LAGOS CLIMATE ACTION PLAN

Second Five-Year Plan 2020 – 2025

LAGOS STATE GOVERNMENT

SECOND FIVE YEAR CLIMATE ACTION PLAN 2020 - 2025

MINISTRY OF ENVIRONMENT AND WATER RESOURCES

SUPPORTED BY :

C40 CITIES CLIMATE LEADERSHIP GROUP

On behalf of Federal Ministry for the Environment, Nature Conservation and Nuclear Safety of the Federal Republic of Germany

UNDP

RICARDO

Ricardo Energy & Environment

SEA SUSTAINABLE ENERGY AFRICA

Table of Contents

Contents

GOVERNOR'S FOREWORD

Climate change and its adverse effects form the gravest environmental threat the world is currently facing. As a highly vulnerable coastal state with a growing population, Lagos State must act to mitigate the impacts of climate change and protect its fragile ecosystems and populations in low-lying areas.

It is against this background that Lagos State signed up to the C40 Cities Climate Leadership Groups' Deadline 2020 programme in 2018. Under this programme, Lagos joined C40 Cities around the world in committing to the development and implementation of an inclusive and ambitious Climate Action Plan (CAP) in line with the goals of the Paris Agreement, that will result in a zero-carbon Lagos by year 2050.

Prior to its current work with C40, Lagos had developed a Climate Change Policy and Action Plan with support from United Nations Development Program (UNDP). As part of its CAP Programme, C40 Cities provided significant technical expertise to align the previously developed Climate Action Plan with the ambitions of the Paris Agreement to limit the global average temperature increase to below 1.50C. The Lagos State CAP, which I am proud to be associated with, has been produced to assist Lagos State in tackling its climate change challenges. This document was produced by Lagos State officials with support from C40 Cities and its team of international consultants, through a rigorous and painstaking research and data gathering exercise involving key stakeholders from different levels of government, non-governmental organisations, the private sector, the informal sector and other grass-root organisations.

This document reveals that the majority of Lagos's greenhouse gas (GHG) emissions are generated in three key sectors: energy, waste and transport. It defines detailed emissions reduction actions that, if fully implemented, will lead to a zero-carbon Lagos by the year 2050.

The actions and targets presented in this Climate Action Plan are ambitious, but I have no doubt that by harnessing the spirit of Lagos, we can deliver its goals.

I therefore wish to use this opportunity to call on every Lagosian, all relevant stakeholders, especially those in the energy, waste, transport, building, agriculture and health sectors and also the informal communities to support this Action Plan in the interest of the survival and prosperity of Lagos State.

Together we can build the Lagos of our dreams!

Mr. Babajide Olusola Sanwo-Olu
Governor, Lagos State

HONOURABLE COMMISSIONER'S FOREWORD

For the past 10 years, the Lagos State Government has made tremendous and concerted efforts to integrate climate change action into its development agenda. These efforts were initiated in recognition of the State's high vulnerability to the impacts of climate change.

Lagos State has further demonstrated its commitment to mainstreaming climate change considerations into its development planning through its organisation of annual International Summits on Climate Change in seven consecutive years. (2009 -2015) Each of these Summits has resulted in a communiqué with suggested initiatives and interventions that need to be developed and implemented to reduce the state's vulnerability to the impacts of climate change. The State has integrated the recommendations of the first five communiqués into a State Plan of Action that guided its approach to climate change up until 2020.

This plan of action, however, was developed before the Paris Agreement on Climate Change came into effect. It thus needed to be revised and updated to make it compliant with the Paris Agreement's goals. It also lacked Agreement-compliant action plans, such as an emissions inventory, emissions scenarios and a climate risk assessment.To address this gap, the State Government signed up to C40 Cities' Deadline 2020, committing to the development and implementation of an inclusive, ambitious and Paris Agreement-compliant Climate Action Plan (CAP) by 2020. The Lagos CAP was developed through the painstaking efforts of relevant stakeholders and technical experts from C40 Cities. It incorporates and builds on the National Policy on Climate Change, as well as the State's Climate Change Policy and Adaptation Strategy. The development of this CAP marks another milestone in the Lagos State Government's efforts to address climate change vulnerability in a strategic and coherent manner that is unprecedented in the country.

Through the CAP, the State will advance and accelerate the implementation of its adaptation and mitigation efforts. The Plan will equip Lagos State to take decisive and impact-oriented action to address the development challenges it faces in the pursuit of sustainable low-carbon and climate-resilient socio-economic development.

The Action Plan promotes people-centred development and will ensure that Lagos State's climate change actions support its development goals. Besides the State Climate Change Policy and the National Climate Change Policy and Response Strategy of 2012, the CAP also draws on the recommendations of the document "Towards a Lagos State Climate Change Adaptation Strategy". This document presents an integrated and systematic approach to reducing vulnerabilities to climate change, promoting sustainability and increasing the well-being of the people of the State.

I wish to use this opportunity to commend our team of in-house climate change experts, C40 Cities and their consultants, relevant ministries, departments and agencies, civil society groups and the informal sectors for their tireless efforts to ensure the successful development of this document. I have no doubt in my mind that the successful implementation of this action plan will lead to a safer, more resilient, inclusive and carbon neutral Lagos by 2050.

Tunji Bello
Commissioner for the Environment and
Water Resources
June, 2021.

C40 EXECUTIVE DIRECTOR

Lagos is one of the founding C40 Cities in Africa and therefore has a rich history of demonstrating leadership and commitment to climate action. The annual International Climate Change Summit which was held for 7 consecutive years between 2009 and 2015 and has now been revived by the Governor Babajide Olusola Sanwo-Olu led administration, demonstrating renewed energy in the city to showcase its commitment to addressing the climate crisis.

The actions prioritized in this plan have been selected through a rigorous stakeholder engagement process, drawing on the best available scientific climate evidence. The actions in the plan have undergone extensive review by C40 global experts and granted unconditional approval attesting to the quality of the process undertaken by the Lagos administration.

I therefore wish to congratulate Lagos for joining the league of leading C40 cities that have published ambitious, inclusive, evidenced-based climate action plans that will lead to more resilient, livable cities for their citizens.

We look forward to continuing to work with, and learn from, Lagos as you embark on the journey of implementing the actions contained in this plan.

MARK Watts
C40 Executive Director
June, 2021

GOODWILL MESSAGE FROM CIVIL SOCIETY ORGANISATIONS

The transition to a zero-carbon economy requires innovative and adaptive leadership structures. Nations and cities face a range of severe environmental and development challenges that are exacerbated by climate change, including the emergence of zoonotic diseases, unemployment, unsustainable growth patterns, sea level rise, droughts, pollution, biodiversity loss and wetland degradation. To address these challenges, governments must find a balance between economic and social development and environmental protection.

Lagos requires a comprehensive, coherent, clear, ambitious and dynamic policy and legal framework to address climate change. This framework must be geared towards building the resilience and adaptive capacity of all Lagosians, so that they can cope with the effects of climate change. As it has done in the past 10 years, Lagos must seek to chart a path towards a low-carbon economy that does not compromise its shortterm competitiveness. It should also pursue partnership opportunities with diverse stakeholders, including through the Policy Advocacy Partnership Project on Climate Change (PAPPCC), which facilitates the co-development of operational tools and frameworks for Lagos State climate change projects.

Economic growth and development in Lagos State are essential to alleviate poverty, build livelihoods and improve residents' quality of life. However, while pursuing growth, the state must also ensure environmental sustainability. This strategic and holistic Lagos State CAP will help the state to define a green growth pathway.

The C40 Cities Climate Leadership Group is a network of the world's largest cities, which have made ambitious commitments to addressing climate change through Climate Action Plans. C40 has provided effective support for the development of a comprehensive plan that will guide Lagos City's response to climate change. C40's strategic engagement has allowed cities to collaborate effectively, share knowledge and drive meaningful, measurable and sustainable action on climate change that has infused the Africa climate agenda with a new dynamism.

C40 Cities has collaborated with the Lagos State's Ministry of the Environment & Water Resources in a progressive partnership to develop a Climate Action Plan (CAP) for the state. The CAP aims to enhance Lagos State's resilience and sustainability while addressing its numerous environmental and socio-economic challenges, including its high population growth rate which exerts immense pressure on both natural resources and infrastructure. It is recommended that Lagos State continue to use the C40 CAP guidelines to drive holistic stakeholder engagement and define zero-carbon development goals in various sectors, including agriculture, energy, mobility and waste management systems.

The Policy Advocacy Partnership Project on Climate Change (PAPPCC) Network supports, recognises and appreciates the development of the Lagos State CAP. We appeal and recommend to policymakers, academia, development practitioners, NGOs and development partners to build synergetic collaboration to drive the implementation of this plan.

Policy Advocacy Partnership Project on Climate Change PAPPCC

EXECUTIVE SUMMARY

0.1 Context

Lagos is one of the major economic hubs of West Africa and one of the fastest growing cities in the world. It is situated on a low-lying coastal plane and over 40% of its area is covered by water bodies and wetlands. More than half of Lagos's 21 million residents live in informal settlements, which renders them highly vulnerable to the impacts of climate change. Meanwhile, the city's rapid growth has resulted in urban sprawl, reclamation of wetlands and other natural areas for settlements, severe stress on the city's infrastructure and basic service provision and growing greenhouse gas (GHG) emissions.

In 2008, Lagos State established a dedicated climate change unit (now department) within the Ministry of the Environment and Water Resources. This department has led the development and implementation of a range of climate change plans and strategies in the State. In 2018, Lagos State signed up to the C40 Cities Climate Leadership Group's Deadline 2020 and committed to developing a Climate Action Plan (CAP) aligned with the goals of the Paris Agreement on Climate Change, with the ultimate goal of achieving carbon neutrality by 2050. The Climate Change Department has led the development of this CAP and will also lead its implementation.

0.2 Goals of the CAP

The CAP builds on earlier climate change strategies for Lagos State to deliver a package of measures that, if implemented successfully, will set Lagos on a pathway towards carbon neutrality by 2050. The aims of the CAP are aligned with the goals of the Paris Agreement on Climate Change, in particular the ambition to limit average global temperature rise to 1.5°C. Besides contributing to climate change mitigation by reducing emissions, the CAP also aims to enhance the resilience of Lagos's population, economy and infrastructure to the impacts of climate change. It further seeks to maximise the co-benefits of climate actions in support of the State's vision to create a cleaner, greener, healthier, stable and more prosperous Lagos in the face of a changing climate.

The development process of the CAP was underpinned by a comprehensive Stakeholder Engagement Plan that aimed to raise awareness of climate challenges and solutions, collect input at various stages of CAP development, foster broad ownership of the CAP among stakeholders and ensure that wider benefits of climate action are distributed equitably. Stakeholders were given the opportunity to contribute to the CAP through workshops and a broad engagement campaign that included household surveys. The State is committed to keeping relevant stakeholders involved throughout the CAP's implementation.

0.3 Climate risk assessment

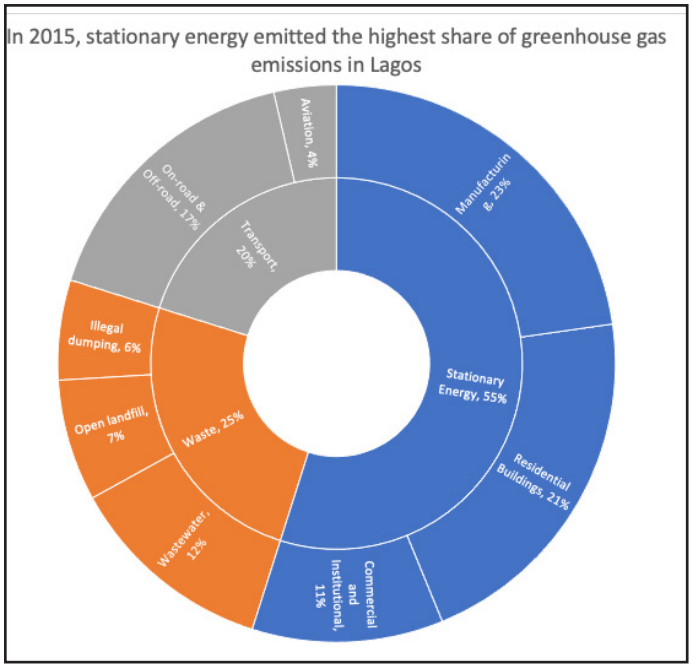
The Lagos State Government undertook a climate risk assessment (CRA) which revealed that Lagos's population and economy are most at risk of flooding. Flooding can occur as a result of subsidence in coastal areas, extreme precipitation events and/or sea level rise. Other significant climate risks include heatwaves, the urban heat island effect, erosion and thunderstorms.

A vulnerability assessment showed that an estimated 65% of the residents of Lagos are extremely poor and therefore highly vulnerable to climate impacts. It further identified close to 7,000 infrastructure assets, buildings and other features that are vulnerable to climate risk. The majority of these, over 6,500, with a value of more than N73 billion, were classified as 'Highly vulnerable'.

In addition, the vulnerability assessment determined that, besides infrastructure, the economic sectors most at risk of climate change impacts are tourism, due to its reliance on coastal features; and agriculture, due to its sensitivity to changing weather patterns.

0.4 Greenhouse gas emissions inventory

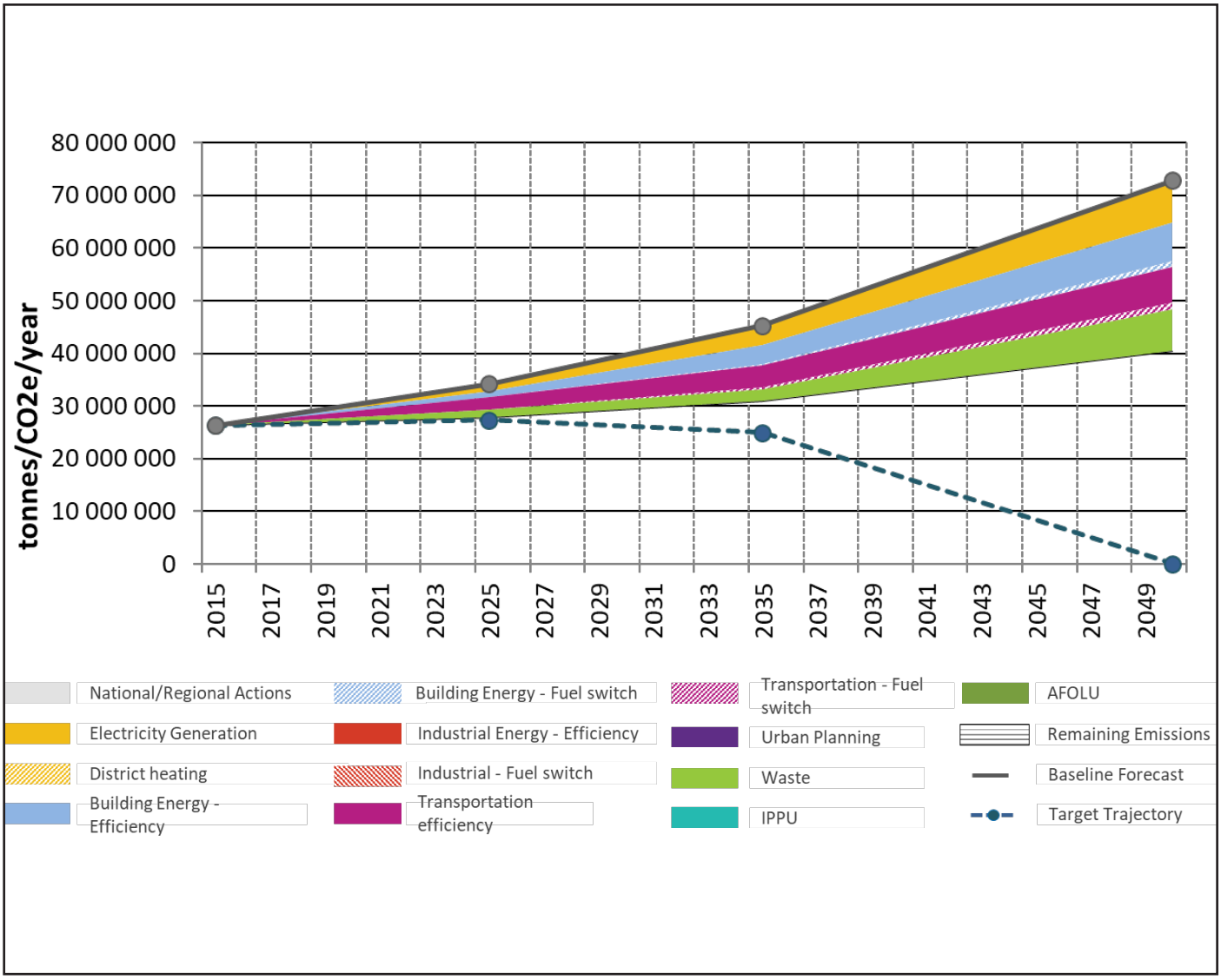
The Lagos State Government developed a greenhouse gas (GHG) emissions inventory for the year 2015, based on the GPC Protocol for Cities. It showed that in 2015, Lagos State generated emissions of 26,443,656 tCO2e, or 1.3 tCO2e per capita, which is similar to other large African cities.As the figure shows, the highest- emitting sectors were stationary Within those sectors, energy use in manufacturing & industry, energy use in residential buildings,



As the figure shows, the highest-emitting sectors were stationary energy (energy generation for use in buildings and industry), transport and waste. Within those sectors, energy use in manufacturing & industry, energy use in residential buildings, and on-road and off-road transport were the largest sources of emissions. The emissions in the stationary energy sector are particularly high due to the widespread use of diesel or petrol-powered generators. Grid electricity is also a significant source of emissions due to the high share of gas and oil-based generation in the national energy mix. Transport emissions are the result primarily of petrol and diesel use in on-road vehicles. Emissions from waste arise from methane production in landfills and wastewater, and from waste burning.

0.5 Emissions reduction scenarios

Based on the inventory and extensive input from stakeholders gathered during three workshops, the GHG inventory team developed a number of scenarios to project Lagos's future emissions given various levels of climate ambition. Under the business-as-usual (BAU) scenario, which assumes continuing population and economic growth and no climate action, emissions are projected to triple by 2050.



The diagram to the above shows the CAP scenario, which will reduce emissions to 45% below BAU by 2050. The State also developed a conditional extended scenario that would bring Lagos closer to zero carbon by 2050. The conditional extended scenario will require the implementation of actions which go beyond those described in the CAP.

0.6 Integrated plan of action

Guided by the climate change scenarios and the target of achieving net-zero carbon emissions by 2050, the CAP team identified a series of climate actions to reduce emissions, build resilience and enhance the quality of life of all Lagosians. The actions presented below were selected through a prioritisation process that combined stakeholder engagement with input from various climate experts. Key selection criteria included the actions' potential to reduce emissions quickly, their cost-effectiveness, their potential to provide broader benefits for society and the environment and the State's capacity and authority for their implementation.

0.7 Mitigation

0.7.1 Waste sector

Waste sector emissions account for 25.3% of the total GHG emissions of Lagos State and are expected to grow significantly due to population growth and changing consumption patterns as residents' disposable income increases. Wastewater emissions are also projected to increase as the population grows. Several interventions are already underway to improve waste management and curb emissions, including the construction of new waste processing facilities, initiatives to promote recycling and the upgrading and expansion of sewers and wastewater treatment plants

The following actions are planned:

1. Waste infrastructure development strategy: Develop and implement a comprehensive strategy to expand and enhance solid waste management infrastructure.

2. Implement waste separation at source and promote alternative uses for organics: Divert organic waste from landfill by encouraging separation at source and introducing composting technologies.

3. Waste management strategies for underserved communities: Implement composting, waste-to-energy and other waste recovery initiatives in underserved communities.

4. Monitor, evaluate and update private sector participants' (PSP) waste collection contracts: Evaluate and where necessary update waste collection contracts to double the collection rate of residential waste (to at least 90%).

5. Construct sanitary landfills with landfill gas capture at existing and new sites: Convert existing open dumps into sanitary landfills and capture methane to produce electricity.

6. Scale up biodigester use in households and communities: Equip low-income communities with biodigesters to treat solid and liquid waste.

7. Install effluent treatment plants for 50% of industrial businesses: Institute incentives to ensure 50% of industrial businesses effectively treat their wastewater.

0.7.2 Transport sector

Transport sector emissions account for 19.6% of Lagos State's total GHG emissions. The development of Lagos State's public transport infrastructure has not kept pace with its population growth. As a result, 1 million vehicles travel in the State every day, causing significant congestion and pollution.

The State has already undertaken several interventions to improve Lagos's public transport infrastructure, for the benefit of the population and to reduce emissions. Projects include the expansion of the bus rapid transit (BRT) system and the planning of a light rail transit (LRT) system.

The State also aims to launch new ferry routes for commuters. In addition, the State has adopted laws and policies to ban certain vehicles from major highways and to promote and develop infrastructure for non-motorised transport, among others.

The following actions are planned:

8. Expansion of the BRT network in Lagos, including construction of four

bus terminal gateway hubs: Expand and improve the BRT network, including by deploying low-emission buses, and construct bus gateway terminals to transfer passengers from interstate buses and private vehicles to the BRT at the edge of the city.

9. Implementation of physical and spatial development plans that encourage low-emission development: Introduce new requirements for spatial planning to promote transit-oriented development.

10. Adopt and implement the NMTP, including improvements to ferry safety and services: Develop infrastructure and introduce incentives for non-motorised transport, and expand and improve regulatory oversight of the ferry services.

11. Encourage the uptake of low-emission vehicles: Provide incentives and invest in infrastructure to promote the uptake of ultra-low emission vehicles and impose restrictions on the use of high-polluting vehicles.

12. Encourage the shift of freight from road to rail: Establish rail links between major ports, industrial centres and airports to allow for freight transportation by rail.

0.7.3 Energy sector

Energy sector emissions account for 55.1% of Lagos State's total GHG emissions. The national grid does not produce enough electricity to meet the growing demand, which means that users have to rely on diesel generators as backup, also during power outages. A 2013 survey found over 17,000 such generators in 13,000 residential, industrial and commercial locations.

Deploying decentralised renewable energy installations can enhance the reliability and climate resilience of the energy supply while reducing emissions. The National Government and Lagos State have adopted several policies and programmes to accelerate the uptake of renewable energy technologies. The following actions are planned:

13. Campaign to install solar photovoltaic (PV) systems at schools, hospitals and municipal buildings: Install solar PV systems on all schools, hospitals and municipal buildings.

14. Develop policies that promote decentralised renewable energy generation, in collaboration with the Federal Government, to improve grid stability: Review and improve relevant regulations, including the feed-in tariff regulation, to stimulate the development of the renewable energy market.

15. Reduce emissions in the residential sector by promoting the development of energy storage technologies and incentivising the deployment of micro-grids in off-grid urban communities: Develop a finance mechanism to promote the accelerated uptake of small-scale energy storage and micro-grid technologies.

0.8 Adaptation

A failure to adapt to current and projected future climate risks could have catastrophic consequences for Lagos's population, economy, infrastructural and natural assets, and political stability. The State of Lagos has identified 5 goals and 26 highpotential actions that together form a comprehensive strategy to reduce sensitivity, mitigate risks, increase adaptive capacity and build resilience.

