needed expanded;
- Determine the cost to society and the City of each potential measure – For each of the adaptation measures an in-depth analysis should be conducted to determine the cost of the measure to by society (most particular the citizens of Johannesburg) and to the City itself;
- Plot adaptation measures costs onto the adaptation magnitude versus likelihood matrix - By overlaying the community and City costs of the different adaptation measures onto the magnitude versus likelihood matrix at the positions where the adaptation measures address the identified climate change risk, a picture emerges. The picture provides an indication as to where the majority of the costs are allocated in relation to where the risk is either most likely to occur and/or the magnitude of the impact it might have is highest.

The inclusion of the society and City costs elements onto the adaptation risk assessment and adaptation measure identification, provides the City with a more comprehensive adaptation measure prioritisation mechanism. However, it is important to consider that the practical prioritisation of the implementation of adaptation measures should also include an assessment of the socio-economic implications of climate change as a whole.

A carbon shadow price

The development of a Marginal Abatement Cost curve will not only provide the City with a mechanism to prioritise its mitigation activities across the different sectors, it will also provide insight into the cost of mitigation of each activity. The CoJ is currently in the process of implementing a new database in which all capital projects are captured. This improved database (superseding SIMS) is based on a set of criteria, these projects are then rated and ranked accordingly. This new database will be rolled out within the organisation in the near future under the name Johannesburg Sustainable Infrastructural Planning (JSIP). The strategic framework is designed to utilise existing CoJ infrastructure as much as possible. It is therefore recommended that a climate change impact criterion is included into the JSIP. When looking at proposed capital projects from a climate change mitigation perspective, three different types can be distinguished:

- Mitigation projects - Where the implementation of a project would result in the reduction of GHG's going into the atmosphere, it is recommended that a criterion is added to the JSIP that attributes a value to the positive climate change impact. The total climate change value could be determined my multiplying the total emission reductions from the project with the mitigation costs in ZAR/tCO_{2e} derived from the MAC curve;
- Carbon Neutral projects - This type of project, by its very nature, would not materially reduce or increase the emissions of GHG within the City. An example of such a project would be an investment into additional medical equipment at a hospital. It is recommended that these types of projects are rated zero under the climate change mitigation impact;
- Emitting projects - Where the implementation of such a project will increase the GHG emissions within the City and thereby move the City's further away from the realisation of its GHGEI reduction targets, it is recommended that a negative monetary value is included in the climate change impact criteria of the JSIP. This value should reflect the 'carbon penalty' that the project carries but does not form part of the project financial assessment and is therefore globally referred to as a shadow price.

Since a shadow price aims at quantifying the carbon costs component of a project, even though these costs are not formally included in the project's financials, there are a number of ways to set a shadow price. This shadow price is then multiplied with the total additional emissions in tCO2e. Commonly, there are three rationales applied to determine a shadow price:

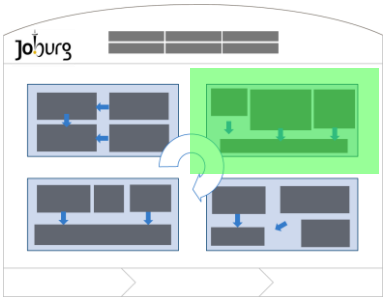
- A cost of adaptation based shadow price - One way of looking at the cost of GHG emissions is by assessing what the future costs of adapting to the climate change resulting from the emission of GHG will be. In 2006 the British government published the 'Stern Review on the Economics of Climate Change' (Stern, 2006), which via a number of iterations, tries to

determine the global costs of adaptation in relation to the cost of the emission of one tonne of CO_{2e};

- A carbon market based shadow price - Globally there are a number of carbon markets that determine the price of one tonne of CO_{2e}. by matching supply and demand of a wide range of carbon credits that are verified under several different standards. A carbon credit (or emission allowance) in essence represents a tonne of CO_{2e}. that is not emitted and thereby represent the right to emit this tonne of CO_{2e}. if purchased on a carbon market;
- A mitigation cost based shadow price - A more direct way of determining a shadow price would be by relating it to the cost of mitigation as determined in the MAC curve. In essence this means that the shadow price applied to an emitting project equals the price related to the costs that need to be incurred to mitigate the additional emissions in an effort to realise the City's GHGEI reduction target.

It is recommended that the City develops a shadow price by apply all three of the rationales and then decides on which shadow price it will apply in the JSIP system. How the change impact criteria will be weight in relation to other criteria within the JSIP is a political decision and therefore falls outside the scope of this report. However, it is recommended that the rating of mitigation and emitting projects is done in an equitable fashion to ensure that proper emphasis is given to the capital investments that fall in the mitigation project category as well as in the emitting project category.

4.3 Implementation



4.3.1 Integrated Citywide Sector Approach

The City desires a citywide sector approach to facilitate engagement on climate change with its citizens and local businesses. As establishing an effective sector-based engagement requires sector expertise, it is proposed to assign responsibilities to the respective relevant departments as per the 'mapping' between sectors and City department and entities presented in Section 3.2 of this report. This would result in assigning leadership in sector based climate change action to the departments as illustrated in the figure below.

Figure 4.5 – Sector and leadership assigned to the relevant departments and city entities

For the sectors 'Buildings' and 'Energy' it is proposed to distinguish between Private/Public Sector and Efficiency/Supply respectively as these different areas per sector link to different departments and entities being the related competent authorities.

The assigned leadership on climate change action per sector would facilitate the required institutionalisation by instating the following leadership responsibilities:

- Defining sector-based climate change adaptation and mitigation targets;
- Planning and implementation of climate change actions in the specific sector;
- Monitoring and reporting on climate change impact;
- Sector based engagement with citizens and business; and
- Championing sector specific climate change action and awareness raising.

The responsibilities as listed above would require skills and capacity which may not be fully available within the respective departments. Departments and City entities would therefore need to take these responsibilities along in their annual assessment of operational capacity and staffing.

The responsibility of leading departments of city entities should however not imposed without any support and overall coordination. It is therefore proposed to further formalise the role of EISD in this regard as described in the following section. With climate change high up the agenda, it also makes sense to put member of the Mayoral committee specifically in charge of the topic. Moreover, department should identify skill development needs to be addressed as described in Section 4.5.3.

4.3.2 Coordinating Role EISD

As described in the previous section and as acknowledged by various departments and entities during the organisational analysis within the context of this study, EISD's coordinating and supporting role will be crucial in order to achieve effective planning, execution and verification of climate change action. Suggested proposed roles and responsibilities are described, per item below.

Planning and Prioritisation – Upfront estimates of climate change impact assist in prioritising climate change action as well as to get an understanding in to what extent targets set will be reached. Although the responsible departments will know best how to assess the generic impact of their actions, in order to assess the climate change angle specifically, departments would need support from EISD. It is nevertheless useful to leave the main responsibility with the department, such that EISD will have to be actively approached in completing this task.

The following measures are therefore proposed:

- Add an obligatory assessment of climate change impact to every budget application – The outcome can be 'no material impact' (e.g. training of personnel), a 'negative impact' (e.g. in case of a new coal fired power plant) or 'positive impact' (e.g. biogas from organic waste).
- Formalise EISD support obligation to departments to assess climate change impact – The department assesses the basic impact, e.g. kWh of renewable energy, while EISD would provide the appropriate tonnes of $CO_{2\text{-}e}$ avoided per kWh to complete the assessment.
- Mandatory check and approval by EISD of the final climate change impact assessment – Having provided the required support to the department in order to finalise the assessment, it would be beneficial to have EISD approving the final assessment result.

Other options could be to allocate the responsibility for assessment of climate change impact fully to EISD. The disadvantage of this is, however, that departments will not benefit from 'learning-by-doing' and build expertise and ownership in this regard.

Monitoring and Data Collection – As EISD currently struggles to get good quality and consistent data, which is required to establish carbon footprints (mitigation) and to monitor progress in the area of adaptation. A formalised process of data collection with a defined climate change dataset could assist in optimising this process.

The following measures are therefore proposed:

- Define 'static datasets for recurrent data for climate change reporting – With regard to adaptation, this for example relates to the water consumption of the different relevant consumer groups.

- Define 'project specific datasets' for new activities – With regard to GHG emissions, this for example relates to the proposed waste incineration project and specific net emissions avoided considering electricity cogeneration, avoided methane and remaining emissions.
- Determine and formalise periodicity of data collection and reporting requirements, as further detailed in Section 4.4.1 of this report.

Verification and Improvement – The assessment of climate change impact is proposed to be performed by EISD in order to centralise the required specialised skills to this end, and to ensure that the appropriate methodologies for assessment are applied consistently. As indicated above, the raw data needs to be collected from the various departments.

For large projects however, for example a flagship project as the Rea Vaya with a positive climate change impact as a key desired outcome, project internal assessment may be preferred in order to enable the project team to optimise the implementation of the project such that the climate change rewards are optimised.

4.3.3 Public Private Engagement (PPE)

The engagement with citizens and local businesses intended to be structured in line with the proposed sector based approach as per Section 4.3.1 would be run by the relevant leading departments in collaboration with EISD. Acknowledging that climate change benefits are not always enough to drive an effective mutual engagement, the City in collaboration with citizens and business could explore what other interests come together which could support and define a 'business case' for specific climate change actions.

Considering the above, the following basic principles to be used in determining the agenda for engagement are proposed:

- Determine potential climate change actions for the relevant sector.
- Determine shared (socio-) economic and financial interests, which in addition to the climate change benefit could drive collaboration for the defined climate change actions.
- Take a reciprocal approach defining what both City and businesses/citizens can bring to the table both from a financial and effort based perspective; and
- Prioritise actions with a strong business case, balancing climate change benefits with other benefits to drive climate change action as well as a good realisation potential taking into account complexity, expected speed and risks related to uptake of the collaboration.

The above principles may be applicable to both citizens and businesses asking themselves 'what is in it for me' although businesses with a natural focus on profitability and revenue generation may have

the strongest need for socio-economic and financial benefits coming along with the climate change action pursued.

The City engages with businesses and citizens in various ways, although climate change action is often not a prominent topic on the agenda. Nevertheless, the City could leverage some of its existing platforms further for engagement on climate change, distinguishing between citizens and business:

- Businesses - The Johannesburg Business Forum could be a good platform to be extended to sector-based initiatives with a relevance to climate change action. This platform is run by the department Economic Development.
- Citizens – JOSHCO and the department Urban Management & Citizens Relationships manage residents' associations and regional task groups respectively. These platforms could potentially also be used for engagement with citizens on climate change action.

With regard to engagement with citizens, the City is aware that there are many other priorities competing with climate change action. A large part of the population deals with issues around basic needs such as a good basic income, food security, education and safety. Many citizens therefore cannot afford the 'luxury' of focussing on other priorities like climate change action, if the co-benefits related to it do not contribute to fulfilling these basic needs.

The city is however, running initiatives which do fulfil these requirements already including:

- Jozi@Work – A flagship programme which includes the creation of green jobs.
- The Green City Start-up – A programme stimulating green entrepreneurship; and
- City food gardens – Growing food at vacant spaces in the City sustainably.

Initiatives like this take into account other drivers for engagement than climate change alone and can be taken as an example in defining further action in collaboration with citizens and businesses.

4.3.4 Programmatic Funding and Financing Approach

Structuring programmes and projects such that these meet the requirements of donors and financiers can be a challenge, but once successful in this, funding and financing opportunities from international sources are generally well available. Also, one of the important requirements of many funders is accountability with respect to impact. The envisaged institutionalisation of climate change action within the City including robust metrics to monitor and verify effectiveness will therefore also contribute to making climate change projects and programmes of the City more attractive to donors.

An opportunity could be the anticipated new commitment under the UN Framework Convention for Climate Change (UNFCCC) for the period 2020 and beyond. For this new period, both industrialised

and developing countries including South Africa will make commitments to reduce their GHG emissions and adapt their countries to soften the impact of climate change. Developing countries can however count on support both financially and technically. The main new fund in the making to channel funding and financing support is the Green Climate Fund.

Key Features

- Concept established in Durban during COP17 in 2011
- Set-up by World Bank but independent board under COP
- More than 10 billion USD currently committed
- Aim to raise USD 100 billion per year by 2020
- Funding will consist of grants and concessional loans

Figure 4.6 – Key features of the Green Climate Fund

The City has been successful in obtaining funding and financing in the past running an extensive urban climate proofing programme with assistance of DANIDA (Mokwena, 2009) and the issuance of a Green Bond in 2014 collecting around ZAR 1.5 billion. International funding becoming available upon a new global climate deal may provide opportunities in both the area of grants (funding) and loans (financing), following a further strengthened programmatic approach with organised central support within the City's organisation.

When organising a more strategic and programmatic approach towards attracting funding and financing, it is proposed to distinguish between grants and loans. Besides the fact that technically grants and loans are of a different nature, the type of donors and the donor requirements are very different as well. As such, the area of expertise required from the side of the applicant, in this case the City, is very different as well.

Grant funding does not require any payback of funding provided. Although projects which could be extrapolated without the help of additional funding are valued, the overall wider socio-economic impact of a project in line with the specific objectives of the donor is generally of much higher importance than any financial return. The engagement with donors is therefore more concentrated on the content and the match between local needs and the objectives of funding programmes available at the side of the donor rather than any financial return.

Finance through loans does require the payback and depending on whether it is a soft loan, the expected return (interest) varies. Sometimes, a loan facility also includes a provision that the loan may be converted into a grant if financial performance of the project over time requires so. In any case, the focus of these type of facilities is on the financial business case and the expected return. Moreover,

the risk appetite may be limited and high socio-economic returns may not be valued when a strong financial business case cannot be established.

Against the foregoing background it is therefore proposed to establish two facilities at the City, one focussed on funding and one on financing.

Climate Change Grant Funding Facility

This proposed facility would take a programmatic approach towards attracting funding, finding matches between the City's needs regarding climate change action and the areas of support donor funding programmes are targeting. When building strong relationships with donors, it may also become possible to, in collaboration with donors, jointly develop funding programmes which for example could be replicated across other cities upon success, or in a certain way are tailor-made funding programmes for the City within the context of a priority area matching with the requirement of a donor. CoJ as a mega city may provide sufficient size and impact in this regard.

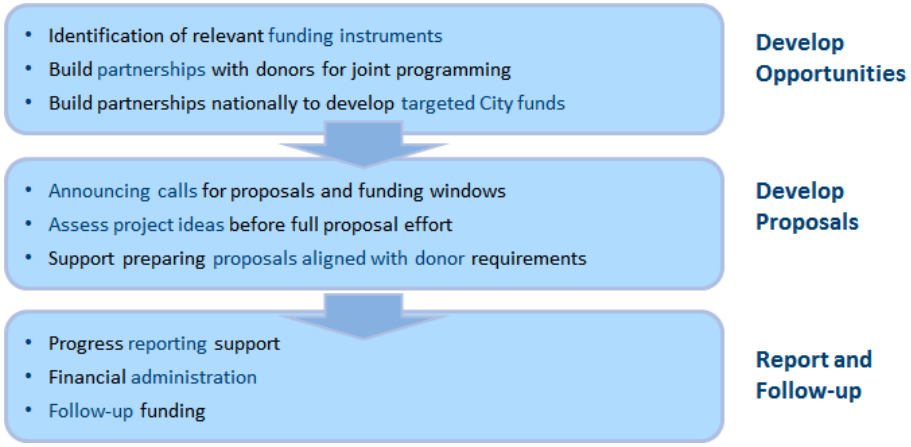


Figure 4.7 – Proposed grant funding facility and support areas

The figure above provides a potential design of such a grant funding facility and the areas of support, starting with the proposed development of opportunities implementing a programmatic approach in collaboration with donors. In addition, making the city departments and entities aware of opportunities and funding mechanisms allows for active participation in obtaining funding. An advantage of a central facility would be to gather expertise on the feasibility of envisaged grant applications centrally and assist in assessing project ideas for grant funding before one embarks on a substantial effort in developing a full application. Finally, yet importantly, a central facility could assist in advising how reporting requirements can be met effectively and when coming at the end of a project one could establish potential follow-up for a next phase if required.