Goal 1: Resilient ecosystem: Protect Lagos State's natural resources from the impacts of climate change to safeguard agricultural production, food security and biodiversity.
Actions:

1. Integrate green and nature-based ecosystem services into hard engineering solutions;

2. Plant more trees to provide shade and cooling in public spaces, in markets and along streets, and encourage tree-planting on private property;

3. Regenerate farm centres and explore urban agriculture opportunities to strengthen food security.

Goal 2: Flood-proof Lagos: Assess and mitigate flood risk to Lagos's population, economy and infrastructure, while protecting its water supply.
Actions:

4. Produce a city-wide flood risk map;

5. Strengthen the State's capacity for the collection, analysis and dissemination of data;

6. Develop and implement a stormwater drainage master plan;

7. Improve, expand and maintain the city-wide drainage network;

8. Construct community wastewater treatment plants;

9. Develop an integrated waste management system;

10. Expand and protect water sources to improve Lagos's water supply;

11. Provide public toilets and bathrooms in each local government and local council development;

12. Strengthen Lagos's urban renewal programme;

13. Promote de-paving and encourage the use of permeable surfaces.

Goal 3: Political flexibility and responsiveness: Build institutional capacity for evidence-based decision making in support of community-level adaptation.
Actions:

14. Develop institutional frameworks for community involvement in developing climate-resilience guidelines for newcity infrastructure;

15. Conduct a state-wide sea-level rise vulnerability assessment;

16. Engage in community-based participatory flood management;

17. Develop coastal-zone management plans that consider community needs.

Goal 4: Social inclusion of vulnerable groups: Build the adaptive capacity of vulnerable groups in high-risk zones.
Actions:

18. Enhance public awareness of the need for climate adaptation and improve adaptive skills and knowledge of indigenous adaptation methods;

19. Engage communities in planning processes related to their settlements in order to reduce their vulnerability to climate change;

20. Strengthen emergency response and evacuation systems;

21. Implement the Lagos state health scheme;

22. Upgrade public healthcare facilities;

23. Increase access to affordable housing;

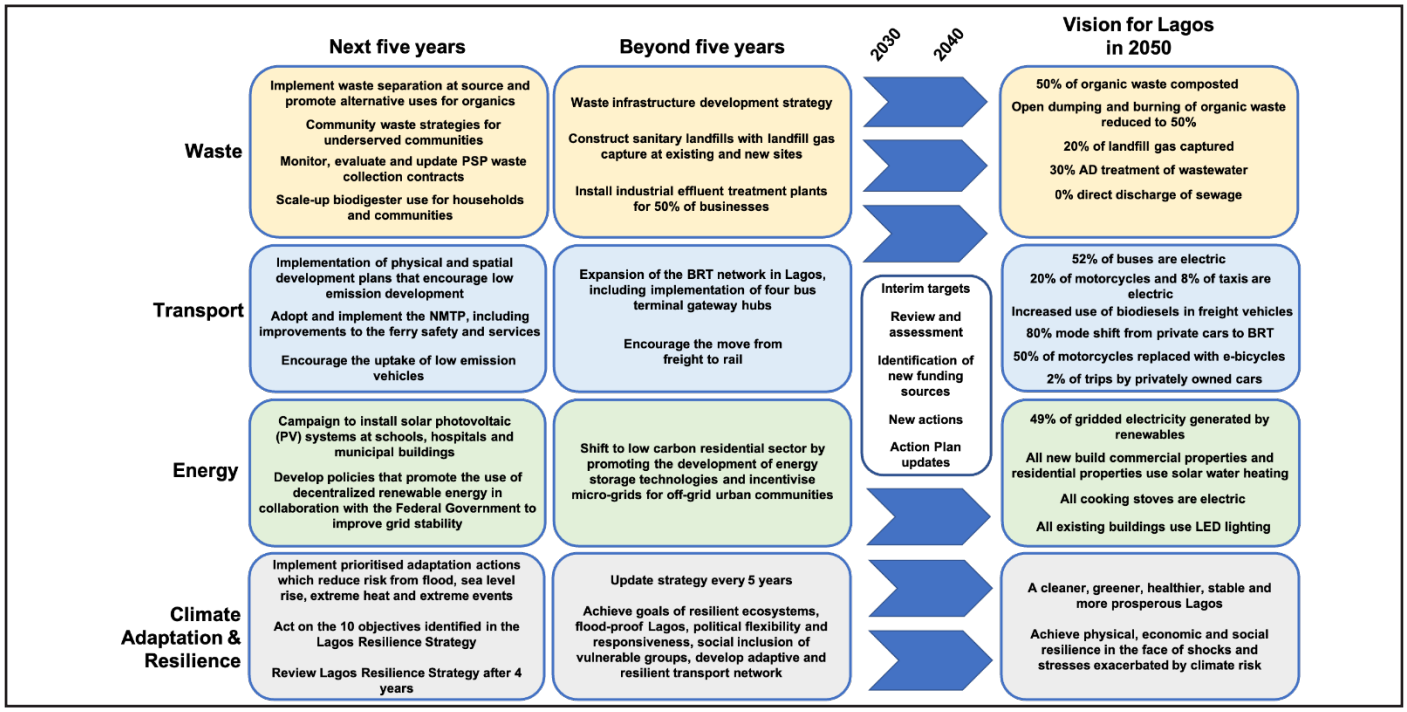
24. Scale up the implementation of the Lagos State Special Peoples Law

Goal 5: Developing an adaptive and resilient transport network: Build the resilience of the transport network. to prevent service disruptions due to extreme weather events.
Actions:

25. Implement the Lagos State strategic transport plan;

26. Expand the water transport network with increased private sector participation.

A summary of all actions, targets and implementation timeframes can be found in the diagram below.



0.9 Climate governance and financing

The Lagos State Government, headed by the Governor, Mr. Babajide Sanwo-Olu, is the primary driver of developmental change in the State. Climate action in the State will be governed by the following three bodies:

•**State Climate Change Council:** Chaired by His Excellency, the Governor, this commission will consist of Honourable Commissioners with relevant portfolios. It will be responsible for overall decision making on climate change issues and for recommending climate actions for approval by the State Executive Council.

•**State Climate Change Forum:** Chaired by the Honourable Commissioner of the Environment and Water Resources, this consultative forum will gather all relevant stakeholders to put forward issues and concerns related to climate change impacts on the environment and human wellbeing.

•**Climate Change Secretariat:** Hosted by the Office of Environmental Services in the State Ministry of the Environment and Water Resources, the Secretariat will manage the activities of the other bodies and serve as a clearinghouse for all knowledge and materials relating to climate change in the state.

Further governance and financing considerations:

•The State is committed to gender mainstreaming as an integral part of all of the planning and execution of its climate change initiatives. •In order to fund CAP implementation, the State will commit internal funding as well as seek external financing, including through public-private partnerships (PPPs).

•A range of state ministries, departments and agencies will be involved in CAP implementation. The State has clearly defined their roles and undertaken an assessment of the additional human resources required for effective climate action.

0.10 Monitoring, evaluation and reporting

The State of Lagos will base the CAP monitoring, evaluation and reporting framework on Nigeria's existing system, which comprises an Inter-Ministerial Committee that sources data from government and private sector entities and receives reports from all line ministries, departments and agencies. Quantifiable indicators have been proposed for each action in the CAP and will be adopted and finalised depending on the availability of relevant data.

0.11 Opportunities to go further

Though implementation of the actions in this CAP will significantly reduce Lagos State's emissions while building its resilience and contributing to the wellbeing and prosperity of its population, they are not yet sufficient to achieve carbon neutrality by 2050. The conditional extended scenario identifies further interventions through which the State can achieve this goal:

1. Electrifying industrial operations;

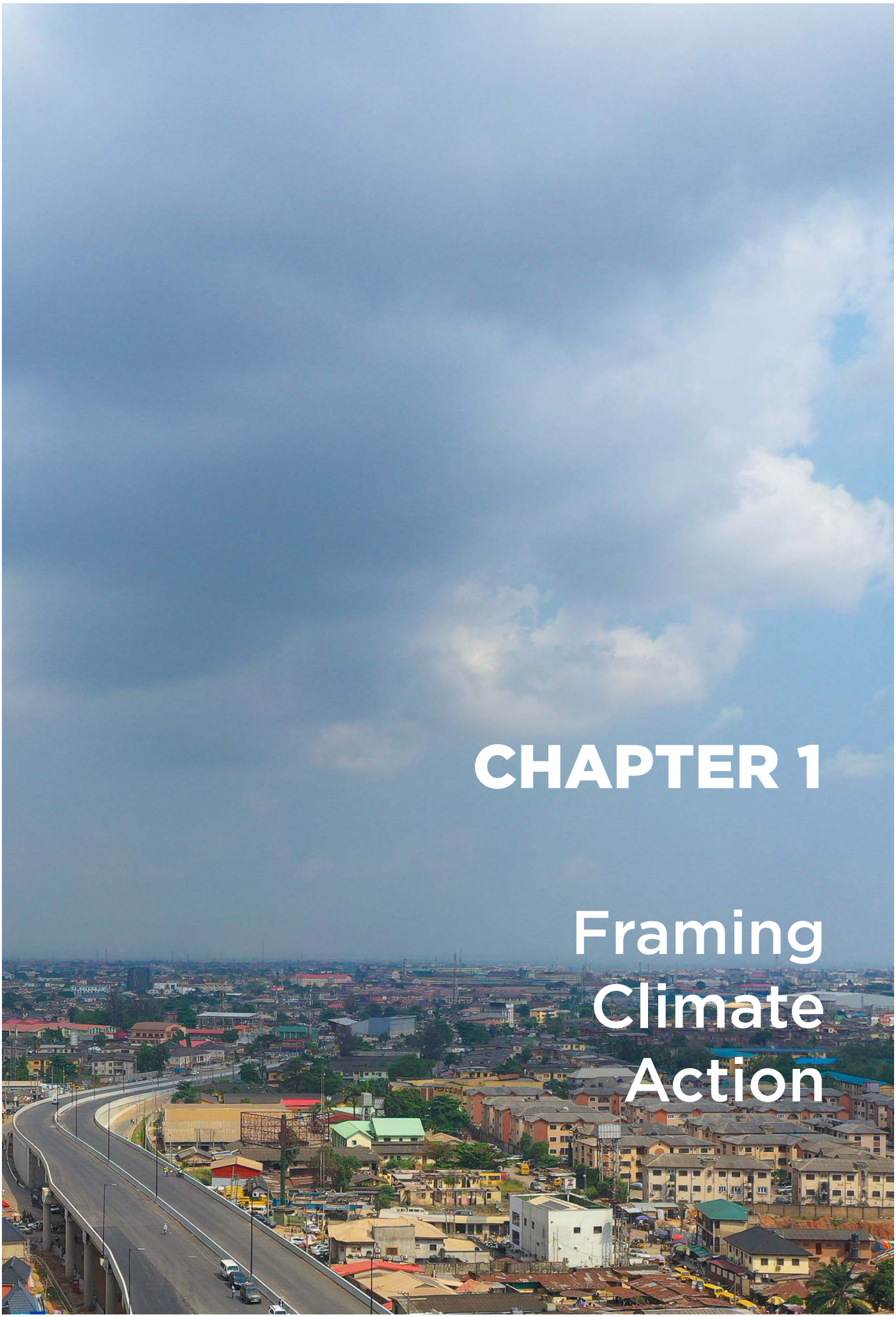
2. Separating wet and dry waste, with widespread composting or organic waste reuse;

3. Stabilising the electricity grid to completely eliminate diesel generators;

4. Powering the grid with grid-connected distributed renewable energy;

5. Revising energy-efficient building codes to drive the adoption of efficient appliances and technologies;

6. Reduce deforestation as a result of urban demand for forestry products.



CHAPTER 1

Framing Climate Action

1.1 Lagos Urban Context

Lagos State is located in the south-western region of Nigeria (Figure 1). The State is made up of five (5) administration divisions – Ikeja, Badagry, Ikorodu, Lagos Island and Epe (jointly known as IBILE). These five divisions are in turn divided into 20 Local Government Areas (LGAs) and 37 Local Council Development Areas (LCDAs).

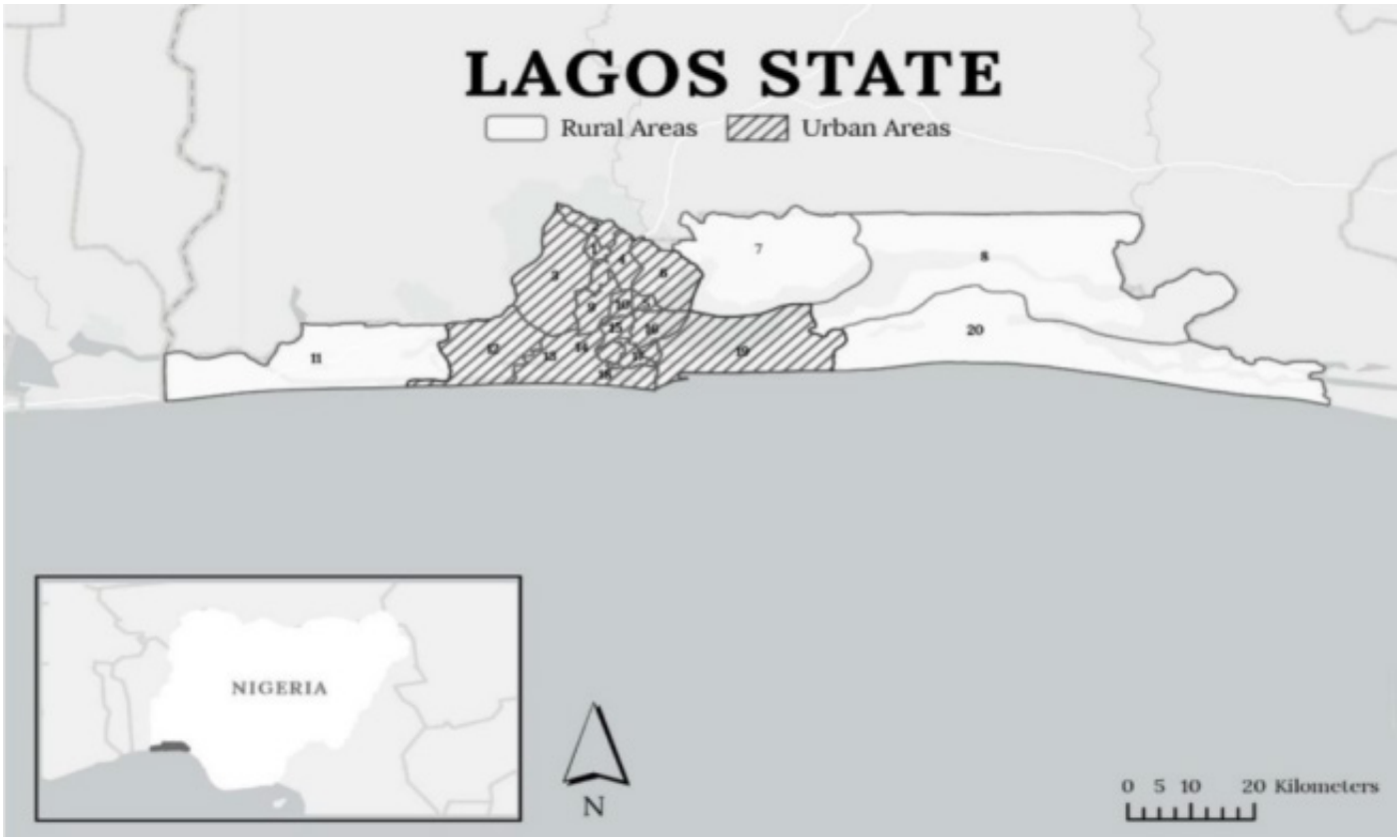


Figure 1. Boundaries within Lagos State showing 20 LGA

Lagos State has a coastline of 180 km. It is situated on a coastal plain underlain by sedimentary rocks. The land slopes gently from the interior to the sea and the terrain is predominantly flat, with an average elevation of less than 15 m above sea level. Water bodies and wetlands cover over 40% of the total land area of the State, with lagoons and creeks accounting for 22% of its area. An additional 12% of the State is subject to seasonal flooding.

Map obtained from Onilude, O and Vaz, E. Data Analysis of Land Use Change and Urban and Rural Impacts in Lagos State, Nigeria. MDPI Spatial Data Science and Digital Earth.

1.1.1 People & Place

Lagos is one of the fastest growing cities in the world. In 1960, it was home to fewer than 1 million people, by 1990 its population had increased to 4 million and in 2015 its population was 15 million. Today, the population of Lagos State is estimated at 21 million people, which makes Lagos the 14th most populous urban area in the world.

Lagos is a thriving city and home to many industries. Many Nigerians consider Lagos a land of opportunity and hence the city sees a constant influx of people in search of greener pastures, from the interior parts of the country and even from the neighbouring Republic of Benin. Lagos's rapid population growth has led to urban sprawl, reclamation of wetlands for housing and infrastructure, and growing numbers of slum areas, as more than half of the city's residents live in informal settlements.

The rapid growth of Lagos has adverse environmental and social impacts, which the State Government is grappling with. The city faces numerous challenges related to electronic waste, high traffic density, plastic pollution and increased security risks, among others. These challenges are exacerbated by low levels of advocacy, political interference, poor planning and implementation in slums, and low levels of compliance with environmental policies.

1.1.1.1 Future Trends

Lagos State is an economic hub in Nigeria and West Africa, and its population is expected to continue to grow. The population of Lagos is projected to double by 2050. This growth will likely result in an increase in gross domestic product (GDP), but also in increased demand for housing, energy and waste management. Meeting the basic needs of Lagos's rapidly growing population will put enormous pressure on its municipal systems, which already struggle to serve the city's current population.

1.1.1.2 Federal Climate Change Context

The Paris Agreement was adopted after the 21st Conference of the Parties (COP 21) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. The 191 signatory countries to this historic agreement have committed to taking action to limit the global average temperature rise due to climate change to well below 2 °C, and preferably below 1.5 °C. In the lead-up to COP21, more than 160 countries submitted Intended Nationally Determined Contributions (INDCs), setting out each country's approach to reducing emissions and adapting to a changing climate. Since COP 21, countries have been invited to confirm these intentions by ratifying the Paris Agreement and submitting Nationally Determined Contributions (NDCs) to the UNFCCC.

Nigeria's INDC falls under the remit of the Nigeria Climate Change Policy and Response Strategy (NCCPRS) and focuses on the delivery of direct development benefits and sustainable economic growth whilst reducing GHG emissions and building resilience to climate change.

1.1.2 Mitigation Component

The table below presents key characteristics of Nigeria's INDC.

ASPECT	DETAIL
Objective	Reduction from Business as Usual
Target year	2030
Implementation period	2015 – 2030
Base data period	2010 – 2014
Summary of objective	Economic and social development: grow economy 5% per year, improve standard of living, electricity access for all
Mitigation targets	20% unconditional, 45% conditional

Table 1: Conditional and unconditional mitigation targets in Nigeria's INDC

Nigeria's latest GHG emissions estimates indicate around 2 tonnes of CO2 equivalent (tCO2e) per capita, per year and the INDC projects that by 2030, under a business-as-usual (BAU) scenario, total emissions will grow by 114% to 900 million tCO2e (approximately 3.4 tCO2e per capita). The high-growth scenario projects 2030 emissions of over 1 billion tCO2e/year. The conditional INDC target for 2030 aims to stabilise emissions at around 2 tCO2e per capita. The INDC sets out a series of mitigation goals to be achieved by 2030, including:

- Ending gas flaring by 2030;
- Deploying 13 GW of off-grid solar PV generation capacity;
- Installing efficient gas generators;
- Improving energy efficiency by 2% per year (30% by 2030);
- Achieving a shift in transport use from private cars to buses;
- Improving the electricity grid;
- Promoting climate-smart agriculture and reforestation.

The mitigation actions included in the INDC to a large extent reflect existing policies and strategies. However, additional legislation and regulatory changes will be required to reach Nigeria's emissions reduction targets. Climate-smart cities are mentioned in the mitigation section of the INDC. It states that: 'Lagos, Kano and Abuja are among the fastest growing cities globally. Keeping them liveable is a major challenge. There is, however, a growing movement to improve urban livelihoods through integrated planning focusing on creating workable communities that are affordable to lower middle-income families. This requires innovative financial products catering to families underserved by banks. Lagos in particular is already strongly impacted by flooding. The government is investing to make the city more resilient to climate change.

1.1.2.1 Adpatation Component

Nigeria is highly vulnerable to climate change. The 2014 World Climate Change Vulnerability Index classifies Nigeria as one of the ten most vulnerable countries in the world. The NDC highlights the following sectors that are projected to be affected by climate change:

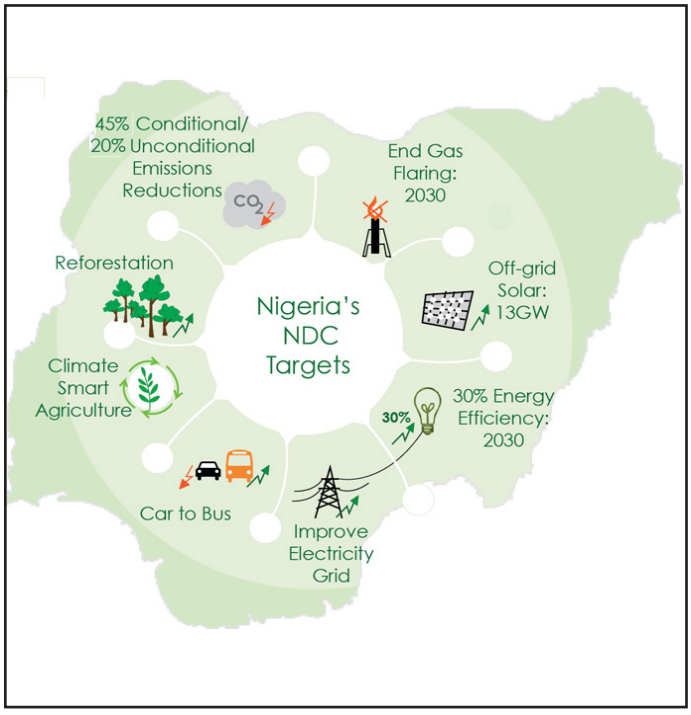
- Economy: If no adaptation action is taken, 2-11% of Nigeria's GDP could be lost by 2020.
- Food security: Agricultural productivity could decline 10-25% per cent by 2080.
- Water stress: A considerable share of the population is at risk; less than 40% of the population has direct access to potable water.
- Flood risk: The 2012 floods were estimated to have caused N1.48 trillion (US$9.5 billion) in damages, about 2% of the rebased GDP.
- Soil erosion: Recent increases in the incidence of landslides are likely to be exacerbated.
- Sea-level rise: An increase of 0.5-1 m by 2100 would result in the loss of 35-75% of the Niger Delta.
- Energy: Demand for cooling is likely to increase, exacerbating shortages in the energy supply.
- Ecosystems and tourism: Impacted by altered weather patterns, flooding, droughts.

The INDC refers to the National Adaptation Strategy and Plan of Action for Climate Change Nigeria (NASPA-CNN; see below) as the key document on adaptation. This plan includes 13 sector-specific strategies, policies, programmes and measures. Its stated objective is to reduce the impacts of climate change through adaptation measures to be undertaken by the federal, state, and local governments, among other actors. The key sectors for adaptation presented in the INDC are:

- Agriculture (crops and livestock)
- Forests
- Energy
- Transportationand communications
- Industry and commerce

The department of climate change has recently finalised the Sectoral Action Plans(SAPs)fortheimplementationofthe INDC in the following key priority sectors:

- Energy
- Oil & Gas
- Agriculture & Land use
- Power
- Transport



It is increasingly recognised that climate action by sub-national and non-state actors, including regional and local governments and businesses, is key to enhancing ambitions. There is significant potential for these actors to address climate change and a variety of practical and cost-effective options for action exist.

1.1.3 Climate Change In Lagos

Climate change has been recognised as a critical development issue since the early 1990's, due to its predicted impacts on biodiversity, livelihoods and national and global economies. Studies have shown that poor countries and people will disproportionately suffer from the effects of climate change due to their lack of institutional, financial and technological capacity for adaptation and mitigation.

The unique features of Lagos State, including its large and rapidly growing population and its topography, marked by extensive low-lying and coastal areas and a high water table, further increase its vulnerability to climate change impacts.

In 2008, the State established a unit (now a fully-fledged department) within the Ministry of the Environment and Water Resources to coordinate its climate change response strategies. [2] The State has taken proactive steps to address climate change impacts because it recognised that temperature increases, sea level rise and increased flooding are likely to severely affect all parts of its economy and society, and jeopardise its development. This unit developed mitigation and adaptation programmes, which are described below.

1.1.3.1 Mitigation Programme

The State Government has taken several ambitious actions to reduce its GHG emissions and mitigate climate change. Some of these actions are in the planning stages, others are underway or have been completed. In the transport sector, the State Government has undertaken actions to expand public transport infrastructure, primarily through the construction of additional Bus Rapid Transit (BRT) systems and the rail mass transit system. The construction of the State's first sanitary landfill is expected to be completed by January 2021. The State has also introduced a programme to install solar panels at schools and hospitals and has begun rolling out solar lighting in low-income neighbourhoods.

1.1.3.2 Adaptation Programme

Several studies have been undertaken to assess the potential for the State to adapt to the impacts of climate change, including the Building Nigeria's Response to Climate Change (BNRCC) Project; the development of climate change scenarios, the projection of sea level rise impacts and the design of adaptation strategies for Lagos State sponsored by United Nations Industrial Development Organization (UNIDO); and the Lagos State Climate Risk Assessment supported by the United Nations Development Program (UNDP). The State has also launched an annual tree planting campaign as the principal vehicle for cushioning the urban heat island effect and increasing the capacity for carbon sequestration, with around 7 million trees planted since 2008. Furthermore, the State has undertaken a programme to improve landscaping of open spaces, road verges and laybys. This CAP also builds on the Lagos State Adaptation Strategy.

1.1.4 Aims of the CAP

This Climate Action Plan (CAP) for Lagos presents a package of climate actions that will set the State on a development pathway aligned with the goals of the Paris Agreement, particularly the ambition of limiting the average global temperature increase to below 1.5°C. The CAP supports this aim by:

1. Presenting a pathway to deliver a zero-carbon city by 2050 at the latest and setting ambitious interim targets.
2. Demonstrating how the city will adapt and enhance its resilience to climate hazards that may impact it now and under future climate change scenarios.
3. Outlining the social, environmental and economic benefits expected from implementing the plan, and improving the accessibility of these benefits to the city's population.
4. Detailing the city's governance, powers and the partners who need to be engaged to accelerate the delivery of its mitigation targets and resilience goals.

The CAP has been developed through a programme of research, analysis and stakeholder engagement. It addresses adaptation and mitigation in an integrated way, identifying interdependencies to maximise efficiencies and minimise investment risk. It provides an evidence-based, inclusive and deliverable plan for achieving transformational mitigation and adaptation, centred on an understanding of the City's power, influence and wider context. Finally, the CAP establishes a transparent process to monitor delivery, communicate progress, and update climate action planning in line with existing governance and reporting systems.

1.1.5 Stakeholder Engagement

To deliver the CAP's ambitious and transformative mitigation objectives in line with the Paris Agreement, the State Government must build and maintain constructive and sustainable relationships with stakeholders that will be impacted by climate change and CAP actions.The development of the CAP was underpinned by a comprehensive Stakeholder Engagement Plan (SEP), that had been designed to improve decision making, create understanding of and build support for the CAP among those it seeks to serve: the State's residents, government agencies, local communities, private sector stakeholders, civil society and other interested parties.

The key objectives of the SEP can be summarised as follows:

- To raise awareness of climate change and of concrete strategies to address it within Lagos State;
- To provide opportunities for input at various stages of the CAP development process;
- To foster ownership of the CAP amongst various stakeholders; and
- To ensure that wider benefits of climate action are distributed as equitably as possible.

The key stakeholder groups identified for participation in the development of the Lagos CAP include federal agencies, Lagos State agencies, development partners, private sector and trade unions, academia and civil society/non-governmental organisations (NGOs).

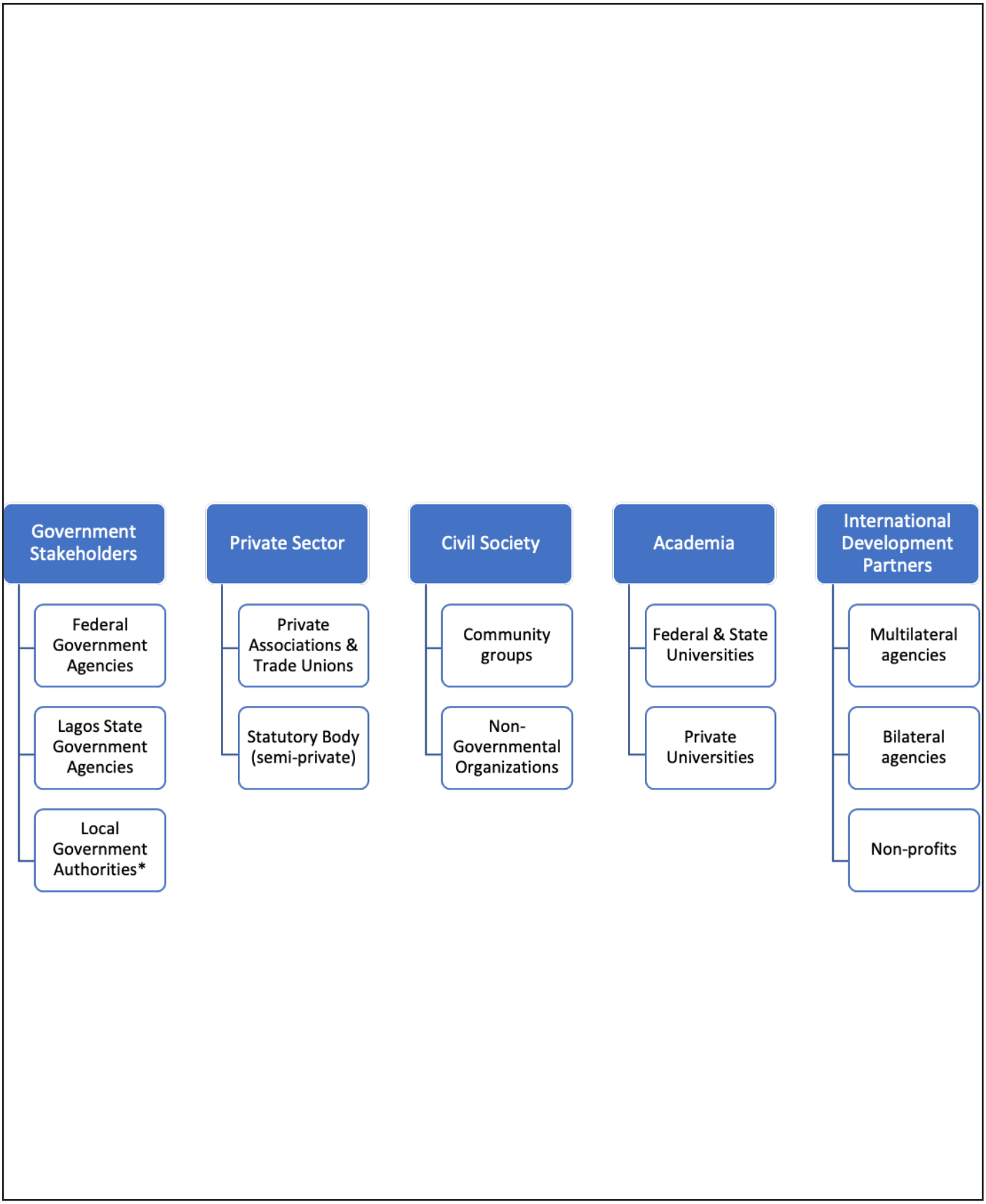
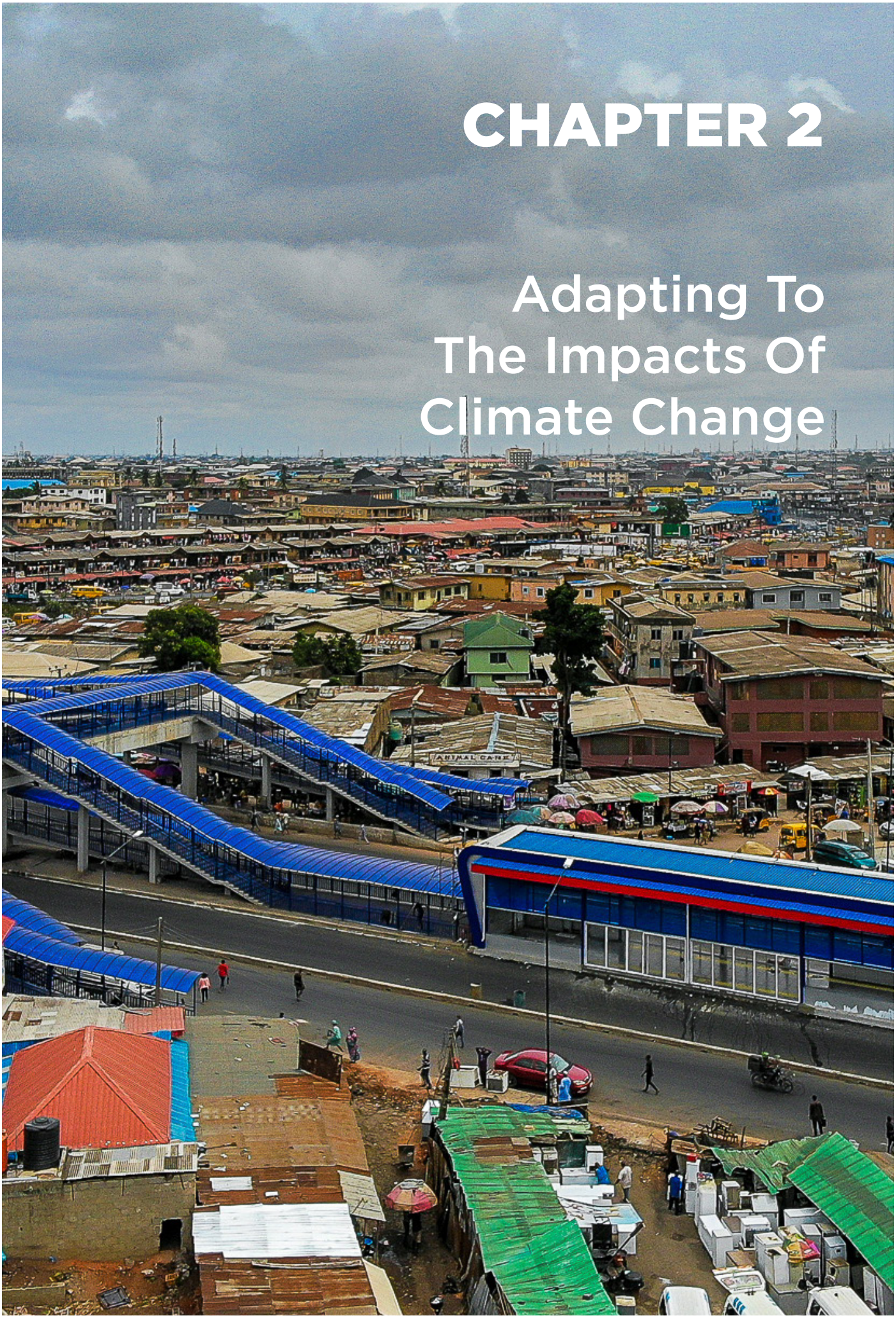


Figure 2: Key stakeholder groups involved in the development of the Lagos CAP

These stakeholders were engaged through a series of workshops, which focused on different aspects of CAP development, such as scenario planning, action prioritisation and implementation. These workshops were supplemented with a wider engagement campaign, which included household surveys (conducted with the support of Geo-Solutions and JEI grants), to ensure the inclusivity of the proposed climate actions.

CHAPTER 2

Adapting To The Impacts Of Climate Change



The global commitment to limiting the average temperature increase to 1.5 °C will not stop climate change altogether; the climate will continue to change even if ambitious mitigation actions are undertaken. Like other cities around the world, Lagos must prepare to address current and future impacts of climate change. To allow Lagos to live up to its reputation as a Centre of Excellence and a state of aquatic splendour, appropriate measures will need to be taken to protect its citizens, its economy, its infrastructure and its ecosystems.

2.1 Climate risk assessment

Due to its situation on the coast, low-lying topography and high water table, Lagos is particularly vulnerable to climate hazards. The climate risk assessment (CRA) conducted for Lagos State describes the physical and climatic features of the region; elevation ranges from 38 metres below to 78 meters above sea level, while its topography favours water retention inland. Water bodies cover a large part of the State; however, recent land-use changes have led to a slight decrease in water bodies as they have made way for settlements. As a result of these characteristics, Lagos's population is highly vulnerable to extreme weather events and other climate hazards.

2.2 Climate Hazards

The highest-priority risk to Lagos State is that of flooding, which is closely related to coastal subsidence. An increase in subsidence will lead to an increase in the area at risk of inundation and related impacts. The second priority risk identified is heat stress; the total area at risk of experiencing extreme heat is growing. This manifests in the urban heat island effect, which affects different parts of the state to a varying extent. Local Government Areas at significant risk of heat stress are Lagos Island, Lagos Mainland, Agege, Kosofe and Oshodi-isolo. A total of nine hazards have been identified as relevant to Lagos State, all of which will be exacerbated by further climate change:

1. Heat waves, as a result of increases in maximum, average and minimum surface temperatures
2. Inland flooding, as a consequence of changes in precipitation intensity, duration and frequency
3. River flooding
4. Flash flooding
5. Erosion
6. Thunderstorms
7. Coastal and lagoon flooding (due to sea-level rise)
8. Tropical storms
9. The urban heat island effect

2.3 Vulnerability Assessment

Lagos State has developed a vulnerability analysis and risk profile to identify the most high-risk, high-vulnerability zones. Assets located in or along flood plains, riverbanks and the Atlantic coastal region are among the most vulnerable to the growing risk of flooding and sea-level rise. The analysis identified 6,983 assets within the state, including infrastructure, buildings and other features, as vulnerable to, and to varying extents exposed to, climate risk.

The demographic composition of Lagos State's population also has significant implications for its vulnerability. Of the projected 2020

population, approximately 13 million of 22 million inhabitants, or just under 65%, are expected to be vulnerable to climate impacts. A large percentage of Lagos's residents is considered extremely poor, which drastically reduces the population's adaptive capacity. In addition, rapid population growth forms a significant stressor across all sectors, both public and private.

The analysis also identified three economic sectors that are particularly vulnerable to climate impacts: tourism, agriculture and infrastructure. Lagos's tourism industry is highly reliant on coastal features, which are under significant threat from inundation and sea level rise. These hazards have already led to the loss of Alfa beach, a once vibrant tourist attraction.

Furthermore, a number of residents of coastal communities have lost their homes to storm surges. Climate change will exacerbate the vulnerability of coastal communities, threatening tourism and the local economy. Promotion of the tourism industry to create economic and social prosperity is one of the strategic goals of the Lagos Resilience Strategy. It must be acknowledged that an increase in coastal tourism, and subsequently in economic activity in coastal areas, will result in increased vulnerability to climate impacts as it will increase the number of people and the value of assets exposed to those impacts. Agricultural activities are intrinsically vulnerable to climate change and its impacts. Rising temperatures and extreme heat events form significant risks for farmers, while storm surges, coastal inundation and subsidence will also threaten the fishing industry.

Climate change impacts on agriculture will not only negatively impact the local economy and food security, but may also lead to loss of life in communities that rely on subsistence farming. Although impact projections contain large uncertainties, significant land-use change is expected in the next century and subsidence and inundation are highly likely to occur. This will exacerbate agricultural vulnerability and exposure. A statistical analysis was conducted to assess the vulnerability of infrastructure assets to flood risk (Table 2). Infrastructure within the Local Government Area of Kosofe was found to be the most vulnerable. The total estimated value of vulnerable infrastructure assets in this area is N34,735,930,000 (US$91,230,282). The analysis indicates the vast majority of infrastructure assets are highly vulnerable.

VULNERABILITY CLASSIFICATION	NUMBER OF ASSETS	ESTIMATED VALUE (N)
Highly vulnerable infrastructure assets	6,563	73,267,056,008
Moderately vulnerable infrastructure assets	339	4,991,800,000
Least vulnerable infrastructure assets	81	6,276,000,000
Total vulnerable infrastructure assets	6,983	84,534,856,008

Table 2: Summary of infrastructure flood vulnerability analysis for Lagos State (Source: Lagos CRA, 2021)

2.4 Adaptation strategy

How is the city targeting success?

Lagos has acknowledged its unique vulnerabilities and stresses that will be exacerbated by climate change and which, without adequate adaptation action, will have severe impacts on social, institutional, economic and environmental systems. In response, the State has identified and will implement adaptation strategies to mitigate physical and economic risk and achieve its vision of an innovative, inclusive and prosperous Lagos. By harnessing adaptation and sustainable growth, Lagos aims to create a cleaner, greener, healthier, more stable and more prosperous State in the face of the changing climate. These goals are aligned with Nigeria's national vision of improving resilience and reducing vulnerabilities, while leveraging new opportunities that arise as a consequence of climate change.

Through engagement with key stakeholders, Lagos defined a set of prioritised goals and objectives within the parameters of State power and capacity. These are aligned with the Lagos Resilience Strategy, which outlines existing initiatives and actions aimed at increasing the physical, economic and social resilience of Lagos in the face of significant shocks and stressors. The support of every Lagosian is key to facilitate successful implementation and the State Government will mobilise stakeholders across all sectors and scales, including Federal, State and local governing bodies or agencies, private sector actors, NGOs, Community Development Areas, and community-based organisations, to deliver prioritised actions.

2.5 Existing Policies and Plans

In 2020, Nigeria demonstrated its commitment to mainstreaming adaptation by publishing the Nigeria National Adaptation Plan (NAP) Framework, supported by the NAP Global Network, which sets out a path for managing medium- and long-term adaptation needs. The NAP Framework does not currently include specific actions; however, these will be developed as the next step in the process.

It is also important to highlight the continued involvement of the Green Climate Fund (GCF) in adaptation efforts at the national level. The GCF supports sustainable development and climate adaptation projects in Least Developed Countries (LDCs) and beyond. The following GCF programmes are currently active in Nigeria:

- Acumen Resilient Agriculture Fund (Adaptation)
- Transforming Financial Systems for Climate (Adaptation and mitigation)
- Programme for Integrated Development and Adaptation to Climate Change in the Niger Basin (Adaptation and mitigation)

The mechanisms and programmes managed by the GCF funnel investment towards vulnerable assets and communities. They support beneficiaries in both the public and private sectors and ranging from the micro to the macro scale. The climate action priorities presented in this CAP are closely aligned with the Lagos Resilience Strategy (2020). This is the State's strategic outline of actions to develop urban resilience and reduce vulnerability. Based on a strategic vision and a mapping of potential

acute shocks and chronic stresses, the State developed 3 pillars, 10 goals and 31 initiatives to achieve an innovative, inclusive and prosperous Lagos. The identified initiatives will have direct or indirect implications for sensitivity, exposure and adaptive capacity, and were considered during the prioritisation process for adaptation actions.

STRATEGY	SCALE	BRIEF DESCRIPTION
Nigeria National Adaptation Plan Framework	National	National framework to plan and manage medium- and long-term adaptation needs
Green Climate Fund Programmes	International	Financial programmes based on international development goals targeted to regional LDCs which have a focus on climate action.
Lagos Resilience Strategy	Sub-National	State-developed action plan which identifies shocks, stresses and vulnerabilities, and outlines initiatives that seek to develop the resilience of assets and communities in response to these risks.

Table 3: Summary of currently active adaptation strategies in Nigeria

2.6 Strategy Development

The State developed two key knowledge products to serve as a foundation for the CAP and the adaptation strategy. The first is the climate risk assessment (CRA), which includes a risk map based on an assessment of hazards, impacts and vulnerabilities , and which has helped to focus adaptation actions on key sectors and communities. The second is the output of a deep-dive workshop on adaptation organised in Lagos in partnership with C40. During this session, the State presented the findings of the updated climate risk assessment to a group of key stakeholders, including representatives of state and federal government departments, academics and private sector actors. The stakeholders then provided their input for the prioritisation of strategic goals, objectives adaptation actions, within the parameters of State power and capacity (Table 4).