Skills required for this type of facility lie in the area of programming and project development, balancing City and donor requirements as well as general reporting on progress and impact. It may therefore be beneficial to allocate the responsibility for such a facility to EISD, which is already taking a coordinating role with regard to climate change action and its impact.

Climate Change Financing Facility

This proposed facility would focus on (soft) loans which could be used in various ways to promote the uptake of climate change action. Apart from the new Green Climate Fund (GCF), there are various other facilities like for example the Global Environment Facility (GEF) and the African Development Bank's Green Bond Programme and Africa Renewable Energy Fund. Facilities like this are made available to finance, either by loans or equity, climate change adaptation and mitigation-related business initiatives.

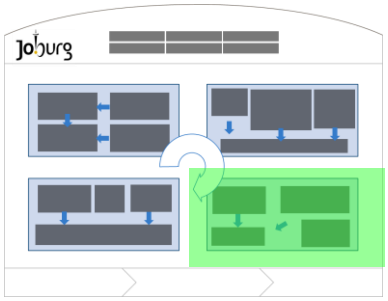
The suggested approach could be similar to the proposed Grant Funding Facility, whereby the City's facility would take action in establishing relationships with financiers and potentially program joint financing instruments to promote the uptake of climate change action in the City. In addition, like with grant funding, one could assist in the assessment of project financing ideas and applications, as well as handling obligations towards financiers once recipients were successful.

Initiatives the City could consider under such facility include:

- Financing schemes for green entrepreneurs;
- Green micro financing schemes;
- Financing of climate change action budget for the City;
- Agricultural drought insurance products; and
- PV solar loan facilities for citizens and businesses.

As can be seen from the examples listed above, these are real financing instruments significantly different in character from grant funding and with a link to green entrepreneurship and business development. The relevant parties with expertise in this area would be Group Finance and the Economic Development department which could take responsibility in running a finance facility.

4.4 Verification and Control



4.4.1 Measurement and Collection of Data

The main bottleneck with the development of any GHGEI is the collection and verification of the data needed to calculate the footprint. The organisational analysis as outlined in chapter three of this report shows that the CoJ is no exception in this regard. The Climate Change Strategic Framework proposes a number of measures to improve and streamline this data collection process and in the process realise a higher data quality and data integrity.

Generically the data required to determine a GHGEI can be divided into three categories:

- Static data - Which consists of more static information resounding the activities and drivers behind GHG emissions (i.e. square metres of government buildings, number of cars and size/number of landfills in operation). This information is critical for the verification of the activity data and provides more detail on the overall footprint which is useful when setting targets and developing and implementing mitigation plans;
- Activity data - Which consists of information outlining the application and consumption of materials and equipment that result in the emission (i.e. fuel consumed, electricity consumed, kilometres travelled and tonnes of waste generated, etc.);
- Emission factor data - Factors which in essence convert the activity data in actual emissions covered in the footprint (e.g. MWh x tCO_{2e}/MWh = tCO_{2e}).

To obtain the information at the initial stage (i.e. the completion of a first footprint) a manual data collection exercise is often conducted. However, a manual process becomes cumbersome if the footprint is periodically renewed with the aim to measure and monitor the results of different mitigation activities. Therefore over time, most organisations implement a GHG monitoring and reporting system to continually collect and report on the GHGEI.

It is recommended that the CoJ develops a data collection template which is managed and maintained by EISD and populated by the different sectors within the City on a quarterly basis. Some of the static data can be obtained from the official key city statistics as published by the Strategic information unit with the office of the City manager. Overtime the City should consider implementing a GHGEI data collection and reporting system to improve the quality and efficiency of the GHGEI reporting cycle. It is essential that someone is put in charge of managing the data collection effort and updating this regularly, which will require appropriate training of personnel.

4.4.2 Monitoring Reporting and Verification

The proposed aspirational target is set for 2040 to align with the timeframe of the GDS. It is recommended that this target is broken down into 5 yearly intermediary targets and that based on the data provided by the different sectors on a quarterly basis, an annual GHGEI is published by EISD for the City. In summary the following monitoring, reporting and target frequencies are proposed:

- Quarterly data collection period;
- Annual GHGEI reporting period;
- Five yearly GHGEI intermediary target period; and
- Overall long term target 2040.

This escalating frequency of the monitoring, reporting and target periods enables the City to identify if it is in the process of realising its interim targets and overall long term-target early on and therefore provides the ability to actively manage the City's emission reduction activities towards the realisation of these targets.

The proposed aspirational target is set as an absolute reduction compared to the 2007 baseline. Effectively this means that every year a GHGEI is published, which can be compared to the 2007 baseline year, to determine the reduction below the 2007 baseline in the direction of the intermediary targets and eventually towards the 2040 target. However, due to the complex nature of developing a GHGEI this comparison has to be conducted within a set of rules to ensure an 'apples and apples' comparison and show recognition of emission reduction activities that are not captured in the methodologies that can be applied to determine a GHGEI. The Framework proposes the following GHGEI principles to ensure this and in the process improve the quality, efficiency and effectiveness of the City's GHGEI:

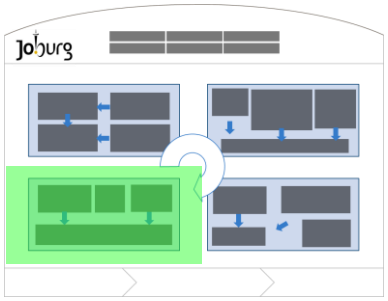
- The same protocol is used every year - For the 2007 baseline year and the 2014 GHGEI the City applied the GPC. The GPC is the global standard when it comes to the determination of the GHGEI for Cities. To ensure that an apple and apple comparison can be made between the different annual City GHGEIs (especially in relation to the 2007 GHGEI) it is recommended that the City consistently applies the same protocol over time;
- Apply the principle of back casting - The development of any GHGEI depends heavily on the availability of information from within and outside of the City. In some cases specific information is not available to be included into a GHGEI and is therefore omitted from the footprint. A good example of this in the case of the CoJ is information on non-technical electricity losses which was not available for the 2007 GHGEI, but only became available for the 2014 GHGEI. If this data was included in the 2014 GHGEI, it no longer becomes possible to compare the 2014 emission with the 2007 emissions. Globally this is addressed by applying the principle of *back casting*, which in essence means that the omitted date that becomes

available after the baseline year GHGEI is also included into the baseline year GHGEI. It is recommended that the CoJ applies this principle for its 2007 GHGEI every time additional information becomes available;

- Report on not-captured mitigation activities in the GHGEI report – Due to the methodology underpinning most of the GHGEI protocols (including the GPC) mitigation activities are not always fully captured within the GHGEI. A good example of this is the solid-waste-related contribution to the GHGEI where the methodology applies an emission factor for each tonne of waste that is landfilled. If, as part of an emission reduction activity, the annual volume to landfill is reduced, the GHGEI reduces in a disproportioned way than would be the case if the methane generated by the landfill is destroyed as part of a landfill gas to energy project. To ensure transparent reporting and provide recognition towards mitigation activities that are not fully reflected in the GHGEI, it is recommended that these activities and their mitigation contribution are reported separately in the annual GHGEI;
- Include carbon credit generation projects into the GHGEI - Mitigation activities that are registered under a carbon credit standard and therefore generate carbon credits for the emission that did not go into the atmosphere are often excluded from a GHGEI. This exclusion is based on the rationale that these carbon credits are at some point down the line sold to an entity that will convert them back into emissions. This rationale, however, does not recognise the different between a GHGEI and an emissions cap. Where a GHGEI represents the actual emissions of an entity, an emissions cap represents the maximum an entity is allowed to emit. Carbon credits therefore do not change a GHGEI they can merely be used to offset the difference between a GHGEI and the emission cap. This is why carbon credits are often referred to as offsets as well as carbon credits. It is recommended that the City does not excluded carbon credit projects from its GHGEI, but that it does report on the quantity of carbon credits generated by its mitigation projects.