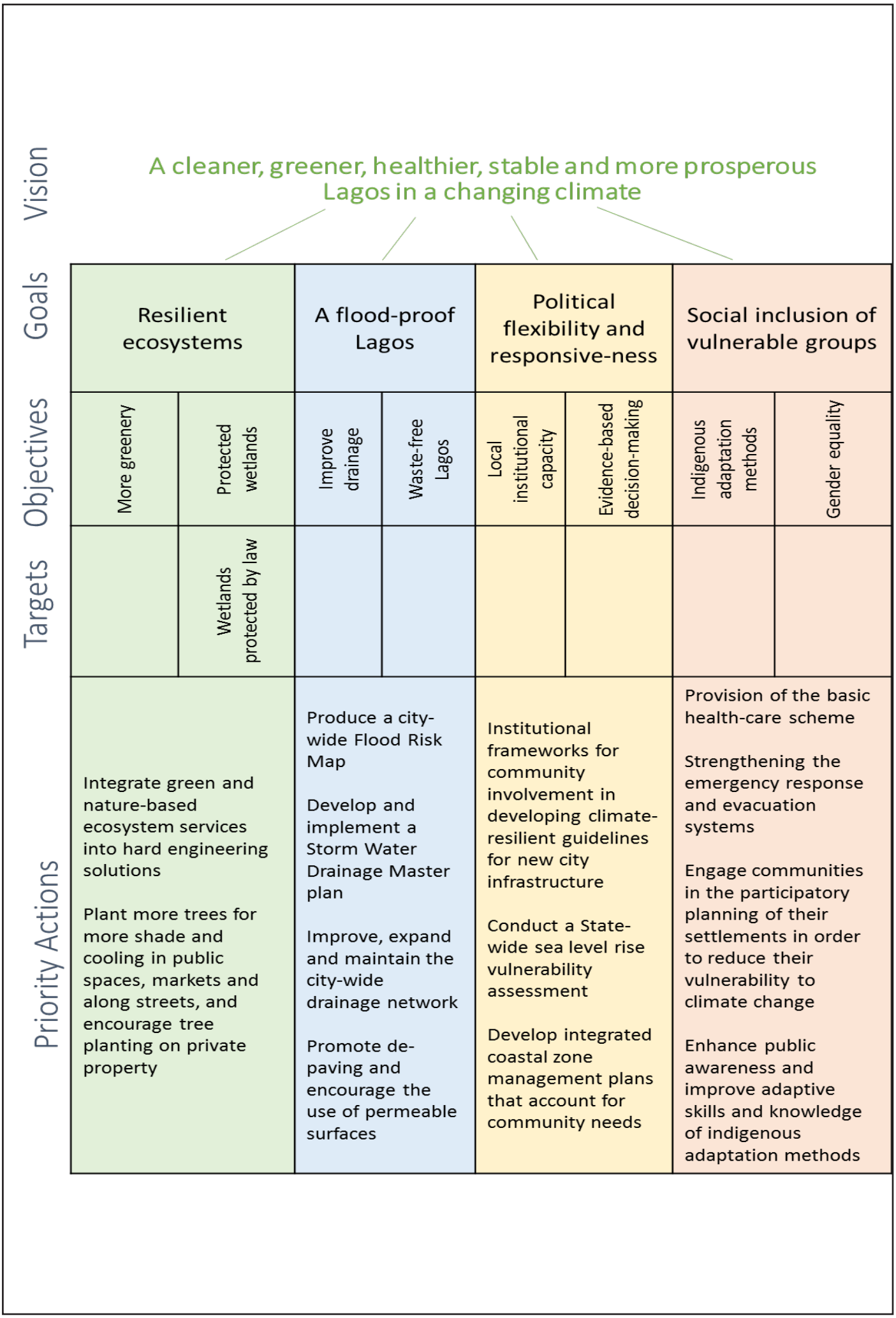
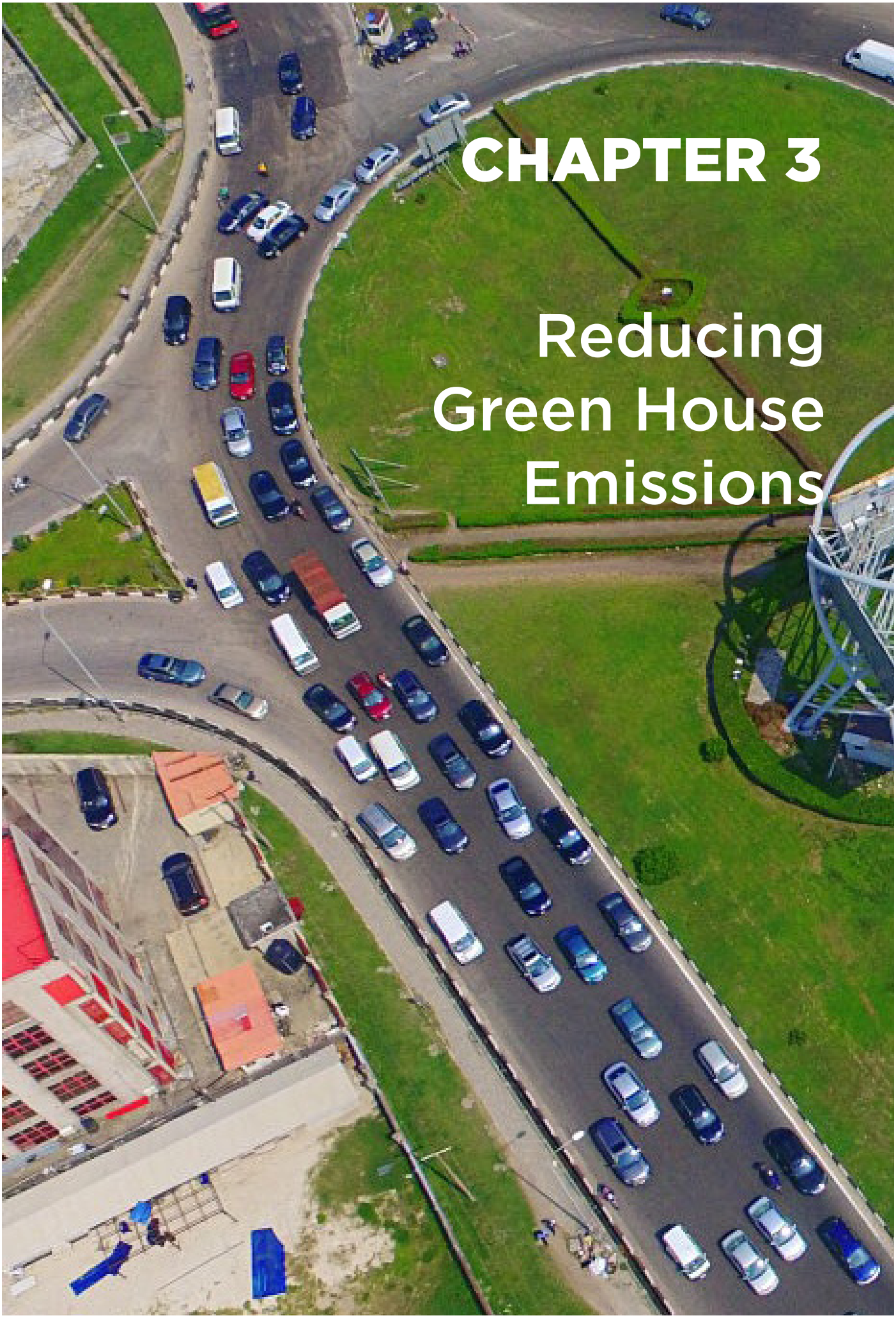


Table 4: Output from adaptation action prioritisation workshop (Source: CRA, 2021)



CHAPTER 3

Reducing Green House Emissions

3.1 Greenhouse gas emissions inventory

Strategies to achieve carbon neutrality by 2050, as is required to meet the targets of the Paris Agreement, must be built on reliable climate evidence. Lagos has developed an emissions inventory to allow it to identify the areas and sectors with the highest potential for GHG emissions reduction, select transformative climate actions and accelerate the transition to a zero-carbon economy.

The first city-level GHG inventory for Lagos was published in 2018, using data for the year 2015. In 2019, the GHG inventory was updated with improved 2015 data. The inventory was developed based on the GPC Protocol for Cities,[GPC Protocol: https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities] which meets IPCC standards but provides a methodology tailored to urban contexts. The GPC standard requires that cities, at a minimum, report on their emissions in the following sectors:

3.1.1 Stationary energy

Emissions resulting from fuel combustion to generate energy for use in buildings (residential, commercial and industrial), including solid and liquid fuels (scope 1) as well as electricity supplied to buildings by the grid (scope 2).

3.1.2 Transport

Emissions resulting from fuel combustion to generate energy for transport, including liquid fuels (scope 1) as well as grid-supplied energy for electric vehicles (scope 2).

3.1.3 Waste

Emissions resulting from the treatment of solid waste (e.g. waste disposed of in open landfills, dumping, burning) and wastewater (e.g. wastewater pre-treated in septic systems, sewage treatment plants and septage handling facilities) within the city boundaries (scope 1) as well as waste generated in the city but treated outside the city boundaries (scope 3).

These three sectors are typically the largest emitters in urban areas. Reporting on emissions from other sectors, such as agriculture, forestry, industrial processes and product use, is recommended but not required under the GPC standard.

Emissions were calculated using existing data, which was entered into an excel-based tool, the City Inventory Reporting and Information System (CIRIS), to produce a BASIC reporting format.

GPC Protocol: https://ghgprotocol.org/greenhouse-gas-protocol-accounting-reporting-standard-cities

3.2 Lagos' greenhouse gas emissions profile

As Lagos is the economic centre of Nigeria, Lagos State's GHG emissions account for a large share of national emissions. Lagos's large and growing population, rapid urbanisation and industrialisation result in high GHG emissions primarily from energy consumption, transport and waste.

Intensity indicators	Per capita	Per unit land area (km2)	Per unit GDP (US$m)
Emissions	1.3	9,452	331

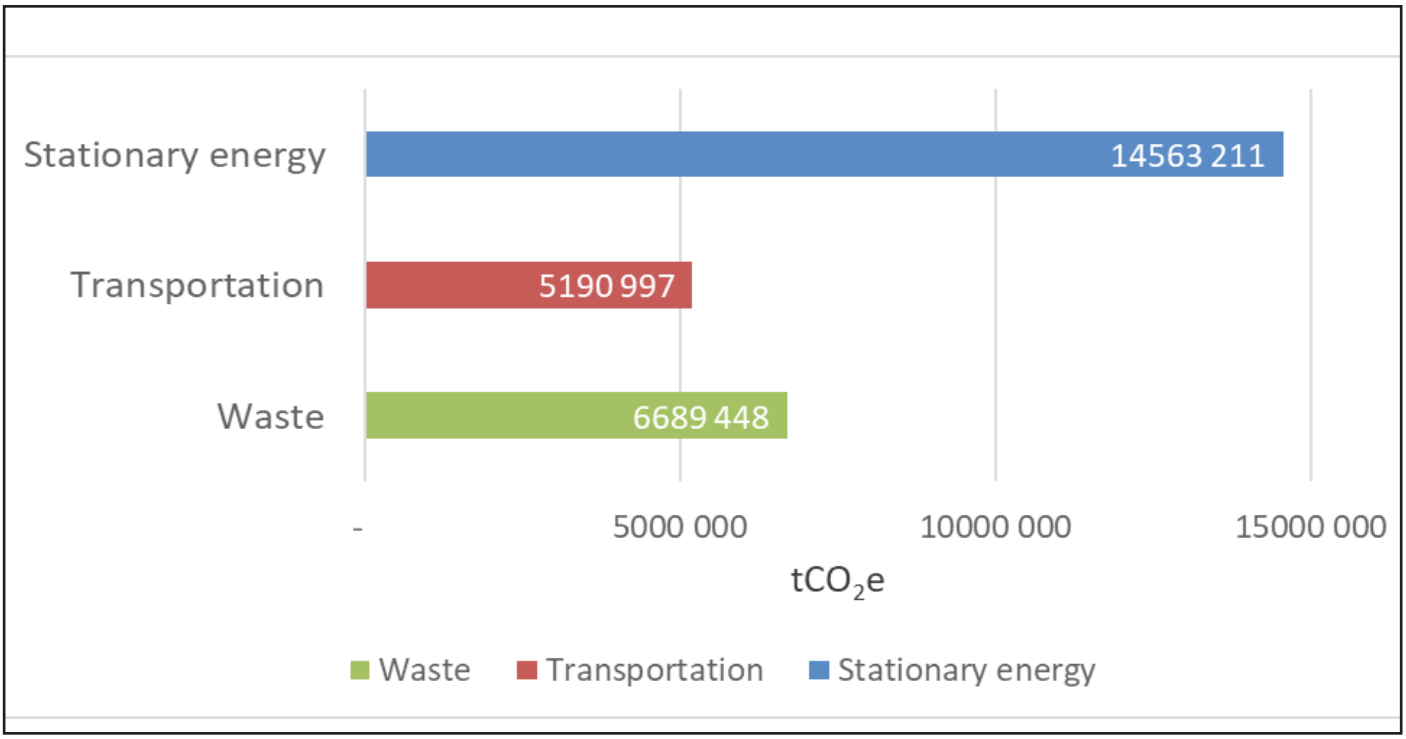


Figure 3. Emissions per sector in Lagos (2015 inventory)

According to the 2015 GHG inventory, Lagos generated GHG emissions of 26,443,656 tCO2e in that year. The majority of emissions (55%) were generated by the stationary energy sector, followed by the waste (25%) and transport (20%) sectors. However, these results contain some uncertainty as data was not available for all relevant activities. When data was unavailable, the inventory team benchmarked against other cities, downscaled national data and/or used international estimates in accordance with best practice. Assumptions are transparently documented with proposed improvements in the Greenhouse Gas Emissions report and the City Inventory Reporting and Information System (CIRIS).

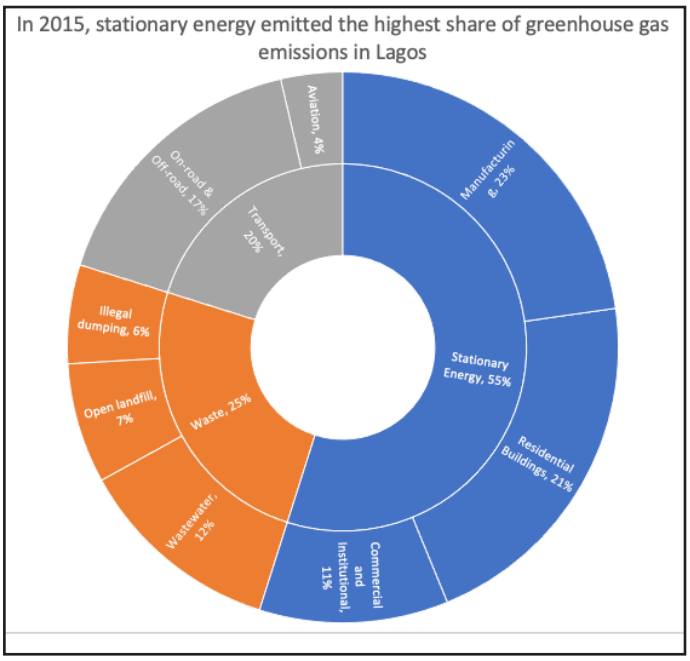


Figure 4: Emissions results by sector and sub-sector in Lagos (2015 inventory year)

The generation of stationary energy for consumption in manufacturing and construction and for use in residential buildings are the two largest sources of emissions. This is primarily due to the use of generators for electricity generation. On-road transport is the third-largest source of emissions, due mainly to petrol and diesel consumption in passenger vehicles and busses. Emissions from solid waste and wastewater are the fourth and fifth largest emissions sources, respectively, caused by gas emissions from landfill sites, open burning of waste and wastewater emissions.

3.3 Greenhouse gas emissions from stationary energy in Lagos

In the stationary energy sector, petrol and diesel for generators account for the largest share of emissions (Figure 5). Grid electricity also accounts for a significant share of stationary energy emissions due to the high share of gas and oil-based generation in the national grid. The largest emitter among the stationary energy subsectors is the residential building sector, which uses a mix of different fuels, followed by industry, manufacturing and construction, which generate a larger share of emissions.

In 2015, the use of energy in buildings and industry in Lagos, including grid electricity, generated emissions of 14,563,211 tCO2e (55% of the total).

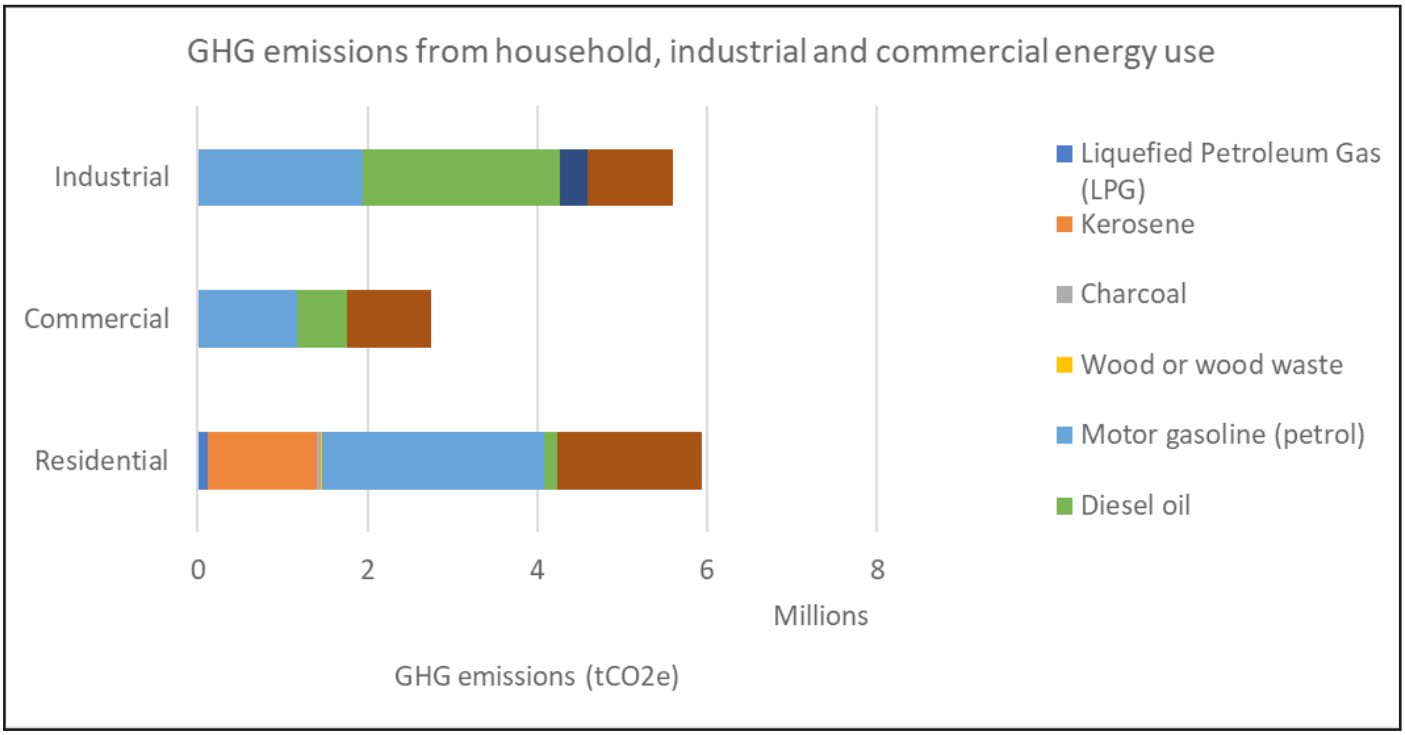


Figure 5: Stationary energy emissions by user group and fuel type

3.4 Greenhouse gas emissions from transportation in Lagos

The majority of transport emissions, which accounted for 20% of total emissions, are generated through petrol and diesel use in on-road transportation (Figure 4). The consumption of jet kerosene in aviation contributes the remaining 18% of transport emissions. A very small proportion of transportation emissions (0.15%) was generated by waterborne transport.

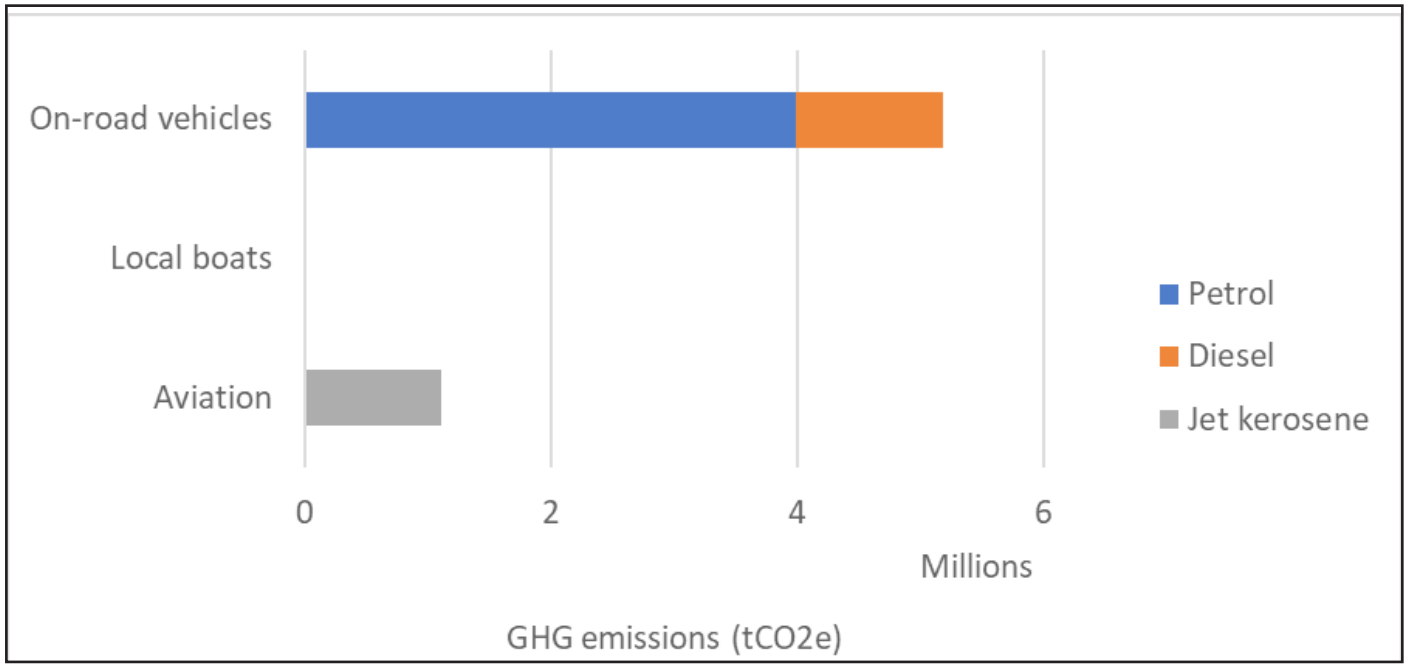


Figure 4: Transport emissions in Lagos by end user and fuel type (2015)

3.5 Greenhouse gas emissions from waste in Lagos

Emissions from waste arise from the decomposition of organic matter under anaerobic conditions, resulting in the generation and release of methane into the atmosphere. Methane has a higher global warming potential (GWP) than CO2, but remains in the atmosphere for a shorter period.[CO2 (carbon dioxide) stays in the atmosphere for up to 200 years. CH4 (methane) stays in the atmosphere for approximately 12 years, but 1 tonne of CH4 has a global warming impact equivalent to 28 tonnes of CO2. Source: IPCC.] The burning of waste by households and on open dumpsites also generates GHG emissions and air pollution. Waste currently accounts for 25% of Lagos's emissions, roughly half of which results from wastewater and the other half from solid waste (illegal dumping and open landfill).

CO2 (carbon dioxide) stays in the atmosphere for up to 200 years. CH4 (methane) stays in the atmosphere for approximately 12 years, but 1 tonne of CH4 has a global warming impact equivalent to 28 tonnes of CO2. Source: IPCC.

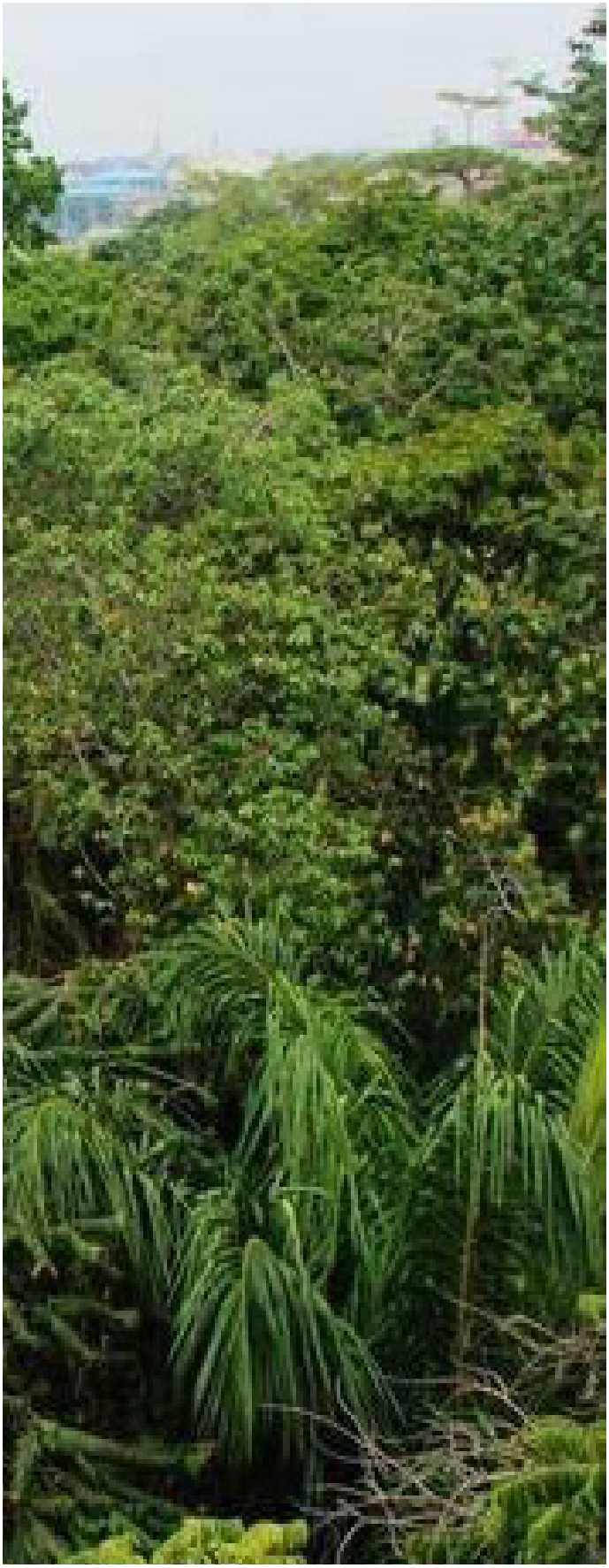
3.6 Benchmarking Lagos' emissions

A comparison of Lagos's emissions profile to national emissions reveals several trends and specific opportunities. In 2015, Lagos was responsible for approximately 29% of national waste emissions, 8% of residential energy-related emissions and 13% of national transport emissions. This suggests that the transition to a low-emissions economy in Lagos will be critical for the national government to achieve its climate mitigation goals.In comparison to those of major cities in OECD countries, such as Copenhagen (2.5 tCO2e), London (3.9 tCO2e) and Washington DC (11 tCO2e); Lagos's per capita emissions (1.3 tCO2e) are relatively low, however they are comparable to those of other major cities in Africa, such as Accra (1.2 tCO2e), Dar Es Salaam (1.4 tCO2e) and Addis Ababa (1.6 tCO2e).

3.7 Projecting emissions and setting reduction targets to 2050

Based on the 2015 baseline inventory, in combination with population and economic growth forecasts, the inventory team developed an emissions growth projection to 2050. This emissions pathway was termed the business-as-usual (BAU) scenario. Modelling was undertaken using the Pathways Scenario Planning Tool.

The BAU scenario indicates that if no climate actions are undertaken, Lagos's emissions will triple by 2050. Table 5 presents Lagos's total emissions in 2015 and projected emissions in 2025, 2035 and 2050. It also presents Lagos's targets for emissions reduction relative to the BAU scenario. Achieving the proposed emissions reduction targets will require ambitious action in all sectors, including by other actors than the Lagos State Government (LSG), in particular the national government.



YEAR	PROJECTED EMISSIONS WITHOUT INTERVENTION (BAU) (TONNES CO2E/YEAR)	EMISSIONS REDUCTION TARGETS (% EMISSIONS REDUCED BELOW BAU)	TOTAL GHG EMISSIONS IF TARGETS ARE ACHIEVED (TONNES CO2E/YEAR)
2015	26 349 728	Current emissions level	Current emissions level
2025	34 194 060	20%	27 355 248
2035	45 300 683	45%	24 915 376
2050	72 806 531	100%	0

Table 5: Lagos's BAU GHG emissions projections and mitigation targets

Lagos's targeted emissions reduction pathway is shown in Figure 7. The State aims to reduce emissions to 20% below the BAU projection by 2025, to 45% below BAU by 2035 and to eliminate GHG emissions completely by 2050. These mitigation targets were set based on a review of national, regional and city-level policies and plans related to climate and development. The State's 2050 target goes beyond the national climate change targets, but national targets were used as a guideline for setting interim targets.

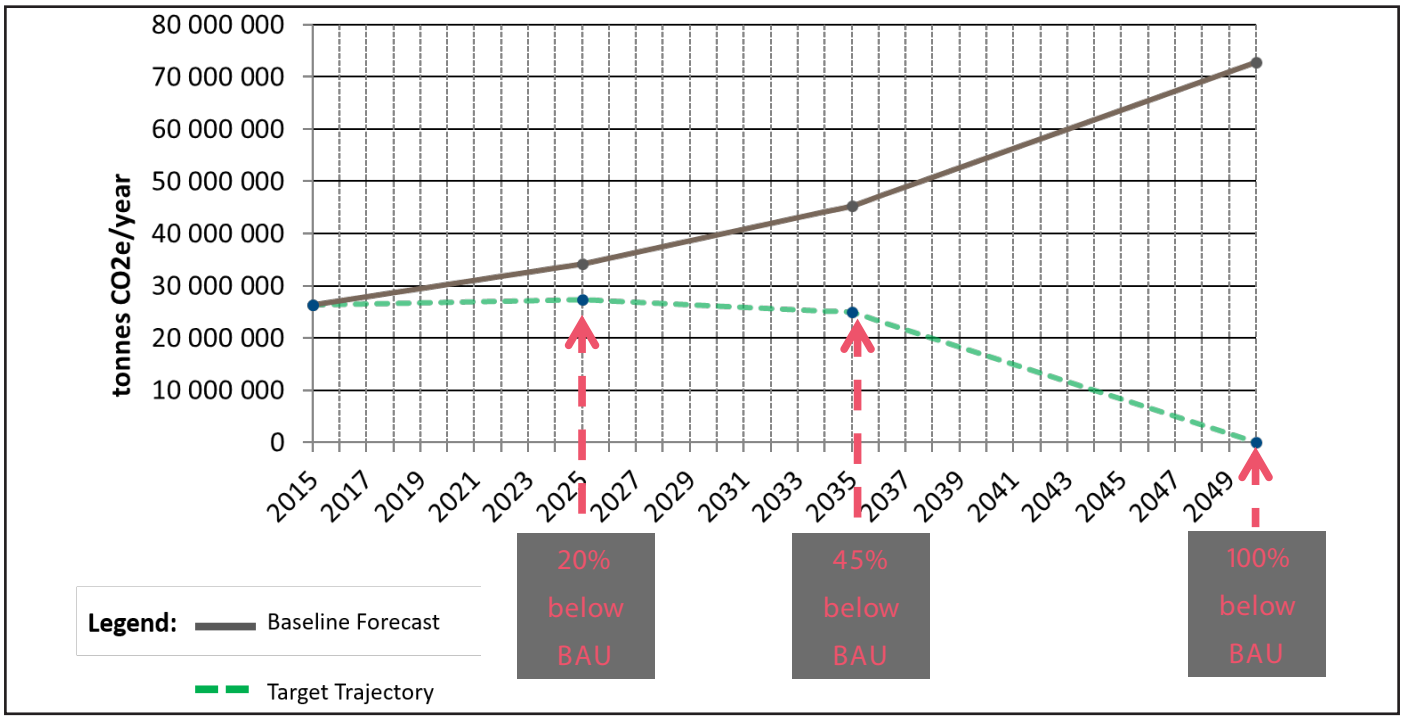


Figure 7: Summary of Lagos's emissions reduction targets by 2035, 2045 and 2050

3.8 Emission reduction scenarios

The inventory team developed several emissions reduction scenarios to support Lagos State with the identification of key strategies for reducing emissions in line with the objectives of the Paris Agreement. Stakeholder engagement formed a critical part of the development process of these scenarios:

- During the first workshop (23- 25 July 2018) with Lagos State, the existing and planned actions scenario was developed and stakeholders received training on scenario development.
- During the second workshop (25 November 2019) with Lagos State, stakeholders developed a scenario for Lagos which included a package of ambitious climate actions.
- Following the second workshop, stakeholders agreed on an outline for the CAP scenario, reflecting the actions identified and prioritised by the stakeholders. The CAP scenario is contingent on the growth and stabilisation of Lagos's electricity grid, as this will enable a wide range of ambitious climate actions.
- The level of ambition of the CAP scenario was reviewed by the Climate Change & Environmental Planning Department of the Lagos State Government in February 2020.
- The modelling of all scenarios was completed by March 2020 and the CAP scenario was approved by the Permanent Secretary in mid-2020.
- As the CAP scenario is not forecast to lead to net-zero emissions by 2050, an Extended Scenario was developed in October 2020, which reflects the additional measures required to meet the objectives of the Paris Agreement on Climate Change.
- A final workshop, focussing on the implementation of priority actions, was held in November 2020.

The following graph shows the emissions reductions to be achieved in key sectors under the CAP scenario relative to BAU:

- 2025: 18% below BAU
- 2035: 32% below BAU
- 2050: 45% below BAU

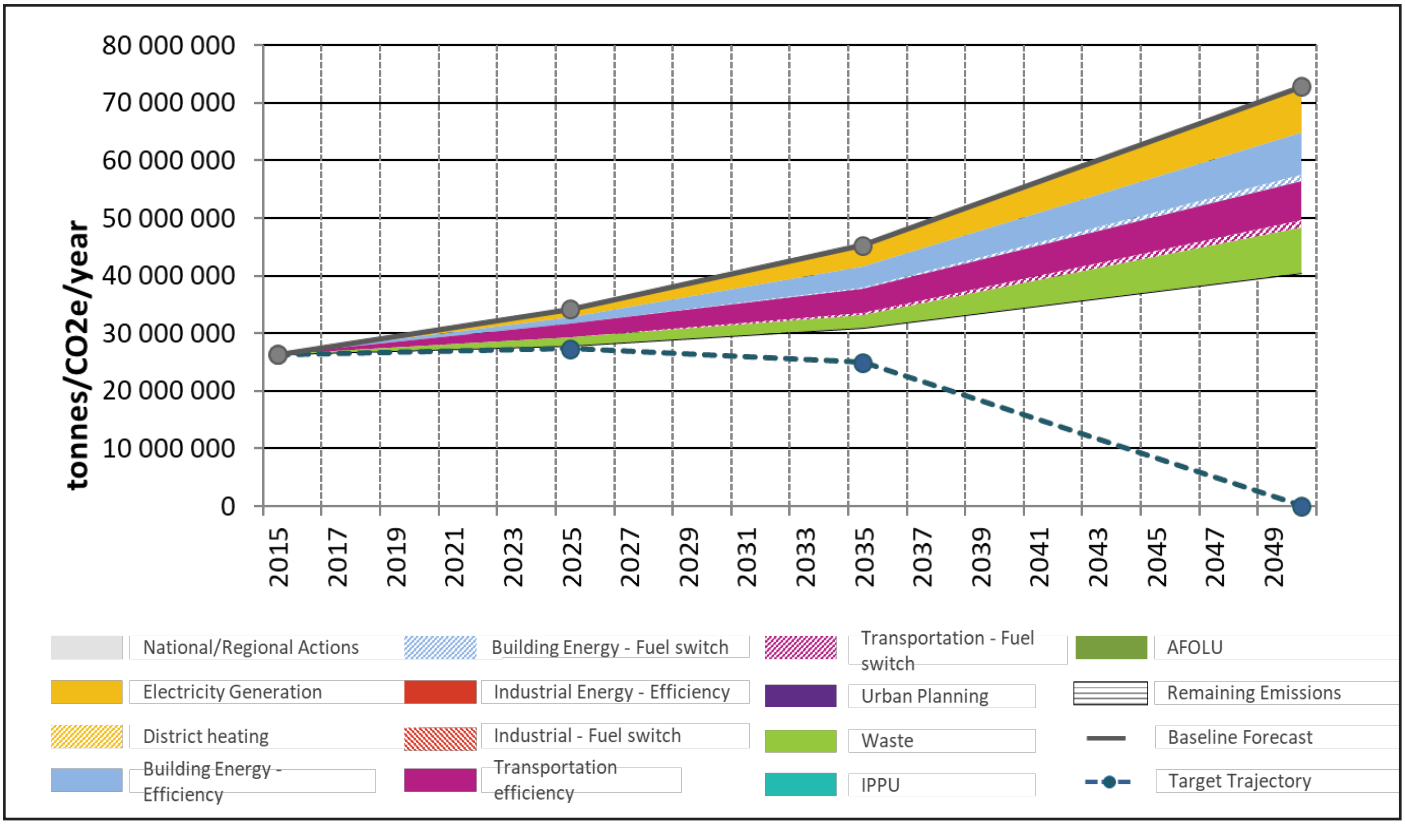
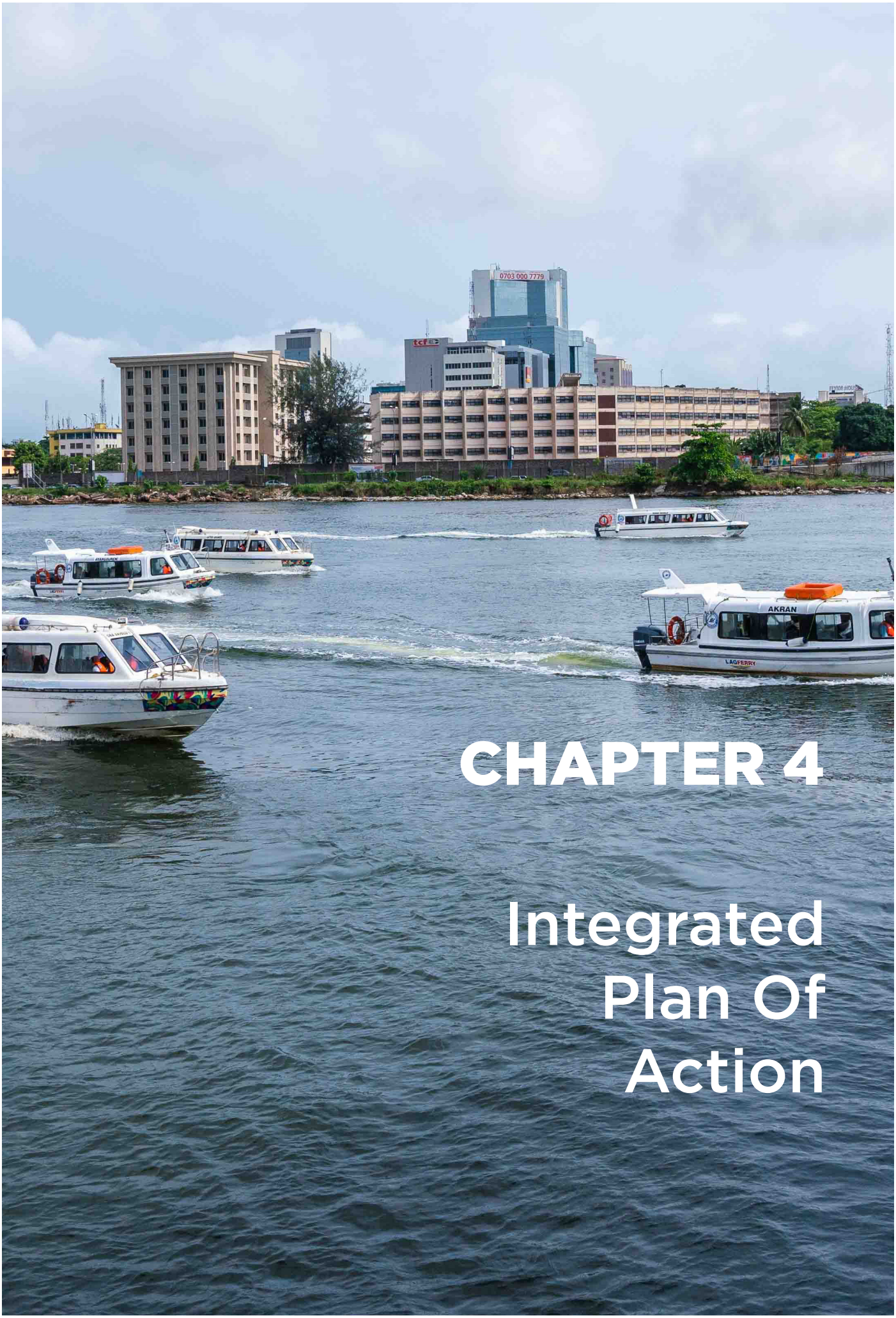


Figure 8: CAP Scenario emissions reductions by 2050

3.9 Lagos Climate Action Plan

The CAP defines a series of actions the targets under the CAP scenario. through which Lagos aims to achieve



CHAPTER 4

Integrated Plan Of Action

The following chapter presents a series of climate actions that have been identified to help Lagos embark on its course towards achieving net-zero carbon emissions by 2050. These actions target a number of areas and will aim to change the way Lagosians generate energy, dispose of waste and travel. They were identified through a process of prioritisation, combining stakeholder engagement, as described in Chapter 1, and insights and recommendations from climate specialists at C40, Ricardo Energy & Environment and Sustainable Energy Africa. Actions were selected based on key criteria including their potential to reduce emissions quickly, the State's capacity to implement them, their cost-effectiveness and their potential to produce broader benefits for society and the environment. The actions identified address both mitigation in current and future high-emitting sectors, and adaptation and resilience building to tackle projected vulnerabilities to climate change. Many of the actions build on existing plans and policies and all reflect the capacity of the Lagos State Government for effective implementation.

4.1 Climate change mitigation

For each of the mitigation actions a summary of the key components and impacts is provided, including:

- **Lead agency** – the key organisation responsible for implementation;
- **Collaborating agency/ies or stakeholder/s** – supporting organisations that will contribute to the implementation of the action;
- **Timeline** – the estimated timeframe for preparation and implementation of the action;
- **Resourcing plan (funding & financing)** – an outline of the expected funding routes for the action;
- **Level of State control** – the extent to which Lagos State has the capacity to implement the action and oversee operations;
- **Alignment with policies & plans** – the extent to which the action is aligned with existing plans and policies;
- **Key performance indicators** – a summary of the indicators that will be used to track the performance of the action following implementation;
- **Co-benefits** – the broader benefits for society and the environment that may result from the implementation of the action;
- **Sub-actions** – the interim steps required to achieve implementation of the action.

The mitigation actions fall under three broad categories: waste & wastewater; transport; and energy, buildings & industry. For each category, a description of current adaptation and mitigation activities is provided, including existing policies and plans. A summary of emissions reduction targets is then presented, followed by the individual mitigation actions. A summary of the actions relating to adaptation, reflecting the findings of the climate risk assessment (see Chapter 2), are listed under 'Climate change adaptation and resilience'.

4.2 Waste

How is the city targeting success?

Lagos's 2015 GHG inventory showed that the waste sector represented the second largest source of emissions in the city, at 25.3% of total GHG emissions. [C40 GHG Emissions interactive dashboard, GHG Inventory 2015 (https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard?language=en_US)].

Emissionsfrom the waste sector are projected to grow significantly until 2050, due to the city's rapidly growing population and residents' rising disposable income and consumption. Despite the projected growth in waste production, the State aims to significantly reduce emissions in the sector. The largest share of the waste produced by the city consists of food waste (45%), followed by plastics (15%), paper (10%), putrescible materials (8%), fine-grade materials (8%), glass (5%), metals (5%) and textiles (4%).[Lagos development plan 2012-2025 pg. 109.] Solid waste management is the responsibility of the Lagos Waste Management Authority (LAWMA), a parastatal institution that is part of the Ministry of the Environment. The State has identified a number of key areas of improvement for solid waste management, including infrastructure, recycling, public awareness and monitoring and enforcement. The growth of wastewater management emissions is also linked to urban population growth. The 2015 city-wide GHG inventory indicated that wastewater treatment in Lagos accounted for 48.5% of the total emissions of the waste sector.2 It is estimated that Lagos State generates 1.5 million cubic metres of wastewater per day.[Lagos development plan 2012-2015 pg. 6] The widespread use of septic tanks can result in groundwater pollution, especially in low-lying areas, which leads to health problems. Lagos State has initiated the refurbishment of several existing wastewater treatment plants and proposed to construct new ones through public-private partnerships (PPPs). Through these and other activities, the State will seek to enhance its centralised and decentralised wastewater collection systems, to reduce emissions and improve public and environmental health.

4.2.1 Existing policies and plans

Solid Waste Management

The State has initiated several sustainable waste management programmes in collaboration with the private sector. The State has also harmonized all environmental laws under the Lagos State Environmental Management and Protection Law 2007. This initiative was designed to address and enforce mitigation of solid waste management challenges in the State, while protecting the environment, public health and residents' living conditions. Lagos State is committed to improving its waste management infrastructure and machinery to meet the highest international standards. Transfer Loading Stations (TLS) are being constructed which will act as a midpoint to temporarily store waste, before being transferred to larger trucks and sent in bulk to landfills for final processing and disposal. The State aims to have 20 Transfer Loading Stations by 2030 to improve waste collection and recycling capacities. Material Recovery Facilities (MRF) will also be constructed as they play a pivotal role in improving the solid waste sector. These facilities ensure that valuable and recyclable items are sorted and separated from waste before final disposal. To achieve this, LAWMA will seek private sector investments through Public Private Partnerships PPP. The State is also planning to reposition its waste collection programme by procuring about 100 new waste trucks before the end of 2021 EarthCare Nigeria Limited provides the only other composting facility in the State, located within a farm settlement at Odogunyan. At full capacity, EarthCare can produce 200,000 metric tons of Grade "A" organic fertiliser per year, which is sold under the brand name CompostPLUS. The facility was closed

C40 GHG Emissions interactive dashboard, GHG Inventory 2015 (https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard?language=en_US) Lagos development plan 2012-2025 pg. 109. Lagos development plan 2012-2015 pg. 6 Nigeria NDC 2014 pg.11

as the demand for the compost was poor and its operation was deemed economically unfeasible. However, in a bid to reduce emission from the dump-sites caused by decomposition of the organic fraction of the waste, the State commenced overhauling of the compost plant in 2021 with a structure in place to facilitate off-takers for the products. Additionally, a briquette plant will be commissioned in 2021 for the production of biomass briquettes using 100% organic waste from sawmill and plant markets.

In order to meet its target to divert up to 40% of residual waste from landfill, the State is currently preparing the Lagos Recycling Initiative, which will ensure every home has access to separate bins for general and food waste. Other, smaller initiatives include a nylon buy-back programme, which aims to reduce the volume of plastic waste in water-ways, and a project to use sawdust from the timber industry for briquette pro-duction. The State also plans to improve enforcement of waste management policies and strategies, and to promote waste re-use and recycling in house-holds and businesses. This will reduce the volume of waste taken to landfills as well as the volume of waste that remains uncollected.

4.2.2 Wastewater

The Lagos State Wastewater Management Office (LSWMO) is the authority in charge of wastewater man-agement in Lagos State. The Office developed a 5-year Strategic and Investment Plan for sewage manage-ment for 2010 to 2015. This strategic plan comprised eight goals and 20 objec-tives. It aimed to construct ten new wastewater treatment plants (WWTP) across the state; complete the upgrade of three existing WWTPs and construct 5,250 kilometres of sewers. Funding for the project was to be sourced through a combination of budgetary provisions and PPPs.

The 5-Year Plan expired in 2015 but the objectives were not fully achieved due to the following:

- Lack of a Wastewater Infrastructural Development Plan (WIDP);
- Lack of a Septage Management Plan;
- Inadequate public awareness on dangers of wastewater mis- man-agement practices by Lagosians

The revised Strategic Plan of LSWMO IS tagged "5 – Year (2021 – 2025) Lagos State Wastewater Management Development Plan – LSWMDP". This new Plan is aimed at providing a road map for appropriate and sustainable Wastewater Management in Lagos State. It is geared towards the promotion of a culture of appropriate wastewater management in Lagos State and ensur-ing that wastewater management in Lagos State achieves the aspirations of both the T.H.E.M.E.S Agenda and the Sustainable Development Goals (SDGs).