In addition to applying the proposed monitoring, reporting and target frequency and the GHGEI principles as outlined above, the GHGEI should be incorporated into the verification processes as they apply for all of the City's activities. To enable a proper and successful verification process, it is proposed that as part of the data collection process all the quarterly data provided by the different sectors is accompanied by clearly defined sources and a person is made responsible for the quality of that information as such. Once a GHGEI has successfully been verified by the City's structures, it is recommended that the annual GHGEI becomes part of the official key City statistics and is published by the Strategic information unit with the office of the City manager.

4.5 Improvement



4.5.1 Climate Change Performance Management

Via its Monitoring and Evaluation Framework (M&E Framework) the CoJ has a functional performance management system that ensures that the organisation's objectives are transferred into measurable performance measures the cascade down the organisational structures. Is indicated in the organisational analysis the M&E framework includes a number of Climate Change related performance measures. However these performance measures are located within the incorrect sector and are not interconnected within the structure M&E Framework. The Climate Change Strategic framework proposes that a set of Key Environmental Indicators (KEIs) are developed that cut across the organisation and are incorporated into each level of the M&E Framework.

As is the case with performance indicators in general the Climate Change Strategic Framework proposes that the KEIs are developed according to the so called S.M.A.R.T. principle which means all KEIs need to be:

- Specific – State exactly what you want to accomplish (Who, What, Where, Why);
- Measurable – How will you demonstrate and evaluate the extent to which the goal has been met?;
- Attainable – stretch and challenging goals within ability to achieve outcome. What is the action-oriented verb?;
- Relevant – How does the goal tie into your key responsibilities? How is it aligned to objectives?; and
- Time measured – Set one or more target dates, the 'by when' to guide your goal to successfully and timely completion (including deadlines, dates and frequency).

In addition to this the KEIs should be designed to be balanced in that they should not only focus on achieving the result but should also include softer elements such as the timely supply of the relevant information to the requesting party. This concept of balanced approach towards performance measures stems from the 'balanced scorecard' as originated by Drs Robert Kaplan and David Norton as a performance measurement framework that added strategic non-financial performance measures to traditional financial metrics to give managers and executives a more 'balanced' view of organizational performance. Following this approach the KEIs should also be balanced between leading indicators and lagging indicators. A very practical explanation of the difference between the two could be that if the objective is to lose weight a lagging indicator would be the number of kilograms that is reflected when you step onto the scale on a weekly basis. A leading indicator (more input oriented) would be the amount of kilojoules that you consume every day (i.e. the amount of

kilojoules consumed every day will have an impact on the number of kilograms reflected on the scale every week).

The Climate Change Strategic Framework proposes that the CoJ develops a set of KEIs that cascade down the organisation from the City's overall climate Change objectives, are balanced in that they include process (i.e. timely and accurate supply of data) and output related indicators and that these indicators are both leading and lagging in nature.

Although the development of an effective and relevant set of KEIs for the City requires thorough investigation and falls outside of the framework (that intends to define the framework within which the KEIs should be developed) itself as such the below provides a theoretical example as to how a string of KEIs could be developed:

- City mitigation KEI – a 65% reduction of the 2007 GHG emissions by 2040 (not to be confused with a real target, but just an illustrative example);
- Transport sector mitigation KEI – a 40% reduction of the 2007 transport sector emissions by 2025;
- Transport sector data process KEI – provide quarterly fuel consumption data for all types of fuel used separated between CoJ used and community use to EISD including the data source(s); and
- Public transport clean fuel KEI – covert 50% of the busses used for public transport to biogas by 2020.

It is important to consider that this is only an example of a balanced KEI structure for on specific emission sector and sub-sector. However it demonstrates the concept of SMART and balanced that is envisaged for the KEIs to be included into the City's M&E Framework and demonstrates the level of involvement of the entire City organisation required to realise the City's climate change objectives and aspirations.

4.5.2 Management Review

Routinely reviewing an organization's targets, processes and systems is necessary to spur continuous improvement and learn from experience. As part of its Monitoring and Evaluation (M&E) Framework, the City of Johannesburg's produces an Integrated Development Plan (IDP) every five years. The IPD "serves as an enabler for mutual accountability on the agreed priorities and allocation of resources to contribute to the long-term development of the municipality" (CoJ, 2012-1) and is updated and reviewed on an annual basis.

It is proposed that climate change targets are made an integral part of this review. Climate change objective that are set in the IDP can be updated with inputs directly from the various Departments. EISD can be consulted to provide feedback on any proposed changes to targets that are being evaluated and requested to assist in evaluating climate change impact. Making the Departments directly accountable for inputs, will reduce the workload on EISD and allocate responsibility to where it belongs: the entities directly responsible for carrying out the mitigation and adaptation activities and initiatives.

4.5.3 Capacity Building: empowerment and skills development

The internal / external analysis indicated that currently knowledge and expertise on climate change within the organization is very limited. It is absolutely essential this is developed further for successful uptake and to motivate meaningful action. Empowerment via training and skills development is a must to build the necessary capacity. In this way, the climate change angle with regard to actions, initiatives and events will also become more explicit each time. The overall objective will be reducing the organization's reliance on insourcing to acquire the necessary knowledge and expertise by building sufficient internal capabilities over time. This will be a long-term process, which should be tackled from several directions:

- A first effort should focus on gathering of relevant news, keeping up with important (international) developments, action plans as well as important research on climate change. To this end, it is necessary to assign an internal EISD taskforce that keeps track of all the main information flows on climate change. The team will be the centre of information and data collection within the Department. It is recommended to keep this in a single database, which can be queried on specific topics, events and studies. The database will serve as a root source for all empowerment & skills development and communication activities of the City. To create and maintain the database, several sources will have to be consulted at regular intervals (daily, weekly, monthly), in order to capture all the relevant information out there (e.g. Carbon Pulse, Point Carbon, UNFCCC, UN Habitat, C40, Urban Climate Change Research Network, Yale Project on Climate Change communication and so forth).
- Secondly, organise routine training and skills development sessions at the Johannesburg Innovation and Knowledge Exchange (JIKE) on various climate change themes and activities within the City to stimulate knowledge sharing. The success of this channel will partly depend on the success of JIKE more generally as a tool to build capacity among City employees. Training and skills development can be either general or more targeted, depending on the audience and objective:
    - Generic training and skills development programs should address questions such as:
        - What is climate change and its impact? What can we do about it?

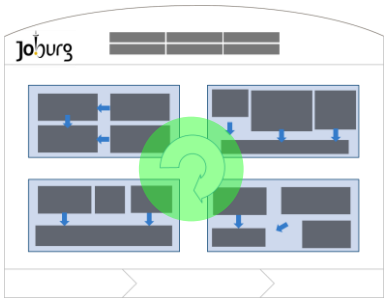
- What are the City's climate change objectives and strategy?
- How do the climate change adaptation and mitigation plans fit into the picture?
- What does the City's monitoring and verification process look like?
- How are the sectors and champions organised (with regard to the latter, see below under Section 4.6.1.)