4.2.3 Opportunities to go further

The actions discussed in this section aim to transform Lagos's waste and waste-water management systems to reduce GHG emissions and improve sanitation in the city. LAWMA's goals are to go beyond just creating an efficient waste collection system, to developing a system that can effectively recycle and manage waste to reduce GHG emissions and environmental impact. Key waste and wastewater targets that will con-tribute to emissions reductions under the CAP include:

- Divert 50% of organic waste to com-posting sites by 2050;
- Reduce open dumping and burning of organic waste by 50% by 2050;

Lagos Strategic CAP Appraisal Report
Lagos development plan 2012-2025.

- Achieve landfill gas capture rates of 20% by 2050;
- Increase anaerobic treatment of wastewater by 30% by 2050 and implement biogas capture;
- Increase wastewater infrastructural outlay from 10% to 100% by 2050;
- Decrease direct discharge of wastewater from 85.4% in 2015 to 0% in 2050;
- Decrease use of latrines from 25.5% in 2015 to 0% in 2050.

The targets related to waste management will deliver the emissions reductions, in comparison with the BAU scenario, outlined in Table 3. The targets related to waste management will deliver the emissions reductions, in comparison with the BAU scenario, outlined in Table 3.

SECTOR	STRATEGY	GHG REDUCTIONS PER YEAR (TCO2E)		
		2030	2040	2050
Waste and Wastewater	Expansions of wastewater treatment facilities	833,869	563,939	2,745,091
	Recycling	313,260	536,160	1,478,43
	Increased composting capacity	255,910	1,170,790	3,745,260

Table 3. Projected emissions reductions for the waste sector in 2030, 2040 & 2050

4.2.4 Waste actions

This section presents the mitigation actions to be implemented in the waste sector in Lagos. Stakeholders at the 'Ready for Implementation Workshop', held in November 2020, identified these actions as offering the greatest potential for implementation in the State. A Blueprint is presented for each action, including an indication of the lead agency and key collaborators, an estimated timeframe for implementation, alignment with existing policies, co-benefits and indicators. All actions listed in this chapter have been factored into the projected emissions reductions. A detailed list of sub-actions can be found in the Action Detailing Report.

Action 1

4.2.5 Waste infrastructure development strategy

Under this action, Lagos State will undertake an evaluation of the current status of waste management and develop a Waste Infrastructure Development Strategy by 2022. The evaluation will be based on data on tons

of waste collected, waste composition and volumes processed by MRF and composting facilities. The strategy will aim to increase the capacity of Lagos's waste transfer, material recovery, bio-digester and composting facilities. It will mandate the construction of new waste infrastructure, including transfer loading stations, starting in Iberekodo, Agunlejika and Odogunyan. The strategy will build on the progress the State has made so far in establishing waste transfer stations and expanding the waste vehicle fleet. The new facilities will need to have the capacity to absorb the expected increase in the volume of recyclables diverted from landfill due to the launch of the Lagos Recycling Initiative. Implementation of the strategy is expected to require State funding and cooperation with the private sector through PPPs. The State could institute a levy on waste disposal to support infrastructure investments. A number of previous projects were abandoned because their operation was deemed unfeasible; demand must be confirmed in the planning phase and consideration must be given to how these projects can be made sustainable in the long term. For wastewater management, the State Government intends to develop an Outline Business Case (OBC) study and WIDP for the sector. The OBC study/ WIDP will cover the preparation of detailed engineering designs, drawings and specifications, construction and operational cost estimates, environmental and social impact assessments, and analysis of required land use for wastewater infrastructure provision for existing and projected population of the State, in line with Regional Masterplan of the State. The WIDP will further determine project implementation and phasing plan, set timelines and process to be followed for project procurement (either through government funding or through private sector participation), while the OBC study will specifically provide a well-developed and comprehensive suite of project documents that will be made available to private investors during the procurement process. This is a useful tool that will bring all the elements of the project together, so that any conflicts between factors can be resolved before approaching the private sector. This document will be used to form the basis on which the project will be assessed and approved for commencement of the procurement phase. It will also have served as an investment document to engender the interest of investors and facilitate the implementation of wastewater treatment projects through public private partnerships (PPP) procurement routes. In addition to this, all existing wastewater treatment infrastructure in the State will be upgraded and expanded to cover more catchment areas, these include Alausa wastewater treatment plant (WWTP), Abesan WWTP, Oke-Afa WWTP and Iponri WWTP.

ACTION TITLE	WASTE INFRASTRUCTURE DEVELOPMENT STRATEGY
Lead agency	LAWMA, LSWMO
Collaborating agency(s) or stakeholder(s)	MOEWR, Lagos Wastewater Agency, Ministry of Works, Ministry of Science and Technology, Ministry of Physical Planning and Urban Development, Ministry of Justice, Ministry of Finance
Timeframe	5 years

ACTION TITLE	WASTE INFRASTRUCTURE DEVELOPMENT STRATEGY
Alignment with Policies & Plans	State Development Plan 2012-2025; Lagos Recycling Initiative; SDGs
Key performance indicators	Waste production (tons/year); Recycling rates (tons per type/year); Volume of waste dumped and burned (tons/year) Wastewater collected (tons/year) Wastewater safely treated (tons/year)
Co-benefits	Reduced pollution (e.g. leachate from open dumps and air pollution from uncontrolled burning); Improved public health (e.g. due to less waste dumped in communities leading to reduced vermin, disease, soil/water contamination) Job creation and economic development (e.g. through new employment opportunities around collection and management); Lower crime rates due to job creation.

Table 3: Action blueprint – Waste Infrastructure Development Strategy

Action 2

4.2.6 Implement waste separation at source and promote alternative uses for organics

This aim of this action is to divert organic waste from landfill. It includes an education campaign to promote waste separation by households and businesses, along with the introduction of technologies to assist with waste composting. The action will also feature community advocacy campaigns, the production and distribution of colour-coded bags and sorting bins, and the establishment of a monitoring team to ensure compliance with the new systems. The action will build upon the recently announced Lagos Recycling Initiative, which will provide bins for households for wet and dry waste. Implementation may be achieved through LAWMA franchising the Private Sector Participants (PSP) model for recycling.

ACTION TITLE	IMPLEMENT WASTE SEPARATION AT SOURCE AND PROMOTE ALTERNATIVE USES FOR ORGANICS
Lead agency	LAWMA
Collaborating agency(s) or stakeholder(s)	Ministry of Education; Private sector; Lagos State House of Assembly; Lagos State Environmental Protection Agency (LASEPA); LSG
Timeframe	2 – 5 years

ACTION TITLE	IMPLEMENT WASTE SEPARATION AT SOURCE AND PROMOTE ALTERNATIVE USES FOR ORGANICS
Alignment with Policies & Plans	State Development Plan 2012-2025; Lagos Recycling Initiative; SDGs
Key performance indicators	Waste production (tons/year); Recycling rates (tons by type/year); Composting rates (tons/year organic waste treated); Contamination rates (%)
Co-benefits	Reduced pollution (e.g. leachate from open dumps and air pollution from uncontrolled burning); Improved public health (e.g. due to less waste dumped in communities leading to reduced vermin, disease, soil/water contamination); Job creation and economic development (e.g. through new employment opportunities around collection and management of organic waste); Upstream AFOLU sector GHG reductions (e.g. through the utilisation of compost for urban agriculture or in place of synthetic fertilisers, reducing food miles and production/use of chemical inputs).

Table 4: Action blueprint – Implement waste separation at source and promote alternative uses for organics

Action 3

4.2.7 Community waste strategies for underserved communities

This action will promote waste recovery projects in underserved communities, such as composting and small-scale waste-to-energy initiatives, and facilitate the collection of reusables and recycling. The action will require an initial investment in capacity building and behaviour change campaigns and to facilitate the allocation or purchasing of land. However, the aim is for the initiative to become self-sustaining after a period, once a market has been established. Waste champions will be appointed in each community to assist with engagement and to identify investment opportunities. This action will further facilitate the improvement of wastewater management at the community level. LSWMO has identified the implementation of decentralized (Cluster) wastewater management strategy to extend wastewater services to underserved communities.

ACTION TITLE	WASTE MANAGEMENT STRATEGIES FOR UNDERSERVED COMMUNITIES
Lead agency	LAWMA

ACTION TITLE	WASTE MANAGEMENT STRATEGIES FOR UNDERSERVED COMMUNITIES
Collaborating agency(s) or stakeholder(s)	LASEPA; MPPUD; Ministry of Works and Infrastructure; MEPB
Timeframe	2 – 5 years
Alignment with Policies & Plans	State Development Plan 2012-2025; Lagos State Resilient Strategy , Lagos Recycling Initiative
Key performance indicators	Composting rates (tons/year organic waste treated); Amount energy generated (kw/tons); Recycling rates (tons by type/ year)
Co-benefits	Clean electricity generation for use or to sell (profit); Reduced pollution (e.g. leachate from open dumps and air pollution from uncontrolled burning); Improved public health (e.g. due to less waste dumped in communities leading to reduced vermin, disease, soil/water contamination); Job creation and economic development (e.g. through new employment opportunities around collection and management of organic waste); Environmental behavioural spillover (increased environmental awareness can catalyse other pro-environmental behaviours).

Table 5: Action blueprint – Community waste strategies for underserved communities

Action 4

4.2.8 Monitor, evaluate and update PSP waste collection contracts

Effective collection of waste and wastewater from both residential and commercial properties is key to effective waste management and to preventing uncontrolled dumping and disposal. The current set of PSP waste collection contracts has achieved a coverage and collection rate of 40-45% of residential waste. The aim of this action is to evaluate and update the contracts to increase coverage and monitor them to ensure that higher collection rates are achieved. If monitoring reveals that contracts are ineffective, a feedback loop needs to be established to review them. The goal is to facilitate collection of 90-95% of residential waste. LAWMA is responsible for reviewing and issuing contracts. However, performance monitoring will be undertaken jointly by LAWMA and the local authorities, as the latter are closer to residents and communities. Other key stakeholders involved in this action will be the PSP operators and the community organisations that provide monitoring and feedback on the effectiveness of the current contracts.

ACTION TITLE	MONITOR, EVALUATE AND UPDATE PSP WASTE COLLECTION CONTRACTS
Lead agency	LAWMA
Collaborating agency(s) or stakeholder(s)	Ministry of the Environment and Water Resources; PSP operators; Recycling Association; Local authorities
Timeframe	2 – 5 years
Alignment with Policies & Plans	State Development Plan 2012-2025
Key performance indicators	Residential waste collection rate (%); Waste production (tons/year); Recycling rates (tons per type/year); Volume of waste dumped and burned (tons/year)
Co-benefits	Reduced pollution (e.g. leachate from open dumps and air pollution from uncontrolled burning); Improved public health (e.g. due to less waste dumped in communities leading to reduced vermin, disease, soil/water contamination); Job creation and economic development (e.g. through new employment opportunities around waste collection and management).

Table 6: Action blueprint – Monitor, evaluate and update PSP waste collection contracts

Action 5

4.2.9 Construct sanitary landfills with landfill gas capture at existing and new sites

The aim of this action is to convert existing open dumps in Lagos into sanitary landfills and to improve methane management. Methane capture systems will also be constructed at all new disposal sites. The captured gas can be used to generate electricity for local use. LAWMA and MoE&WR will be responsible for the implementation of this scheme. However, collaboration will be required with various other stakeholders, including the Ministry of Energy and Mineral Resources (MEMR), the utility, technical institutions and private sector development partners. The key steps to implementing this action include the completion of a feasibility study, the development of a financing package, updates to the regulatory framework to allow the sites to supply power to the local grid and construction. LAWMA will aim to employ a public/private investment model using a blend of government and donor funds, private investment and revenue from energy generation.

ACTION TITLE	CONSTRUCT SANITARY LANDFILLS WITH LANDFILL GAS CAPTURE AT EXISTING AND NEW SITES
Lead agency	LAWMA
Collaborating agency(s) or stakeholder(s)	MEWR; MoW; MoE; MEMR
Timeframe	5 years
Alignment with Policies & Plans	State Development Plan 2012-2025
Key performance indicators	Methane capture (m3 per ton); Methane captured converted to electricity
Co-benefits	Energy production; Reduced pollution (reduction in smoke/air pollution, bad odours and leachate groundwater penetration)

Table 7: Action blueprint – Construct sanitary landfills with landfill gas capture at existing and new sites

Action 6

4.2.10 Scale-up biodigester use for households and communities

The objective of this action is to increase the use of biodigesters in low-income communities. The action will equip buildings in these communities with technology to treat solid and liquid waste. Pilots have already been conducted in several low-income communities across Lagos. MEWR will be the agency responsible for promoting this scheme, working through LSWMO and the Lagos State Urban Renewal Agency (LASURA). Community groups and NGOs will also play a central role in implementing the scheme, along with donor partners. The biodigesters will be financed through a combination of state funding (grants), funding from community savings groups and donor funds (e.g. Urban Poor Fund International; UPFI). It is anticipated that this scheme will form part of a larger programme to improve wastewater management systems across Lagos.

ACTION TITLE	SCALE-UP BIODIGESTER USE FOR HOUSEHOLDS AND COMMUNITIES
Lead agency	MEWR
Collaborating agency(s) or stakeholder(s)	MEWR; Lagos Wastewater Agency; LAWMA
Timeframe	2 – 5 years
Alignment with Policies & Plans	State Development Plan 2012-2025
Key performance indicators	Access to biofill toilets and biodigesters (% of people); Volume of sewage collected (m3/year); Volume of wastewater treated (m3/year); No. vacuum trucks (number operational/year); No. of households connected to sewage network (households/year)
Co-benefits	Improved public health and sanitation (e.g. less waste dumped in communities leading to reduced vermin, disease, soil/water contamination); Job creation and economic development (e.g. through new employment opportunities around collection and management).

Table 8: Action blueprint – Scale up biodigester use for households and communities

Action 7

4.2.11 Install industrial effluent treatment plants for 50% of businesses

This action reflects the objective set out in the Lagos State Development Plan 2012 – 2050 (p. 197) to ensure that 50% of industrial businesses install effective and efficient effluent treatment plants. The policy underpinning this action is already in place and significant stakeholder engagement has been undertaken. The State is considering instituting incentives, including tax incentives and awards for the best treatment plants. The action will also initiate monitoring of progress and the effectiveness of installations, and awareness and advocacy campaigns. The private sector will be expected to finance the installation of the plants, but the Government will fund incentives and a 'Green Bond' scheme could be considered to generate additional investment.

ACTION TITLE	INSTALL INDUSTRIAL EFFLUENT TREATMENT PLANTS FOR 50% OF BUSINESSES
Lead agency	LASEPA
Collaborating agency(s) or stakeholder(s)	MEWR; Lagos Wastewater Agency; MoW
Timeframe	5 years
Alignment with Policies & Plans	Cleaner Lagos Initiative; State Development Plan 2012-2025
Key performance indicators	Volume of wastewater treated (m3/year); Number of vacuum trucks (number operational/reduced/year); Number of businesses connected to sewage network (businesses/year)
Co-benefits	Reduced pollution (e.g. leachate from open dumps); Increased public health (e.g. less waste dumped in communities leading to reduced vermin, disease, soil/water contamination).

Table 9: Action blueprint – Install effluent treatment plants for 50% of industrial businesses

4.2.12 Implementation timeline

The following table presents the expected timelines for implementing actions related to waste and wastewater.

ACTIONS	<2 years	2 – 5 years	>5 years
1. WASTE INFRASTRUCTURE DEVELOPMENT STRATEGY			✓
2. IMPLEMENT WASTE SEPARATION AT SOURCE AND PROMOTE ALTERNATIVE USES FOR ORGANICS		✓	
3. COMMUNITY WASTE STRATEGIES FOR UNDERSERVED COMMUNITIES		✓	
4. MONITOR, EVALUATE AND UPDATE PSP WASTE COLLECTION CONTRACTS		✓	
5. CONSTRUCT SANITARY LANDFILLS WITH LANDFILL GAS CAPTURE AT EXISTING AND NEW SITES			✓
6. SCALE-UP BIODIGESTER USE FOR HOUSEHOLDS AND COMMUNITIES		✓	
7. INSTALL INDUSTRIAL EFFLUENT TREATMENT PLANTS FOR 50% OF BUSINESSES			✓

Table 10. Timeline for implementation of waste actions

4.3 Transport

How is the city targeting success?

Lagos is one of the fastest growing cities in the world. However, the development of its transport infrastructure has not kept pace with population growth and the attendant urban sprawl.. The public transport network is inadequate for the size of the city, despite recent improvements to the bus network. Forty percent of all fuel consumed in Nigeria is used in Lagos, and the approximately 1 million vehicles travelling in the State each day cause significant air pollution. Pollution is exacerbated by the prevalence of old and poorly maintained vehicles, and two-stroke engine motorcycles. Congestion is a large and growing problem in the city due to increasing private vehicle ownership. The 2015 GHG inventory showed that Lagos's transport sector was the third-largest emitter, accounting for 19.6% of total GHG emissions. Majority of these emissions are generated by on-road transport, which accounts for 18%, or 5.2 MtCO2e per year. To tackle these challenges, the city aims to promote a modal shift to mass transit by developing the light rail mass transit, expanding the BRT network, and implementing physical and spatial development plans, including a non-motorised transport policy.

4.3.1 Existing policies and plans

The Ministry of Works and Infrastructure is responsible for transport infrastructure in Lagos, while LAMATA is saddled with the responsibility of developing transport infrastructure on the Declared Road Network (DRN), mainly bus transport routes of about 623 kilometres. The transport systems, procurement and operation of public transport vehicles fall under the remit of the Ministry of Transport. Spatial development is the responsibility of the Ministry of Physical Planning and Urban Development. The State Government has the authority to implement transit-orientated development interventions that help to address climate change, such as the development of mass transit, walking and cycling infrastructure. Commercial freight systems are largely owned and operated by the private sector. In order to promote the adoption of low-emission vehicles in the commercial sector, the State Government would need to amend legislation. The two main transport projects in Lagos State are the BRT system and the rail mass transit system. The BRT system first opened with a 22 km line in 2008, and the network has since been extended with several additional routes and stations. The BRT system serves over 180,000 daily users and the plan is to introduce 5,000 new buses. In addition, 820 low emission buses have been procured and 13 new terminals and 300 new bus stops were completed in 2018. Lagos State is currently constructing 2 out of the planned 7 planned lines of the Light Rail Transit (LRT) system that will come into passenger operation in December 2022. The Lagos Metropolitan Area Transport Authority (LAMATA) manages this project in collaboration with the State Government. Lagos State has recently adopted several policies that will reduce transport sector emissions, including:

Lagos Non-Motorised Transport Policy pg. 15

4.3.1.1 Lagos State Transport Sector Reform Law 2018

The transport sector law governs the operation of commercial buses, motorcycles and tricycles on Lagos roads. It however prohibits the use of motorcycles and tricycles with an engine capacity of 200cc on major highways within Lagos State. Failure to comply with the above can be punished upon conviction by a competent court with imprisonment for a term of three years.

4.3.1.2 Non-Motorized Transport Policy (NMTP), 2018

The NMTP was developed by the LAMATA on behalf of the Lagos State Government. The policy aims to guide the development of transport systems that prioritise the needs of pedestrians and cyclists. The NMTP improves basic mobility, the affordability of transport, access to public transport and also provides health and recreational benefits. Improving the convenience, comfort and safety of walking and cycling reduces the demand for personal motorised vehicle travel and can help to alleviate the critical traffic challenges the State faces. Increased investment in NMT will complement existing efforts by the Lagos State Government to expand public transport services through initiatives such as the BRT system. This policy has been developed following extensive consultations, including stakeholder meetings and capacity building workshops. Successful implementation of the policy will require the joint efforts of relevant stakeholders to develop a safe, accessible transport system for all road users.

4.3.1.3 Bus Reform Initiative 2019

The initiative supports the State's ambition of delivering a world-class transportation system. Lagos is currently pursuing an integrated, affordable, multi-modal transport system that will allow citizens to reach their destinations in the shortest possible time. The aim of this initiative is to relieve the burden on the 5600 buses that currently services the 13.65 km route. It will provide 14 bus stations, 11 pedestrian bridges across the corridor, 1 bus depot and 3 bus terminals at Oshodi, Iyana Ipaja and Abule Egba. The Bus Reform Programme is expected to result in significant job creation in local communities.

4.3.1.4 Lagos Urban Transport Project (LUTP)

Phase one of the Lagos State Government's transport sector policy and strategy is the Lagos Urban Transport Project (LUTP). The project has five main components: Capacity Building, Road Network Efficiency, Bus Services Enhancement, Water Transport Promotion and Preparation of Future Phases, including a Transport Master Plan for the city

4.3.1.5 Lagos State Water Transport Programme

The physical environment of Lagos is well-suited for water transport, as about 17% of Lagos's total area is covered by lagoons and waterways. The Lagos Strategic Masterplan for Transportation calls for the launch of 17 proposed passenger ferry routes, with services to

target commuters. Water transportation is a vital mode of transport, especially for moving containers and other cargo to and from Lagos's ports.

4.3.2 Opportunities to go further

The transport and urban planning actions discussed in this section aim to achieve substantial and sustained reductions in GHG emissions in Lagos, while delivering an improved transport system for the benefit of the community. These actions focus on modal shifts, fuel switching, and enhanced fuel efficiency.

Key transport mitigation targets included in the CAP projections include:

- Reduce share of private car travel from 11.5% of all trips (2015) to 2% by 2050;
- Promote 50% modal shift from motorcycles to bicycles by 2050;
- Promote 80% modal shift from private cars to BRT by 2050;
- 52% of buses (standard & BRT) to be electric by 2050;
- 20% of motorcycles to be electric by 2050;
- 8% of taxis to be electric by 2050;
- Increased use of biodiesel in freight vehicles.

These goals and targets are expected to deliver the emissions reductions presented in the following table.

SECTOR	STRATEGY	GHG REDUCTIONS PER YEAR (TCO2E) 2030	2040	2050
Transport	Mode shift – walk/bike	406,056	966,571	1,622,949
	Mode shift - transit	1,608,120	2,601,868	4,449,665
	Passenger vehicle – fuel/ efficiency	121,859	379,191	340,274
	Transit vehicle – fuel switch/ efficiency	282,075	652,449	1,536,911

Table 11: Projected emission reductions for the transport sector in 2030, 2040 & 2050

4.3.3 Transport actions

This section presents the mitigation actions to be implemented in the transport sector. Stakeholders at the 'Ready for Implementation Workshop', held in November 2020, identified these actions as offering the greatest potential for successful implementation in the Lagos transport sector. A Blueprint is presented for each action, including an indication of the lead agency and key collaborators, an estimated timeframe for implementation, alignment with existing policies, co-benefits and indicators. All actions listed in this chapter have been factored into the projected emissions reductions. A detailed list of sub-actions can be found in the Action Detailing Report.

Action 8

4.3.4 Expansion of the BRT network in Lagos, including construction of five bus terminal gateway hubs

This action will expand the BRT network from the current three lines to a total of 14 lines. It will also make improvements to the network, including higher-frequency services, better design of lanes and stops, development of information systems to manage the system and deployment of low-emissions buses (biogas and/or electric). The action will include an integrated system that will help passengers to decide when and where to make journeys. The action is linked to broader transport schemes, including the construction of park and ride (P&R) stations, green corridors to enable. better walking and cycling access to the BRT and the promotion of car sharing. The five interstate bus gateway terminals will allow interstate buses to terminate at the edge of the city and their passengers to transfer onto BRT or other urban public transport modes. This action will remove the large number of interstate buses from Lagos inner city roads. These gateway sites will also be used to support car sharing and P&R schemes for interstate car journeys, to further reduce congestion on Lagos roads. In addition, the State will consider offering electric vehicle charging points at the gateway terminals.