- Specific training and skills development programs deal with topics that are relevant to a particular Sector or Department. They can provide more elaborate and in-depth insights as to a particular subject, issue or area of expertise.

- Thirdly, send out EISD teams to hold regular presentations on suitable occasions throughout the Citi's Departments and Groups in order to create awareness and develop skills. This effort should start basic, but the materials should be developed so that it gradually becomes more complex and targeted on repeat visits. Talk about the issues, actions, what can be done further, what is expected of departments and why it is urgent to act. Furthermore, make the link between the various initiatives with climate change explicit where this is not yet the case.

In summary, the above proposed outline will ensure that the organization has up-to-date and accurate information at its disposal for capacity building. Secondly, it will provide a platform where City employees can go to acquire the required skills, whether through general or more specific trainings. Lastly, it provides a mechanism by which EISD goes to the various Departments and Groups to impart the necessary knowledge and expertise.

4.6 Communication



Good communication is essential for any strategy, plan or indeed overall organizational performance. With regard to the climate change strategic framework at hand, communication touches on all processes of the City. It will enable strategy development, implementation of adaptation and mitigation plans, monitoring and verification, capacity building, help motivate action and much more. For this reason, communication is at the centre of the framework. It involves external stakeholders like citizens and business, and internal stakeholders such as city employees, and comes in various forms and shapes.

This makes it a very broad-ranging subject. In this section, as in the rest of the report, we will therefore necessarily restrict ourselves to outlining an overall framework for effective climate change communication. This involves options, guidelines and a high-level path forward.

The internal and external analysis highlighted that the City is currently strong on reporting on specific climate change events and successes achieved, such as the C40 Cities Leadership Summit organised in 2014 in Sandton. It should be the aim to make this communication more strategic, continuous and broad-based, in order to reach a larger target audience, create awareness and trigger more meaningful action. This means following fully through on the City's communication effort, to mobilise citizens and businesses, and motivate employees alike. To this end, the following approach is proposed.

4.6.1 Mobilizing citizens and business

A crucial aspect in tackling climate change is mobilizing citizens and business to care about and act against it. Besides the various conventional policy options available to government (i.e. taxes, subsidies and regulation), it is important to instil a sense of urgency and change behaviour that way. Self-motivated actors are a powerful force in the effort to act against global warming, and may even be more effective than in any other area of government intervention.

One important reason is that climate change is a global issue. This may restrict the effectiveness of conventional policy tools, which absence international cooperation and coordination, are mostly limited to a country's borders. A second reason is that the mandate to implement such measures often lies with central levels of government. This reduces the capacity of decentralised or local authorities to act and therefore their need to explore alternatives. Good communication to induce behavioural change has proven a very potent tool in this regard.

There are various communication channels available that cater to different audiences, with pros and cons associated to them. In line with the overall report focus, a sector-based communication approach is recommended (i.e. buildings, energy, health, transport, waste and water) with inputs from the various departments in the City. This will streamline information delivery and focus the effort. Moreover, due to differentiated needs, it is proposed to distinguish between two main audiences: citizens and with business.

The main thrust of the City's communication effort should come from two dedicated websites that provide ongoing and strategic communication to these two target groups. Other communication channels are necessary for website traffic generation and to ensure additional engagement and exposure. The latter can be organised on a more ad hoc or event-driven basis.

Reaching citizens

A good website is everything nowadays. The Internet is famous for its reach, richness and affiliation and as such an excellent modern communication tool. Reach, richness and affiliation are three characteristics of information that together with disruptive internet technologies can have a major impact (Evans and Wurster, 1997):

- Reach – refers to the number of people one can potentially interact with. The Internet has drastically increased the number of actors one can connect with, nationally and internationally, at low cost, making content readily available through search engines.
- Richness – is a characteristic of the information itself. Websites contain more detailed information in a richer format about subjects, events, actions and for example products and services. This enables more interactivity and customization to engage with citizens and business. It can also be easily kept up to date.
- Affiliation – focusses on the effectiveness of relations with partners. If done right, more and deeper links are possible though online communication, generating higher affinity and influence then before with traditional tools.

When it comes to communicating climate change to citizens, a dedicated City website has several objectives. The website should clearly communicate the City's green agenda, report on news and events, outline specific actions citizens can take, but also open up a dialogue with citizens. The following general goals for a City website can be set as guidelines for its design:

1. Raise awareness of climate change generally and more specifically with regard to the climate change issues in the relevant sectors;
2. Incite climate action among the public and trigger collaboration with the City;
3. Advice on choices and trade-offs implicit in doing something about the issue; and
4. Report on progress and successes achieved to show that meaningful action leads to results.

As indicated, it is recommended these objectives follow a sector-based approach. Sector-based communication provides an appropriate division of climate change-related issues, in a way that is generally comprehensible to the public. Waste handling, water management, energy saving, health concerns, transportation trade-offs and housing are all issues citizens confront in their daily lives and routines. Linking this to climate therefore makes sense. Examples of initiatives that can be promoted on a website are composting and recycling tips, cycling and walking initiatives, energy-saving measures in the home and so forth.

Any external communication will have to take place in close cooperation with Group Communications. The latter has the existing infrastructure, knowledge and expertise to communicate effectively to the public on all the relevant issues.

From an organizational perspective, two questions will need to be addressed:

1. Who is responsible for feeding the relevant inputs and information to Group Communications; and
2. If not EISD, what role will they take on in facilitating this information exchange, if any?

Because Departments within the City's organization will have the most (up-to-date) climate change-related information regarding the sector they are in, it is proposed that the principal responsibility for sourcing information lies with the Departments. In theory, two models for organization can be designed to make this work.

The first model envisages EISD as a coordinator with regard to the information exchange between Departments and Group Communications. In this model, the information is sent by the Departments directly to Group Communications. EISD will have a coordinating role. It might direct Departments to relevant sources or admonish them if nothing is submitted, but will stay on the side lines otherwise. In the second set up, EISD will function as an intermediary or go-between Departments and Group Communications. Hence, it will receive all information, review and pass it on.

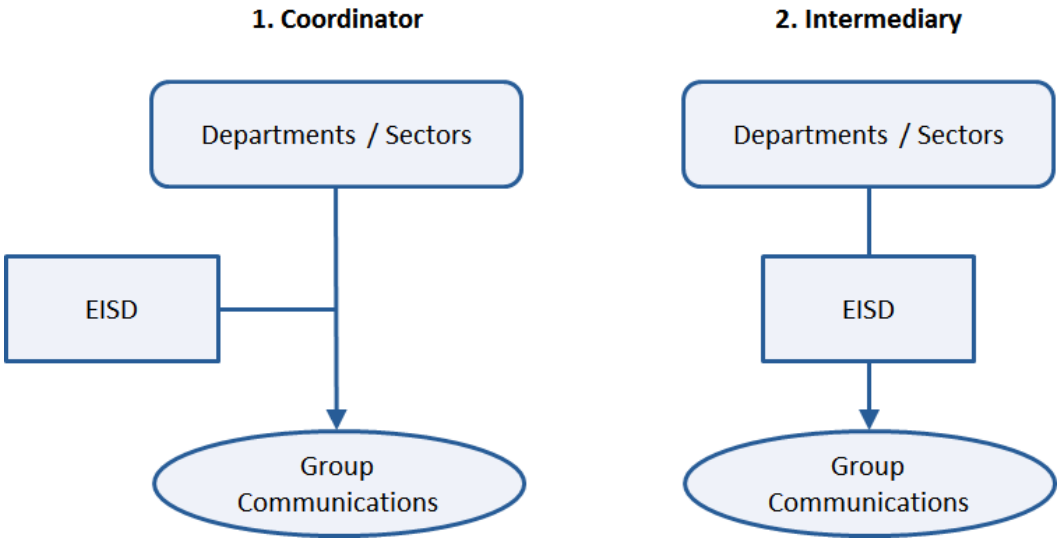


Figure 4.8 – Potential roles of EISD with regard to information exchange for communications

With the second approach, EISD would have more direct control over the process; however, a number of factors most likely make the first approach more optimal in the longer term. By having department directly feed the relevant inputs to Group Communications, they become solely responsible. A system of KPIs can be used to evaluate outcomes. Decentralizing responsibility this way, would also significantly reduce the workload on EISD, while marginally increasing it for each individual

department. Hence, this approach of having EISD as a coordinator is recommended to structure the information flow as input for external communication.

Other communication channel can and should be used as a back up to generate traffic to the website and raise awareness in case of specific events and actions. This set up provides a powerful mix of communication tools that provide both ongoing and periodic communication to inform citizens. Table outlines a range of options with different reach, targeting and costs associated to them. Below we will outline a number of them briefly. However, details should be worked out in separate comprehensive communication plan, which is to be defined in close cooperation with Group Communications. It is recommended to start the communication effort soon, and refine upon completion of the stakeholder engagement at a later stage in the process (for the proposed timeline, see below Chapter 5 - Roadmap).

Table 4.1 - Channels to communicate climate change

	Mass		Differentiated		Targeted	
TV, Radio, Newspapers						
Website						
Email						
Social media						
SMS / Web chats						
Telephone						
Climate rapid response team						
Community engagement						

A first interesting option to complement the website are social media like Facebook and Twitter. These media are capable of reaching large audiences, sometimes in a highly targeted manner. The city already has a very active Facebook and Twitter account to engage on general issues. For example, Group Communications reported that its Facebook policy is to provide several updates on a daily basis. At the moment, it is the most visited page of cities in South Africa. Twitter is used to deal with residents' queries and complaints, and broadcast information. In 2015, it had almost 110,000 followers.[6] This opportunity is largely free of cost and should be used to communicate climate change as well.

[6] http://mg.co.za/article/2015-07-16-tweeting-tumelo-komape-puts-himself-in-your-shoes

A green blog can be developed with regular posts and more elaborate pieces and information, with an update at regular intervals (see the C40 website for a good example). The responsibility for keeping the blog up to date will lie with EISD, with part of the contents being generated through inputs from the Departments as part of the general information flow on climate change (as detailed above). The blog can be part of the City's dedicated website, or a separate effort with a link from the website. To keep the source of all climate change information centralised, the first is likely to be the best option.

TV, radio and newspapers will be seen, heard or read by everyone with access. It can also be costly to advertise and get the positive news out (negative news will be covered), so there needs to be budget. Nonetheless, these media are capable of reaching large audiences at the same time, even more so than a website, where people have to actively go to get the information. This option should be interesting in case of specific events and activities.

A system of SMS alerts can be highly targeted, especially in case of calamities or emergencies. For example, such a system could be part of an adaptation strategy to warn against flash floods or acute outbreak of a climate change-related disease. However, it would presumably also require people to register with the service, so it is uncertain whether this will have a high overall effectiveness in reaching people.

Another interesting option as a communication tool would be to set up a Climate Science Rapid Response Team as a facility for journalists and policymakers to get access to expert scientists and consultants on climate change issues. Such initiatives have already been explored internationally[7]. It would provide highly targeted inputs from academia and other experts for policymakers and journalists with complex problems or questions they need to take decisions or want to report on.

Finally, but no less important, is direct community engagement to activate and empower citizens through a "boots-on-the-ground" approach. Group Citizens Relations & Urban Management, which is organised along the City's regional structure, already actively engages with citizens this way. Because regions have different needs and priorities, this enables engagement on climate change with citizens on general issues, but also on issues relevant to their residential areas. In addition, the Department of Community Development would be able to facilitate a similar process through its sports facilities and libraries, and Social Development via its agri forums and resource centers. With each subsequent alternative, the communication can be tailored more specifically to the situation. EISD would be responsible for providing the relevant inputs.

Communication to facilitate engagement with business

[7] http://talkingclimate.org/guides/resources-for-communicating-climate-change/

It is proposed to create a separate dedicated website for sector-based communication with business, which is generally of a different nature than that with citizens. In practice, business generally takes a quid pro quo stance. Often there is a lot of enthusiasm, until true commitments need to be made. Interestingly, in Paris, where one follows a similar approach of two dedicated websites, it took four years to get good uptake of the website aimed at citizens, while the process for business spanned around ten years.

As detailed earlier in this report, engagement will require identifying economic drivers and setting the incentives right. For this reason, communication should revolve around forming lasting partnerships with the business community. Among other things, the website should showcase these partnerships to trigger further participation, cover news on topical issues with a commercial angle, and offer guidance and advice for getting tech and financial support. Green delivery services, including those procured through the private sector, can also be communicated through the website. As such, communication with business should support ongoing two-way traffic on relevant topics. Important is not only to communicate what the City is doing, but also what business is undertaking and this way trigger further engagement and action.

Other channels that can be developed to disseminate information are gaining (periodic) access to corporate stakeholder intranets and employee email lists. This will require a proactive stance from EISD and the City, for example, by regularly calling or meeting with external stakeholders to get their support. Whether this is possible, will in part depend on getting business onboard by setting the appropriate incentives as discussed. One very important benefit or primary driver for business to cooperate would be mayoral involvement, so as to be able to communicate their own agenda and influence policy. A first step in this direction should an external stakeholder mapping and align this with the existing green agenda of the City.

4.6.2 Lead and Inspire: Create a network of champions

The City benefits greatly from the Mayor being a strong champion, advocating climate change action on a local and international level. As to the internal communication effort, the above outline on external communication should be complemented by additional champions and supporters throughout the entire organization. The core task of the network is communicating climate change to all ranks and levels within the organization, raising additional awareness and motivating employees to take action. The ultimate goal of the network would be moving the organization towards a model of intrinsic motivation to work on the problem at hand. Self-motivated employees are more likely to take issues seriously, work together and come up with creative solutions.

The envisioned network will involve committed people from all Departments and sectors. It should be open to all people with sufficient knowledge and a sincere interest in climate change. However, to

keep it effective, the network should include no more than a few people per entity, depending on size and significance. In this way, a more or less exclusive character is retained, with the benefit of keeping the effort focused and the level of expertise high. To set up the network, EISD will have to identify potential candidates and see if they are willing to be part of the network.

The champions should receive regular (email) updates from EISD with relevant climate change information. They can also develop activities among themselves to stay on top of the issue. These inputs are used as a basis to inform and motivate employees throughout the City's echelons. Champions are in turn responsible for feeding information to the Group Communication on issues relevant to their Departments for external communication purpose, as outlined in Figure 4.8 above, where EISD has a coordinating role. The overall process as proposed is graphically represented in Figure 4.9 below.