ACTION TITLE	EXPANSION OF THE BRT NETWORK IN LAGOS, INCLUDING CONSTRUCTION OF FOUR BUS TERMINAL GATEWAY HUBS
Lead agency	MoT, LAMATA
Collaborating agency(s) or stakeholder(s)	LAMATA; Ministry of Works & Infrastructure (MoWI); Ministry of Physical Planning and Urban Development
Timeframe	5 years
Alignment with Policies & Plans	Transport Master Plan; Bus Reform Policy; Lagos State Transport Sector Reform Law 2018; Strategic Transport Plan
Key performance indicators	Personal motor vehicle (PMV) use (Vehicle Km Travelled – VKT/year); BRT use (no. of passengers/year; average journey length)
Co-benefits	Community benefit (improved public transport); Environment (e.g. air quality improvements – reduction in pollutant concentrations); Mobility & accessibility (e.g. reduction in journey times, improved connectivity)

Table 11: Action blueprint – Expansion of the BRT network in Lagos, including construction of four bus terminal gateway hubs

Action 9

4.3.5 Implementation of physical and spatial development plans that encourage low emission development

This action will involve the preparation of updated physical and spatial development plans that include the goal to reduce GHG emissions as a core consideration. The new plans will introduce requirements for developers to incorporate low-emission technologies in proposed development plans and introduce new spatial planning requirements that promote transit-oriented development, closely aligned with public transport networks, walking and cycling infrastructure and waste management systems. The updated plans will be aligned with the updated Strategic Transport Master Plan (STMP), which is currently under development and will outline the State's transport strategy to 2040. The action will also involve a review of obsolete plans, the establishment of masterplan champions to oversee implementation across ministries, departments and agencies (MDAs) and improvements to the planning regulatory system.

ACTION TITLE	IMPLEMENTATION OF PHYSICAL AND SPATIAL DEVELOPMENT PLANS THAT ENCOURAGE LOW EMISSION DEVELOPMENT
Lead agency	MPPUD, MOT
Collaborating agency(s) or stakeholder(s)	MoWI
Timeframe	2 – 5 years
Alignment with Policies & Plans	Lagos Strategic Transport Master Plan
Key performance indicators	New developments meeting improved standards; Modal share walking (%); Modal share cycling (%)
Co-benefits	Road safety (e.g. reduced number of accidents due to reduced car use and improved safety measures for pedestrians and cyclists); Environment (e.g. air quality improvements – reduction in pollutant concentrations); Improved infrastructure and amenities (e.g. footpath improvements and reclaimed public space); Mobility & accessibility (e.g. reduction in journey times, improved connectivity)

Table 12: Action blueprint – Implementation of physical and spatial development plans that encourage low emission development

Action 10

4.3.6 Adopt and implement the Non-motorised transport policy, including improvements to ferry safety and services

This action will build upon the recently developed Non-Motorised Transport Policy (NMTP). It will aim to enhance the safety of pedestrians and cyclists across Lagos, through a combination of advocacy campaigns, development of infrastructure and introduction of incentives for bicycle use. The action will be implemented by LAMATA, with support from the MoT and the Lagos State Waterways Authority (LASWA) and will build upon the pilot scheme for improved walkability in Lagos, which is currently under implementation by LAMATA and the Transformative Urban Mobility Initiative (TUMI). This action also includes improvements to the ferry service, to ensure the provision of a multi-modal transport network in Lagos. Lagos's ferries serve an estimated 2 million passengers per month, but the service could be expanded to further relieve pressure on the congested road networks. This action will expand and improve regulation of the ferry network, which has grown to 20 ferries in 2021, and assess the potential for the introduction of low and zero-emission ferries.

ACTION TITLE	ADOPT AND IMPLEMENT THE NON-MOTORIZED TRANSPORT POLICY (NMTP), INCLUDING IMPROVEMENTS TO THE FERRY SAFETY AND SERVICES
Lead agency	LASWA, MOT, LAMATA
Collaborating agency(s) or stakeholder(s)	LAMATA; MoWI; LAWMA; NIMASA; NIWA; Safety commission Ministry of Waterfront and infrastructure; MOEWR
Timeframe	2 – 5 years
Alignment with Policies & Plans	Lagos Strategic Transport Master Plan; Lagos State Transport Sector Reform Law 2018; Non-Motorised Transport Policy.
Key performance indicators	Mode share walking (%); Mode share cycling (%); Mode share of ferry passengers (%)
Co-benefits	Community benefit (improved public transport); Environment (e.g. air quality improvements – reduction in pollutant concentrations); Mobility & accessibility (e.g. reduction in journey times, improved connectivity); Reduction in road congestions (e.g. improved city living, reduction in car accidents)

Table 13: Action blueprint – Adopt and implement the NMTP, including improvements to ferry safety and services

Action 11

4.3.7 Encourage the uptake of low emission vehicles

This action will introduce a package of measures to increase the number of ultra-low emission vehicles (ULEVs, including electric/hybrid/hydrogen cars, motorcycles and freight vehicles). The package of measures will combine incentives and grants for the uptake of ULEVs, investment for infrastructure to support ULEVs, the introduction and enforcement of priority bus lanes and greater restrictions on the use of high polluting vehicles. The action will build upon a feasibility study for electric vehicle charging infrastructure currently ongoing in Lagos. The action will aim to achieve improvements in local air quality and reductions in GHG emissions. Its activities will be supported through the employment of traffic officers and an administrative team to manage implementation and the collection of fines. The steps to implement the action will include the completion of an assessment of low-emission transport measures to identify a preferred package of options, the establishment of vehicle testing centres and the introduction of improvements in relevant systems to facilitate enforcement of the changes, with the participation of PPPs.

ACTION TITLE	ENCOURAGE THE UPTAKE OF LOW EMISSION VEHICLES
Lead agency	MoT, LAMATA
Collaborating agency(s) or stakeholder(s)	LAMATA; MoWI; LAWMA; MoEWR
Timeframe	2 – 5 years
Alignment with Policies & Plans	Transport Master Plan; Lagos State Transport Sector Reform Law 2018; NMTP
Key performance indicators	No. of low emission vehicles (% of hybrid / electric / hydrogen vehicles); Uptake of ULEVs grants (No. of grant applications); Sales of petrol /diesel fuel (liters/ gallons of fuel in a time period); Sales of catalytic converters
Co-benefits	Environment (e.g. air quality improvements – reduction in pollutant concentrations); Mobility & accessibility (e.g. reduction in journey times, improved connectivity); Reduction in road congestions (e.g. improved city living, reduction in car accidents); Job creation in new sectors and technologies associated with low emission cars

Table 14: Action blueprint – Encourage the uptake of low emission vehicles

Action 12

4.3.8 Encourage the shift of freight from road to rail

Freight is an often-overlooked area in transport policy, as it is viewed as a private sector activity. However, it is likely to be a significant contributor to transport emissions and has wider social and safety impacts. Shifting freight to rail will remove lorries from the roads, which will reduce both emissions and congestion. This action will invest in establishing rail links between the State's major ports, industrial centres and airports to allow for freight transportation by rail. This action will build upon recently introduced freight policies in Lagos, including operational restrictions in central areas and the introduction of truck parks. It is also expected to be supported by the development of a new Freight Masterplan.

The Master Plan Study for Utilization of Solar Energy in the Federal Republic of Nigeria
C40 GHG Emissions interactive dashboard, GHG Inventory 2015 (https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard?language=en_US) Nigerian Energy Support Programme (NESP)

ACTION TITLE	ENCOURAGE THE SHIFT OF FREIGHT FROM ROAD TO RAIL
Lead agency	MOT
Collaborating agency(s) or stakeholder(s)	LAMATA; MoT
Timeframe	5 years
Alignment with Policies & Plans	Lagos Strategic Transport Master Plan; Lagos State Transport Sector Reform Law 2018; Non-Motorised Transport Policy
Key performance indicators	No. of freight vehicles on the road (% of vehicles); Expansion of rail networks (km of railway lines, no. of rail ports, connections)
Co-benefits	Environment (e.g. air quality improvements – reduction in pollutant concentrations); Mobility & accessibility (e.g. reduction in journey times, improved connectivity); Reduction in road congestions (e.g. improved city living, reduction in car accidents)

Table 15: Action blueprint – Encourage the move from freight to rail

4.3.9 Implementation timeline

The following table presents the expected timelines for implementing actions related to transport.

ACTIONS	<2 years	2 – 5 years	>5 years
8. EXPANSION OF THE BRT NETWORK IN LAGOS, INCLUDING IMPLEMENTATION OF FOUR BUS TERMINAL GATEWAY HUBS			✓
9. IMPLEMENTATION OF PHYSICAL AND SPATIAL DEVELOPMENT PLANS THAT ENCOURAGE LOW EMISSION DEVELOPMENT		✓	
10. ADOPT AND IMPLEMENT THE NON-MOTORIZED TRANSPORT POLICY (NMTP), INCLUDING IMPROVEMENTS TO THE FERRY SAFETY AND SERVICES		✓	
11. ENCOURAGE THE UPTAKE OF LOW EMISSION VEHICLES		✓	
12. ENCOURAGE THE MOVE FROM FREIGHT TO RAIL			✓

Table 16: Timeline for implementation of transport actions

4.4 Energy

How is the city targeting success?

Lagos State has the highest electricity demand of any State in Nigeria, consuming over 800 MW of the 4,000 MW produced nationally.[The Master Plan Study for Utilization of Solar Energy in the Federal Republic of Nigeria] The 2015 GHG inventory indicates that the energy sector is responsible for approximately 55.1% of total emissions. Energy use in residential buildings generates 5.9 MtCO2eq per year (41% of the overall stationary energy emissions), energy use in manufacturing industries generates 5.6 MtCO2eq per year (38%) and energy use in commercial buildings generates 2.95 MtCO2eq per year (20%).[C40 GHG Emissions interactive dashboard, GHG Inventory 2015 (https://www.c40knowledgehub.org/s/article/C40-cities-greenhouse-gas-emissions-interactive-dashboard?language=en_US)]

Electricity accounts for the majority of energy consumed in buildings in Lagos, however, significant emissions also result from the use of fossil fuels (such as LPG, kerosene, diesel and other liquid fuels) and biomass. Commercial institutions and industries also often use backup (diesel) generators during power outages. Kerosene and LPG are commonly used for cooking in residential and commercial premises and heavy fuel oil is typically used in the manufacturing sector.

Improving the resilience of the energy sector to climate change impacts requires transforming the energy mix. This can be achieved by diversifying energy sources to include hydropower and other renewable energy, in addition to implementing energy efficiency measures and increasing access to off-grid energy. In support of energy sector transformation, the city facilitates the uptake of small-scale renewables and energy efficiency improvements in existing buildings and encourages decentralised renewable energy generation.

The State Government is responsible for energy supply to some government-owned buildings, through five independent LPG-fuelled power facilities operated by PPPs. The State Government has the authority to install renewable energy generation capacity in all government facilities, including housing estates and public utilities. However, beyond government facilities, the State has limited capacity to effect change. The Ministry of Housing is responsible for the implementation of energy efficiency measures in government projects and for advocating for the application of similar schemes in private developments. The Ministry of Energy and Mineral Resources manages energy efficiency in existing city-owned, government-owned and privately owned buildings. The State Government has the authority to impose higher energy efficiency standards for new and existing buildings.

4.4.1 Existing policies and plans

Nigeria's NDC sets a target of generating 30% of electricity using renewable energy technology by 2030.[Lagos Strategic CAP Appraisal Report] However, electricity demand in Nigeria is expected to double in the next decade due to population growth. As a result, more consumers will depend on firewood, kerosene, petrol and diesel to supplement their power needs. In response to these growing needs, the National Government developed the Electric Power Sector Reform Act of

2005 and a National Energy Master Plan (NEMP), which culminated in an Electricity Master Plan in 2008. Subsequently, in 2015, the Government adopted the National Renewable Energy and Energy Efficiency Policy (NREEEP). This is a vital policy for Lagos State, as it aims to reduce reliance on small-scale diesel generators for electricity production. The policy aims to accelerate the uptake of renewable energy technologies, including hydro, wind and solar PV. It sets production targets for some renewable energy technologies; for example, it aims for 3% solar energy in the energy mix by 2020 and 6% by 2030. Other policy and strategy interventions include:

- The establishment of the Rural Electrification Agency (REA), which undertakes feasibility studies on the potential for using renewable electricity generation technologies in remote and off-grid areas;
- The development of building energy efficiency codes to ensure buildings are designed to take advantage of climatic conditions in order to reduce energy consumption;
- Mandating the deployment of energy-saving light fixtures in federal government offices and facilities;
- The provision of grants to communities to aid the adoption of community-based renewable energy generation.

Under the NREEEP, two further products have been developed: (a) the National Renewable Energy Action Plan (NREAP) and (b) the National Energy Efficiency Action Plan (NEEAP). These action plans articulated the objectives, policies and strategies set out in the NREEEP and formed the foundation for the Revised National Policy on Renewable Energy and Energy Efficiency.

The Lagos State House of Assembly recently passed the Lagos State Electric Power Sector Reform Law, 2018. The Law aims to boost electricity supply in Lagos State through the establishment of a power scheme and the creation of offences for energy theft. It aims to generate and distribute approximately 3,000 MW for public use in the State using off-grid energy generation installations. This is a special initiative comprising off-street lighting, community electrification and embedded power programmes.

4.4.2 Opportunities to go further

Some of the key mitigation targets related to the energy sector factored into the CAP projections include:

- 49% of grid electricity to be generated by renewables in 2050;
- 80% of newly built commercial properties to use solar water heating by 2035;
- 100% of residential properties to transition to solar water heating by 2050;
- 100% of cook stoves to be electric by 2050;
- 95% of existing buildings to use LED lighting by 2035.

These goals and targets will deliver the emissions reductions presented in Table 17.

SECTOR	EMISSION SOURCE	GHG REDUCTIONS PER YEAR (TCO2E) 2025	2035	2050
Electricity Generation	Off-grid re-newables	844,508	2,180,625	4,192,497
	Self-generation	184,824	585,454	2,578,439
	Grid decarbonization	457,598	379,191	1,224,741
Building energy	New construction – efficiency	259,381	1,665,418	5,446,168
	Retrofit – building envelopes	40,778	136,899	208,298
	Space cooling – efficiency	28,662	91,612	132,526
	Water heating – efficiency/fuel switch	105,555	456,205	859,571
	Cooking – fuel switch	38,717	-12,287	59,203
	Lighting – efficiency	405,410	1,283,797	1,351,365
	Equipment - efficiency	73,273	256,455	403,000

Table 18: Projected emissions reductions in the energy sector in 2030, 2040 & 2050

4.4.3 Energy actions

This section presents the mitigation actions to be implemented in the energy sector. Stakeholders at the 'Ready for Implementation Workshop', held in November 2020, identified these actions as offering the greatest potential for implementation in Lagos. A Blueprint is presented for each action, including an indication of the lead agency and key collaborators, an estimated timeframe for implementation, alignment with existing policies, co-benefits and indicators. All actions listed in this chapter have been factored into the projected emissions reductions. A detailed list of sub-actions can be found in the Action Detailing Report.

Action 13

4.4.4 Campaign to install solar photovoltaic (PV) systems at schools, hospitals and municipal buildings

This action will build upon the progress made so far in installing solar PV systems at schools and hospitals across Lagos. The action will look to expand the installation programme to cover all schools, hospitals and municipal buildings, whilst also raising public awareness of the benefits of solar PV systems, stimulating investment in the sector and supporting local economies. This action will be managed by the MEMR, the Lagos State Electricity Board and the Ministries of Health and Education. Key stakeholders that will be engaged include NGOs, PPPs, student organisations and members of the public. At present, many solar PV installations are used to provide backup power, or have been installed in areas where energy supply is limited. The next steps will be to develop a roadmap for rolling out new installations at all remaining buildings and to identify investors and funding organisations for these installations. A regulatory framework for attracting funding is currently under development with the support of the UK Government. The campaign has benefited from effective public engagement, including the introduction of an education programme for participating schools, and from positive media coverage. It will be important to build on this awareness to gain buy-in from local communities and investors.

ACTION TITLE	CAMPAIGN TO INSTALL SOLAR PHOTOVOLTAIC (PV) SYSTEMS AT SCHOOLS, HOSPITALS AND MUNICIPAL BUILDINGS
Lead agency	MEMR
Collaborating agency(s) or stakeholder(s)	LSEB; MoH; MoE&WR; LGAs & LCDAs; MoIS; Private Sectors Ministry of Education
Timeframe	2 – 5 years
Alignment with Policies & Plans	Lagos State Electric Power Sector Reform Law; Nigeria's Renewable Energy Master Plan; Nigerian Energy Support Programme; Renewable Energy Strategy for Lagos State
Key performance indicators	Solar PV installations (% buildings with technology installed; number of new units installed/year); No. of employment opportunities created in the sector
Co-benefits	Community benefits (e.g. cost savings from lower consumption of diesel/grid electricity; increased comfort); Environmental (e.g. improved air quality from reduced use of diesel, kerosene and other fuels; lower energy demands reducing generation needs)

Table 19: Action blueprint – Campaign to install solar photovoltaic (PV) systems at schools, hospitals and municipal buildings

Action 14

4.4.5 Develop policies that promote decentralised renewable energy generation, in collaboration with the Federal Government, to improve grid stability

This action will promote the uptake of small-scale renewables through a package of measures, including improvements to the feed-in tariff regulation. Under this regulation, Distribution Companies (DisCos) are obliged to source 50% of their electricity from renewables. Further promotion and support of this policy will help to increase the uptake of renewables in Lagos and across the wider region. The action will also include a review of the current regulation with the aims of giving Lagos State more control over the energy system within the city and of evaluating the potential for introducing more attractive tariffs. Support measures may include educational information campaigns for suppliers and energy consumers. The improved feed-in tariff will provide a clear signal to the market to boost investment in renewable energy

technologies, stimulate the market and increase the share of renewables in the energy mix. It will also be important for Lagos State to lead by example, by generating renewable energy on municipal land or buildings where feasible. This action will benefit from improvements to planning and permitting processes, including the introduction of requirements for renewables in new developments, and from the development of a renewables roadmap for the State, as recommended by the recently published Renewable Energy Strategy for Lagos State. This action also aims to improve the reliability of the grid electricity supply (generation and transmission), by influencing the Federal Government, Lagos State Government and MEMR to engage with DisCos, Generation Companies (GenCos) and the transmission company.

There are plans to reform the existing power generation system in Nigeria. The Federal Government has contracted Siemens to develop a strategy for increasing generation and improving transmission. There is a precedent for successful Federal-State collaboration in support of grid expansion (a partnership that distributed invertors). The Federal Government would be responsible for the implementation of this action, with input from State Governments and private organisations. In areas where it is not possible to expand the grid, it will be important to prioritise the deployment of off-grid renewables and battery systems. This action will be critical to ensuring these off-grid areas have adequate access to modern energy and to supporting the State's ambitions of achieving net-zero emissions.

ACTION TITLE	DEVELOP POLICIES THAT PROMOTE DECENTRALISED RENEWABLE ENERGY GENERATION, IN COLLABORATION WITH THE FEDERAL GOVERNMENT, TO IMPROVE GRID STABILITY
Lead agency	Federal Government & LSG
Collaborating agency(s) or stakeholder(s)	MEMR; Discos; GenCos; National Transmission Company; MoF; MoIS; LSEB; MEBP
Timeframe	2 – 5 years
Alignment with Policies & Plans	Lagos State Electric Power Sector Reform Law; Nigeria's Renewable Energy Master Plan; Nigerian Energy Support Programme; Renewable Energy Strategy for Lagos State
Key performance indicators	Solar PV installations (% buildings with technology installed; number of new units installed/year); No. of employment/ upskilling opportunities created in the sector; Coverage of grid connections (total area (ha); expansion of new connection areas in ha/year); Access to electricity (% of households connected to the grid, access to off-grid renewables); Energy mix (%renewable energy); Grid stability (baseline data on grid efficiency); Uptake of renewable technologies (supply and demand in the market and decrease or increase of unit cost); Uptake of feed-in tariff (amount of excess energy generated and sold back to the grid)

ACTION TITLE	DEVELOP POLICIES THAT PROMOTE DECENTRALISED RENEWABLE ENERGY GENERATION, IN COLLABORATION WITH THE FEDERAL GOVERNMENT, TO IMPROVE GRID STABILITY
Co-benefits	Economic (e.g. extra power can be exported; cost savings for households); Environmental (e.g. indoor and outdoor air quality improvements from reduced combustion of fossil fuels; reduced noise pollution from generators); Social and inclusivity (e.g. increased access to electricity ensuring more equitable access to opportunities, including education, more free time for women); Security (reduced levels of crime, safer communities due to street lighting); Education (increase in school grades as children are able to study after school hours)

Table 20: Action blueprint – Develop policies that promote decentralised renewable energy generation, in collaboration with the Federal Government, to improve grid stability

Action 15

4.4.6 Reduce emissions in the residential sector by promoting the development of energy storage technologies and incentivising the deployment of micro-grids in off-grid urban communities

This action pursues improvements in the residential housing sector in Lagos, including by developing a finance mechanism and subsidies to support the uptake of renewables. The action will build on the successes of the Eko Gas Project and the Lagos Solar Project. It will be managed jointly by the Ministry of Energy & Mineral Resources and the Lagos State Electricity Board, with support from the Ministry of Environment & Water Resources and the Ministry of Physical Planning & Urban Development. The action will also include the introduction of new building standards, which set requirements for energy efficiency and the adoption of renewables in new developments.

The use of energy storage technologies will be crucial to the success of decentralised renewables in the residential sector, as they can ensure that the energy generated is fully utilised. Lagos is in the process of introducing batteries to support street lighting systems in some parts of the State. This action will focus on individual and local-scale storage technologies such as battery storage, rather than large-scale storage to support the grid. The action will also support local businesses involved in the production of renewable energy and associated technologies. Measures to increase the supply of clean, reliable and affordable energy will include a market study and strategy development, the development of an affordable financing model and the implementation of PPPs between Lagos State and the private sector for the deployment of micro-grids. The action will target off-grid communities by developing a market for small-scale renewables.

ACTION TITLE	REDUCE EMISSIONS IN THE RESIDENTIAL SECTOR BY PROMOTING THE DEVELOPMENT OF ENERGY STORAGE TECHNOLOGIES AND INCENTIVISING THE DEPLOYMENT OF MICRO-GRIDS IN OFF-GRID URBAN COMMUNITIES
Lead agency	MEMR; LSEB
Collaborating agency(s) or stakeholder(s)	MEWR; MPPUD
Timeframe	5 years
Alignment with Policies & Plans	Lagos Solar Project; National Renewable Energy and Energy Efficiency Policy; Lagos State Electric Power Sector Reform Law; Nigeria's Renewable Energy Master Plan; Nigerian Energy Support Programme; Renewable Energy Strategy for Lagos State
Key performance indicators	Solar PV installations (% buildings with technology installed; number of new units installed/year); Coverage of grid connections (total area (ha); expansion of new connection areas in ha/year); Access to electricity (% of households connected to the grid, access to off-grid renewable electricity); Energy mix (%renewable energy); Uptake of battery storage (% of storage units; day and night tariffs and usage)
Co-benefits	Economic (e.g. extra power can be exported; cost savings for households); Environmental (e.g. indoor and outdoor air quality improvements from reduced combustion of fossil fuels; reduced noise pollution from generators); Social and inclusivity (e.g. increased access to electricity ensuring more equitable access to opportunities, including education, more free time for women); Security (reduced levels of crime, safer communities due to street lighting)

Table 21: Action blueprint – Reduce emissions in the residential sector by promoting the development of energy storage technologies and incentivising the deployment of micro-grids in off-grid urban communities

4.4.7 Implementation timeline

The following table presents the expected timelines for implementing actions related to energy.