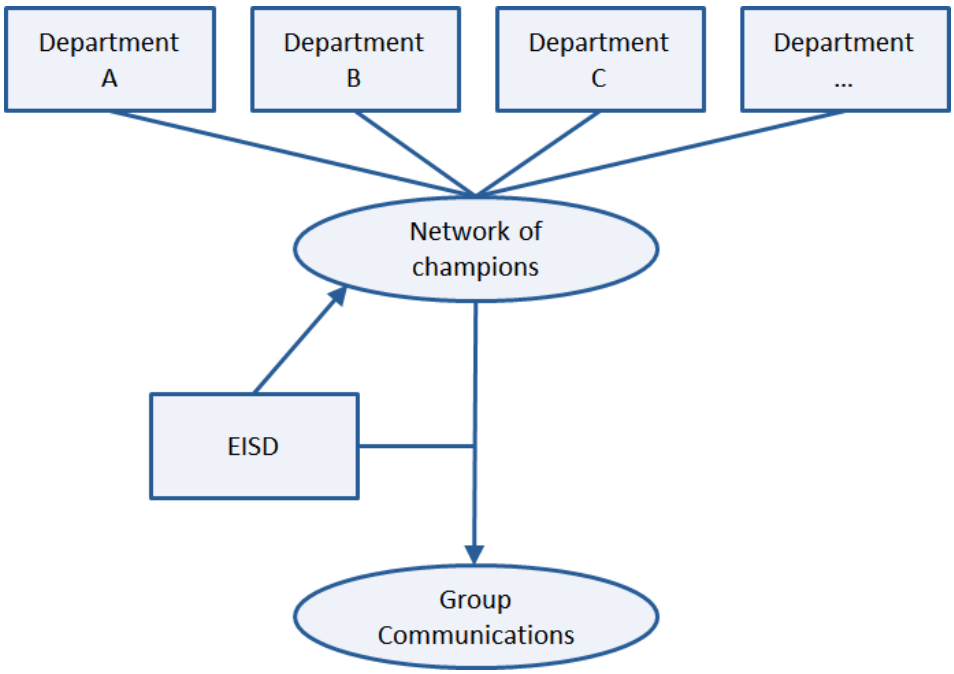
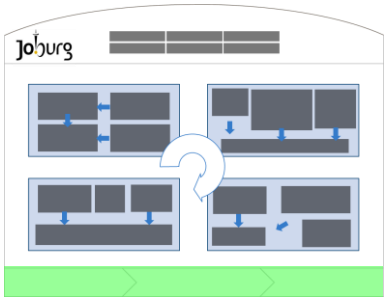


Figure 4.9 - Information flow for internal and external communication purposes

5 Roadmap



5.1 Overall Plan and Timelines

The proposed framework is aimed at making climate change action an integral part of the organisation, bringing in place the core supporting mechanisms for climate change action and where necessary empowering the City realising its increased ambitions in responding to climate change.

The proposed measures take time to implement and require careful planning. As such, a high level roadmap has been defined as part of this framework, prioritising the most important measures first, and working forward from there towards the full implementation of a renewed integrated climate change strategy by June 2018. This milestone is realised by the budget approval of new climate change adaptation and mitigation activities resulting from the implementation of the Climate Change Strategic frameworks in line with a new integrated climate change strategy.

The main roadmap milestones and timing thereof are presented in the figure below, followed by a description of each milestone and the logic behind the timing.

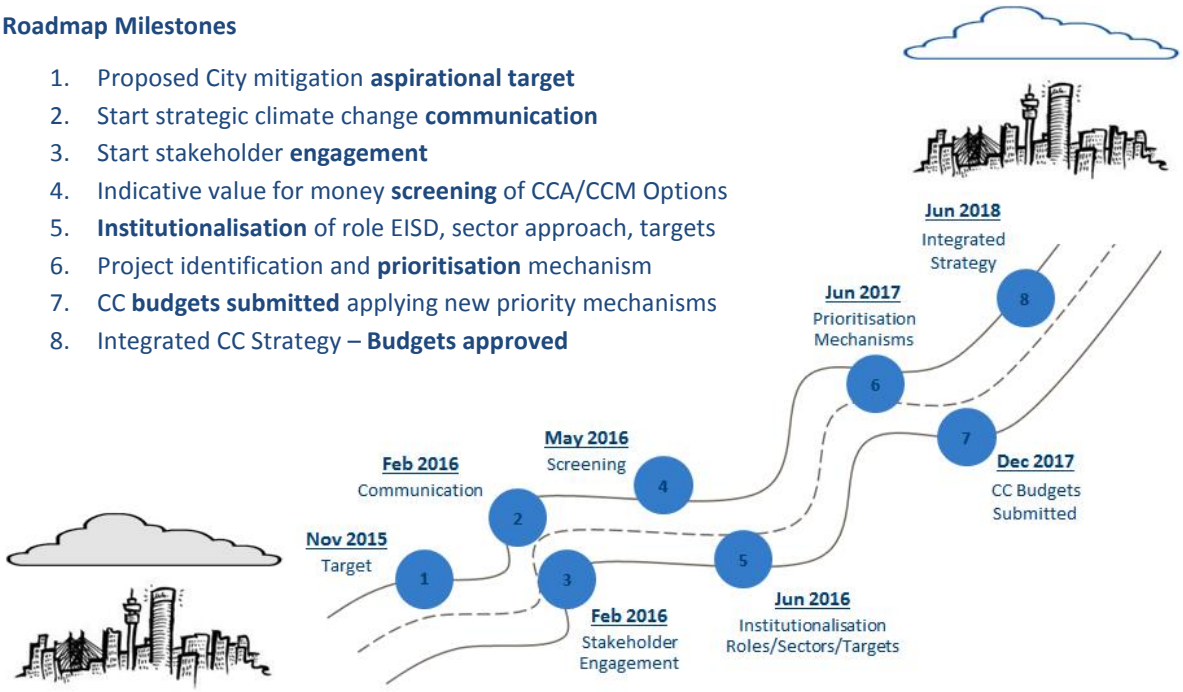
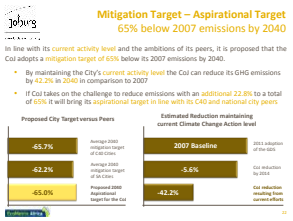


Figure 5.1 - CCSF roadmap towards an integrated climate change strategy

5.2 Main Actions and Milestones

The action pan as outlined below takes cognisance of short-term actions related to the window of opportunity ahead linking adaptation and mitigation strategies and action plans with the start of the next five year IDP planning cycle. The pictograms provided next to each milestone stems from the PowerPoint presentation, as is included as annex 1 into this report.

5.2.1 Aspirational targets



To drive climate change leadership and to be compliant with the City's C40 commitments, a City wide 2040 aspirational target should be adopted in October 2015 to be presented at CoP 21 in Paris in December 2015. The proposed aspirational mitigation reduction target range of between 40% and 65% below the 2007 baseline by 2040 is based on a review of the ambitions as set by the City's international and domestic peers as well as an analysis of the current emission reduction profile as derived from the 2007 and 2014 GHGEI, together with the target as contained in the ECCSAP.

It is important to ensure that the aspirational target range is presented as an aspirational target, which will be refined and made sector specific during future stages of the implementation of the framework.

Start date: September 2015.
Completion date: November 2015.

5.2.2 Strategic Climate Change Communication

The City's external communication effort should start sooner rather than later to get citizens and business on-board from the beginning. This will enable the City to communicate the green agenda from the start, build the necessary support and to strategically report on progress made over time. The same applies to its internal communication effort via the network of champions.

Two dedicated websites will have to be developed. Identify a team of developers no later than February 2016 and aim for a development period of 3 to 4 months. During this period, the required website content has to be made available to the team by EISD. At the same time, the network of champions will have to be formed and informed. Parallel to this effort, start working on a separate, comprehensive communication plan in February, 2016. For this, the procurement process will have to start by the end of this year.
Start date: February 2016.

Completion date: Ongoing, but websites should be up and running by June 2016. By this time, the network of champions should also have been identified and briefed. Refine the communication plan upon completion of the stakeholder engagement.

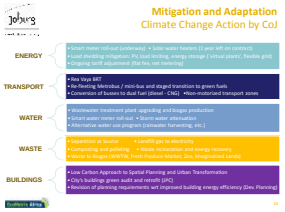
5.2.3 Stakeholder Engagement

In line with a sector-based approach, a renewed stakeholder engagement process will be started up aimed at programming initiatives in collaboration with citizens and business around interests, balancing climate change with (socio-) economic and financial interests. This process will be started in February 2016 in order to inform the refinement of targets, sector programming and related actions.

Moreover, it is envisaged that the City can get an early indication of what type of actions could potentially be implemented in collaboration with citizens and business. This process will be ongoing and will ultimately result in potential joint firm commitments with business when planning for the next budget cycle in December 2017.

Start date: February 2015.
Completion date: Ongoing but firm engagement commitments foreseen by Dec 2017.

5.2.4 Screening of CCA/CCM Options



During the screening of CCA/CCM options, the mitigation and adaptation options currently identified by the City will be reviewed and extended. Once an overview of the options at the disposal of the City has been finalised, the options will be made sector specific. These sector specific adaptation and mitigation options will be used by the City as a whole and the individual sectors to identify the level of influence and control they have to realise its Climate Change ambitions over time.

The screening stage is estimated to take up to three months to complete and should be completed and fully internalised by the different City sectors before a refinement of the City's overall aspirational target can be conducted or individual sector targets can be assigned;

Start date: March 2015.
Completion date: May 2015.

5.2.5 Institutionalisation

In order to further strengthen climate change action within the City, one of the first action should be the formalisation or institutionalisation of the coordinating role of EISD and delegate climate change related responsibilities to the departments.

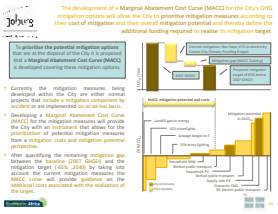
Looking at the 2014 Carbon footprint, the current mitigation activities and the development of the City into the future, ICLEI will amend the aspirational target and distribute it within the CoJ's emitting sectors. This activity should be conducted after the adoption of the Aspirational target by the City to identify the potential gap between the aspirational target and the forecasted emissions by 2040 in relation to the baseline emissions in 2007.

It is proposed to start the institutionalisation and formalisation of roles, sector responsibilities and targets immediately after adoption of the CCSF and to have completed the institutionalisation process by June 2016 at the start of the next annual cycle.

Start date: Upon adoption of the CCSF and its recommendations.
Completion date: June 2016.

5.2.6 Identification and Prioritisation Mechanism

After the institutionalisation of the Climate Change roles and responsibilities across the different sectors within the City and the adoption of sector specific mitigation targets by the sectors that can exercise control over the development of these emissions over time, the mitigation and adaptation prioritisation mechanisms should be developed.



The prioritisation mechanisms will utilise the potential options as identified during the screening stage as the primary inputs from which the costs implications relating to closing the gap between the City's aspirational target in the case of mitigation and the City's emissions profile by 2040, as determined during the Institutionalisation stage.

Start date: March 2016.
Completion date: June 2016.

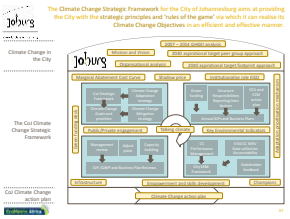
5.2.7 Climate Change Budgets submitted

Once the prioritisation mechanisms have informed the City's overall and sector specific implementation planning of both the adaptation and mitigation activities, the costs implications related to this planning can be incorporated into the City's overall budgeting cycle. The information provided by the prioritisation mechanisms can be enhanced by the information from the JSIPs on the projects that carry a material additional carbon penalty as reflected from the shadow price and additional volume of tonnes of CO_{2e} emitted by such projects.

It is important to consider that the primary dependency of this milestone does not lie within the implementation process of the Climate Change Strategic Framework but directly in the City's overall budgeting and planning processes and cycles.

Start date: July 2016.
Completion date: December 2017.

5.2.8 Integrated Strategy



The Climate Change Strategic Framework for the CoJ aims at providing structure and coordination to the City's climate change activities by introducing a systematic approach towards the realisation of it climate change objectives. The Framework tries to achieve this via the introduction of a set of rules, principles and mechanisms for the benefit of the City. When in December 2017 the costs of both mitigation and adaptation activities are included into the City's operational and financial planning system as a result of the implementation of the Climate Change strategy, its objective of integrating the City's climate change activities has been realised.

Start date: December 2017.
Completion date: July 2018.

6 References

C40, 2014. *Global Aggregation of City Climate Commitment*.

Carbonn, 2015. *Carbonn Climate Registry*. Available at: http://carbonn.org/data/report.

City Power Johannesburg, 2015. *Updated Business Plan 2015 – 2017, Draft 3,* Reuven, Johannesburg.

CoJ, 2007. *Climate Change Vulnerability Assessment Study for the City of Johannesburg.* Unpublished manuscript informing the climate change adaptation strategy.

CoJ, 2009. *Climate Change Adaptation Plan.* Phalatse, L. and Gwata, M. Johannesburg.

CoJ, 2011-2. *Joburg 2040 – Growth and Development Strategy*. ISBN 978-0-620-51782-9. Compiled by the Central Strategy Unit Office of the Executive Mayor, City of Johannesburg.

CoJ, 2012-1. *2012/16 Integrated Development Plan (IDP) "Committing to a promising future"*. City of Johannesburg

CoJ, 2012-2. *Greenhouse Gas Emissions Inventory for the City of Johannesburg 2007*, Siemens, the C40 Measurement & Planning initiative.

CoJ, 2012-3. *Johannesburg Energy and Climate Change Strategy & Action Plan (ECCSAP)*. Compiled in March 2011 and approved in May 2012. Johannesburg, South Africa.

CoJ, 2015-1. *2015 Budget Speech – Tomorrow will be better than today.* Speech by councillor Geoffrey Makhubo, member of the mayoral committee. May 2015. Sandton.

CoJ, 2015-2. *Greenhouse Gas Emissions Inventory For the City of Johannesburg 2014*, ICLEI, Unpublished until completion of C40 verification process.

CoJ, 2015-3. *2015/16 Institutional Service Delivery and Budget Implementation Plan (SDBIP).* City of Johannesburg, July 2015.

CoJ, 2015-4. *2012/16 Integrated Development Plan – Turning Challenges into Opportunities – 2015/16 Review.* City of Johannesburg.

CoP 15, 2009. *Copenhagen Climate Change Conference*. Copenhagen.

DEAT, 2004. *A National Climate Change Response Strategy for South Africa*. Department of Environmental Affairs and Tourism

DEAT, 2007. *Long Term Mitigation Scenarios – Strategic Options for South Africa.* Department of Environment Affairs and Tourism, Pretoria, October 2007

Deming, W. Edwards, 1986. *Out of the Crisis. MIT Center for Advanced Engineering Study*. ISBN 0-911379-01-0. Cambridge, USA.

DLGH, 2010. *Gauteng Integrated Energy Strategy*. Department of Local Government and Housing. Marshalltown, Johannesburg.

DME, 2005. *Energy Efficiency Strategy of the Republic of South Africa*. Department of Minerals and Energy, Pretoria.

Evans P. and Wurster T.S., 1997. *Strategy and the New Economics of Information*. Harvard Business Review.

Françoise, Y. 2015. Review of the '*Internal and external analysis section of the draft Strategic Climate Change Framework*'. City of Johannesburg, Not published.

GDARD, 2012. *Gauteng Climate Change Response Strategy and Action Plan*. Gauteng Department of Agriculture & Rural Development.

Mokwena, L. 2009. *Municipal Responses to Climate Change in South Africa - The case of eThekwini, the City of Cape Town, and the City of Johannesburg*. Centre for Policy Studies, Johannesburg.

Mushayanyama, T. 2015. *City of Johannesburg official key statistics.* Strategic Information Unit, Office of the City manager. Johannesburg.

Naucler, T. and P. A. Enkvist 2009, *Pathway to a Low-Carbon Economy – Version 2* of the Global Greenhouse Gas Abatement Cost Curve. McKinsey & Company.

NCCRP, 2011. *National Climate Change Response White Paper*. South African Government

NDP, 2012. *National Development Plan 2030*. South African Government

Statistics South Africa, 2012. *Census 2011. Stats SA publications Statistical release – P0301.4.* Statistics South Africa. Pretoria.

Stern, N. 2006. *The Economics of Climate Change*. Stern Review.

Waterman, R.H. et al., 1980. *Structure is not Organisation*. Business Horizons. The Journal of the Kelley School of Business, Indiana University.