ACTIONS	<2 years	2 – 5 years	>5 years
13. CAMPAIGN TO INSTALL SOLAR PHOTOVOLTAIC (PV) SYSTEMS AT SCHOOLS, HOSPITALS AND MUNICIPAL BUILDINGS		✓	

ACTIONS	<2 years	2 – 5 years	>5 years
14. DEVELOP POLICIES THAT PROMOTE THE USE OF DECENTRALIZED RENEWABLE ENERGY IN COLLABORATION WITH THE FEDERAL GOVERNMENT TO IMPROVE GRID STABILITY		✓	
15. SHIFT TO LOW CARBON RESIDENTIAL SECTOR BY PROMOTING THE DEVELOPMENT OF ENERGY STORAGE TECHNOLOGIES AND INCENTIVISE MICRO-GRIDS FOR OFF-GRID URBAN COMMUNITIES			✓

Table 22: Timeline for implementation of energy actions

4.5 Climate Adaptation & Resilience

Prioritized Adaptation Actions

It is known that extreme events will continue to occur as a consequence of climate change. Due to identified topographic and geographic characteristics, Lagos State is exposed to significant climate risk. Flooding events, coastal erosion, inundation, subsidence, extreme storms and extreme heat impacts are priority hazards of concern to the population; many of whom are known to be extremely vulnerable. Three sectors have also been characterised as extremely vulnerable, due to their unique sensitivity and exposure to climate hazards – tourism, agriculture and infrastructure. Failing to adapt to certain climate risks could have catastrophic consequences on Lagos' population, economy, infrastructural and natural assets, and political stability. These prioritised goals, objectives and initiatives have been determined through their ability to combat climate impacts, risks and hazards. They outline a comprehensive strategy that seeks to reduce sensitivity, mitigate impact, increase adaptive capacity and create resilience. The goals and objectives have been developed through a process of stakeholder engagement, within context to state capacity and power, and reflect the vision of creating a cleaner, greener, healthier, stable and more prosperous Lagos in a changing climate. The development process also took into consideration state resources, power and capacity to implement initiatives, which has ensured the goals and objectives are achievable and realistic within the context of Lagos. The identified initiatives are a combination of existing and proposed policies or actions that will operationalize the objectives of the State's CAP in the face of significant risk.

4.5.1 Resilient Ecosystem

Lagos State will experience an increase in annual average temperatures, ex treme heat events, sea level rise, erosion and inundation. All of which will have significant impact on natural resources. The strength and health of ecosystems directly correlates to agricultural production, food security and biodiversity. To reduce the vulnerability of these areas the following actions have been identified.

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Integrate green and nature-based ecosystem services into hard engineering solutions	Ministry of Agriculture LASPARK	>5 years	Area of land used for the purpose of green and nature-based ecosystems; increase in species number and type; funding allocated to green and nature-based ecosystem services	Improve ecosystem health; Increase adaptive capacity of infrastructure; Reduced environmental impact of hard-engineering solutions; Reduced emissions from full life-cycle of solutions;
Plant more trees for more shade and cooling in public spaces, markets, along streets, and encourage tree-planting on private property	Ministry of Agriculture LASPARK	>5 years	Number of trees planted in public and private spaces, funding allocated to tree planting	Improve ecosystem health; Increase adaptive capacity of city spaces to heat related impacts; Improve air quality, soil quality, soil stability, water quality; Promote greening and beautifying of urban spaces; Increase natural carbon-capture capacity
Regenerate farm centres and explore urban agriculture opportunities to strengthen food security	Ministry of Agriculture	>5 years	Collaborations with farming centres; Establishment of urban agriculture opportunities; Food pricing; Average distance of 'farm to fork' food provision	Meets basic needs; Supports livelihood and employment; Protects natural and man-made assets; Empowers a broad range of stakeholders; Fosters economic prosperity

Table 26: Actions supporting a resilient ecosystem

These actions will reduce ecosystem sensitivity to climate impacts by improving ecosystem health, increase adaptive capacity of urban areas to extreme heat and the urban heat island effect, and increase the resilience of food systems and agriculture.

Goal 2

4.5.2 Flood-Proof Lagos

The most certain and significant risks to the State of Lagos are impacts from flood events and sea level rise.

The State's geographical and topographical characteristics create intrinsic sensitivity to flooding, while poor infrastructure and waste management have degraded drainage systems and increased the incidences of flash flooding events. Primary impacts include loss of life, infrastructure damage, disrupted operations, environmental damage, pollution of water sources, salination, inundation and displacement. Secondary impacts consist of health risks such as disease from polluted water sources, social unrest from disrupted operations and services, and economic downturn following extreme events. The following initiatives and actions have been proposed:

Target Flood Risk

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Produce a city-wide flood risk map	Ministry of the Environment and Water Resources	2 – 5 years	Identification of flood risk areas; Provision of public information on flood risk data and guidance	Increase institutional capacity to plan for, respond to and recover from flood risk; Increase community capacity to understand local flood risk; Increase evidence-based decision-making; Increase public trust in institutional capacity to manage climate risk; Improve ability to embed climate risk into urban planning and development; Prevent maladaptation by understanding spatial and temporal flood risk
Strengthen the State's capacity for the collection, analysis and dissemination of data	Lagos State Residents Registration Agency Lagos State Ministry of Budget and Planning (Lagos Bureau of statistics)	2 – 5 years	Available of access to stakeholders and public; Establishment of data owners; Agreement on data owners and a system for collection and maintenance	Improves capacity for evidence-based decision-making; Improves institutional capacity for climate risk analysis; Improves institutional capacity for vulnerability analysis; Improves city capacity for adaptation; Engages stakeholders and fosters trust between the public and institutions

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Develop and implement a storm water drainage master plan	MoEWR	>5 years	Allocation of funding to support development; Development of Masterplan; Agreement on priority actions	Reduced sensitivity of city to flooding hazards; Reduced potential of flash flooding events; Mitigates impact to health and sanitation from flooding events; Mitigates displacement and loss of life; Mitigates damage to infrastructure and property; Mitigates impact to natural capital (i.e. degradation of soil quality, soil stability, water quality, water availability)
Improve, expand and maintain the city-wide drainage network	MoEWR	>5 years	Allocation of funding for draining improvements; Completion of impact assessments; Commissioning of private sector; Percentage of city with adequate drainage coverage	Reduces sensitivity of city to flooding hazards; Reduces potential of flash flooding events; Mitigates impact to health and sanitation from flooding events; Mitigates displacement and loss of life; Mitigates damage to infrastructure and property; Mitigates impact to natural capital (i.e. degradation of soil quality, soil stability, water quality, water availability)

Table 27: Actions supporting reduced flood risk

Reduce Waste and Improve Water Quality

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Construct community wastewater treatment plants	Lagos State Wastewater Management Office	>5 years	Identification of priority areas for wastewater treatment plants; Allocation of funding for treatment plants; Completion of impact assessments; Commissioning of private sector; Percentage of households with access to adequate sanitation	Reduced sensitivity of city to flooding hazards; Reduced potential of flash flooding events; Reduced pollution in community spaces; Reduced incidence of water borne disease; Reduced pollution and improves health of ecosystems; Reduced vulnerability of communities to disease and cascading impacts of flooding; Increased water quality, soil quality and stability.

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Develop integrated waste management system	Lagos Waste Management Authority	>5 years	Securing investments for waste management system; Improved relations with PSPs; Increased waste collection and treatment rates	Reduced sensitivity of city to flooding hazards; Reduced potential for flash flooding events; Reduced pollution in community spaces; Reduced incidence of water-borne disease; Reduced pollution and improved ecosystem health; Reduced vulnerability of communities to disease and cascading impacts of flooding; Increased water quality, soil quality and stability Risk of maladaptation: Potential to cause maladaptation through implementation of waste-to-energy projects which will increase pollution, decrease air quality, contribute to emissions and decrease environmental or human health
Expand and protect water sources to improve Lagos' water supply	Ministry of the Environment and Water Resources	>5 years	Identification of priority areas for protection; Areas of land designated for protection; Establishment of team responsible for enforcing protections	Increases adaptive capacity of city to drought and heat related impacts; Reduces vulnerability of social, natural and economic capital; Promotes soil quality, soil stability, nutrient abundance; Sustains agricultural productivity; Promotes biodiversity and ecosystem health; Promotes and sustains land suitable for agriculture, infrastructure and settlements; Increases food security; Aids GDP growth; Promotes community health
Provide public toilets and bathrooms in strategic locations in each local government and local council development areas. Provide public toilets and bathrooms strategic locations in each local government and local council development Areas	Ministry of the Environment and Water Resources	>5 years	Identification of priority areas for toilets / bathrooms; Allocation of funding; Commissioning of private sector; Local authorities with access to public toilets and bathrooms	Decreases waste pollution in public spaces; Reduces impact from disease; Promotes health; Reduces strain on health service; Protects ecosystem and environmental health within urban spaces

Table 28: Actions supporting reduced water consumption and improved water quality

Promote Natural Solutions

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Strengthen Lagos urban renewal programme	Lagos State Urban Renewal Agency MPP&UD	>5 years	Agreement on priority areas; Allocation of funding; Stakeholder engagement	Promotes resilience of urban spaces to climate change; Decreases the Urban Heat Island Effect; Promotes greening of urban spaces, leading to improved air quality and reduced impact from respiratory diseases and reduced stress on health services; Improves environmental health
Promote de-paving and encourage the use of permeable surfaces	Lagos State Urban Renewal Agency MPP&UD	>5 years	Agreement on priority areas; Allocation of funding; Completion of designs and supporting assessments; Stakeholder engagement; Commissioning the private sector	Decreases the Urban Heat Island Effect; Improves natural drainage; Decreases impact from flood hazards; Increases water table height; Increases availability of natural water resources; Increases soil health, quality and stability; Improves land suitability for infrastructural and housing development; Improves ecosystem health; Improves biodiversity health

Table 29: Actions to promote natural solutions

Improving flood risk management will increase adaptive capacity by increasing ability to monitor, plan for and create knowledge around flood and sea level rise impacts. Improving and expanding water sources will also increase adaptive capacity while ensuring clean and safe water sources are maintained, creating knock on benefits for agriculture and food security. Decreasing waste will reduce sensitivity to flood risk by improving drainage systems and will mitigate risk from secondary impacts on human and ecosystem health. Promoting natural solutions, such as increasing permeable surface area, will not only reduce sensitivity to flood risk by improving natural drainage, but will also reduce sensitivity to the urban heat island effect by reducing the heat-retention of infrastructure.

4.5.3 Political Flexibility and Responsiveness

The ability to adapt and create community level change is paramount to reduce impacts by reducing exposure, reducing sensitivity and increasing adaptive capacity. This ability relies heavily on institutional capacity, including the utilisation of tools, resources, power and knowledge. High institutional capacity will allow Lagos to assess changes or impacts and implement adaptation in the face of substantial and continual climate hazards and slow-onset changes. To increase institutional capacity and promote evidence-based decision-making, the following initiatives and actions have been proposed.

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Develop institutional frameworks for community involvement in developing climate resilience guidelines for new city infrastructure.	Ministry of Physical Planning and Urban Development MoEWR	>5 years	Development of framework; Establishment of draft guidelines; Community engagement	Increases institutional and community capacity to adapt to climate change; Promotes public trust in actions and development; Embeds vulnerability into development plans
Conduct a state-wide sea level rise vulnerability assessment	Ministry of Environment and Water Resources;	2 – 5 years	Allocation of funding; Completion of assessment; Stakeholder engagement	Increases capacity to make evidence-based decision-making; Improves knowledge of current and future risk from sea level rise; Improves ability to plan for, respond to and recover from impacts from sea level rise; Promotes consideration of sensitivity, adaptive capacity and exposure across the city

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Community participatory flood management	Ministry of Agriculture	2 – 5 years	Identification of priority areas; Community engagement; Improvements in community protection from flooding	Increases capacity to make evidence-based decision-making; Increase institutional capacity to plan for, respond to and recover from flood risk; Increase community capacity to understand local flood risk; Increase evidence-based decision-making
Develop coastal-zone management plans for community needs	Ministry of Environment and Water Resources	>5 years	Identification of priority areas; Community engagement; Improvements in community protection from flooding	Increases capacity to make evidence-based decision-making; Increase community capacity to understand local flood risk; Reduces impact from coastal hazards to local communities; Encourages stakeholder participation in decision-making; Promotes conservation of coastal ecosystems; Protects coastal livelihoods; Prevents displacement; Protects tourism interests and assets

Table 30: Actions to encourage political flexibility and responsiveness

By engaging community level stakeholders in adaptation planning, and promoting initiatives that target community vulnerabilities, this will improve the adaptive capacity at the community level and institutional level by improving public and institutional knowledge, harnessing public support, and avoiding mal-adaptation, leading to better evidence-based decision-making.

4.5.4 Social Inclusion of Vulnerable Groups

Identifying vulnerabilities within the population will streamline adaptation action and highlight high-risk zones. To prevent loss of life due to climate impacts, it is vital highly sensitive groups are supported and that their sensitivities are not exacerbated by being excluded from adaptation actions. The following actions and initiatives aim to reduce sensitivity of highly sensitive groups, increase population resilience and improve adaptive capacity through strategic preparation.

Participation

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Enhance public awareness and improve adaptive skills and knowledge of indigenous adaptation methods	Ministry of Environment and Water Resources	>5 years	Development of engagement campaign; Identification of priority communities; Stakeholder engagement	Improves institutional and community knowledge; Prioritises health of ecosystems and biodiversity; Promotes inclusion of minority groups; Promotes public support for adaptive actions and policies; Promotes climate justice; Supports SDGs to promote and protect indigenous rights
Engage communities in the participatory planning of their settlements in order to reduce their vulnerability to climate change	Ministry of Physical Planning and Urban Development	**>5 years**	Development of engagement campaign; Identification of priority communities; Stakeholder engagement	Increases adaptive capacity of communities; Increases resilience of settlements; Improves knowledge of community vulnerability; Improves public support for climate actions and policies

Table 31: Actions to facilitate participation

Emergency Response & Disaster Preparation

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Strengthen emergency response and evacuation systems	Lagos State Emergency Management Agency	**2 – 5 years**	Review opportunities for improvement; Development of improvement plan; Engagement with emergency services; Implementation of recommendations	Increases institutional capacity to plan for, respond to and recover from disaster events; Reduces impact of extreme events on communities; Prevents loss of life
Implement one health strategy in the Lagos State Health Scheme	Ministry of Health, MoE&WR, NGOs	<2 years	Establish implementation plan; Secure funding; Agree milestones; Engagement with stakeholders	Increases institutional capacity to manage stressors on the health service; Improves community health; Reduces community sensitivity to climate change; Reduces vulnerability to climate change; Reduces impact from chronic climate-related disease; Reduces potential for shocks to health service from disease outbreak; Prevents loss of life; Promotes productivity within the economy and industries; Promotes GDP growth
Upgrade public health-care facilities	Ministry of Health	>5 years	Funding secured; Plan for improvements established; Number of healthcare facilities upgraded	Increases institutional capacity to manage stressors and shocks on the health service; Improves community health; Reduces community sensitivity to climate change; Reduces vulnerability to climate change; Reduces impact from chronic climate-related disease; Prevents loss of life

Table 32: Actions to improve emergency response and disaster preparation

Protecting the Most Vulnerable

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Increase access to affordable housing	Ministry of Housing	>5 years	Identification of priority housing areas; Allocation of funding; Percentage of affordable houses	Decreases vulnerability of communities to climate change; Promotes cleanliness and health within urban spaces; Increases social, physical and economic resilience of communities; Decreases instances of informal settlements; Decreases poverty; Prevents loss of life; Promotes livelihood sustainability; Promotes community health
Scale up the implementation of the Lagos State Special Peoples Law	Lagos State Office for Disability Affairs	2 – 5 years	Areas covered by law; Communities benefitting from law	Decreases vulnerability of disabled peoples; Decreases vulnerability of the community; Promotes inclusivity within the city; Promotes community health; Increases social capital; Mitigates loss of life

Table 33: Actions to help protect the most vulnerable

Increasing the participation of minority and sensitive groups in adaptation planning while communicating climate risks and actions to the public will improve adaptive capacity through increased awareness of the skills, knowledge and behaviours needed to adapt to potential climate impacts. Improving emergency response and disaster preparation, including direct action on health infrastructure, will create primary and secondary benefits for Lagos State. The primary benefit is increased adaptive capacity to withstand impact from extreme events. Early warning and evacuation systems will reduce loss of life through prevention, and a strengthened health care system will better manage emergency medical care to impacted communities. The secondary benefit is reduced sensitivity to climate impacts by improving the overall health of the population. This is synonymous with protecting the most vulnerable; by increasing access to affordable housing, the State can reduce the exposure of highly sensitive groups.

4.5.5 Developing an Adaptive and Resilient Transport Network

Lagos State's transport sector is exposed to high-impact hazards. Severe flooding events will lead to disruption of services, reduced mobility and isolation of communities, while sea level rise and inundation may increase the permanence of these impacts. Transport is not only a highly valuable asset, but also vital to economic and social activity. The following actions have been identified to reduce climate impacts within the transport sector.

ADAPTATION ACTION	LEAD AGENCY	TIMELINE	KEY PERFOMANCE INDICATORS	CO-BENEFITS
Implement Lagos state strategic transport plan	Lagos Metropolitan Area Transport Authority (LAMATA) MOT	>5 years	Identification of priority areas; Allocation of funding; Improvements in congestion; Reduced air pollutant concentrations; Improved public health	Increases institutional capacity to adapt to climate change; Improves mobility, and therefore adaptive capacity of communities; Reduces contribution of transport sector to Urban Heat Island Effect; Reduces pollution; Improves air quality; Improves community health; Reduces impact from chronic disease; Reduces stress on health service
Expand the water transportation network with increased private sector participation	Lagos State Waterways Authority	2 – 5 years	Identification of priority routes; Identification of investors; Increased ferry fleet; Increased passenger numbers	Improves capacity to adapt to flood and sea level rise related hazards; Operationalises natural assets to improve mobility; Reduces impact from Urban Heat Island Effect Maladaptation: Increase in fossil fuel based water transportation will increase contribution to emissions and therefore climate change; Will impact coastal ecosystems, water quality and biodiversity; Potential to decrease productivity of fisheries, and impact coastal livelihoods

Improving public transport systems will increase adaptive capacity to flooding events and storms by strengthening public infrastructure. This will also reduce sensitivity to extreme heat by reducing traffic which is a compounding factor in the urban heat island effect. It is also important to identify opportunities that arise from climate impacts; improved water transport will increase adaptive capacity to flooding events and sea level rise by utilising Lagos State's natural assets to mitigate the risk to services or operations, urban mobility and community access.

However, there must be careful consideration of the changing sensitivities and exposure as a result of development within the transport sector. Vulnerability, impact and risk analysis must be considered during planning and implementation.

4.5.6 Summary of Actions

The following diagram provides a summary of the actions presented in this CAP and illustrates how these relate to the vision for Lagos in 2050.

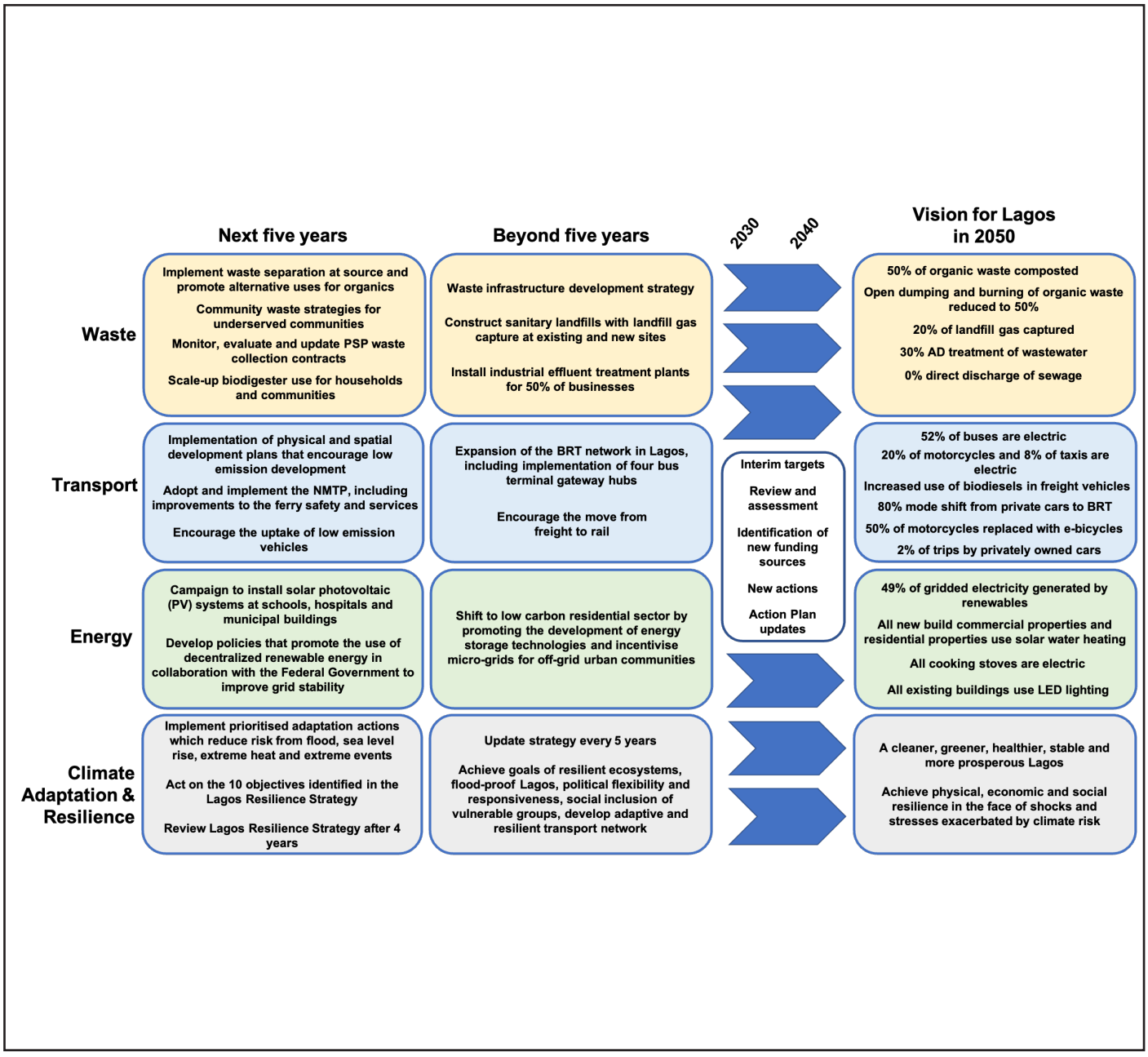
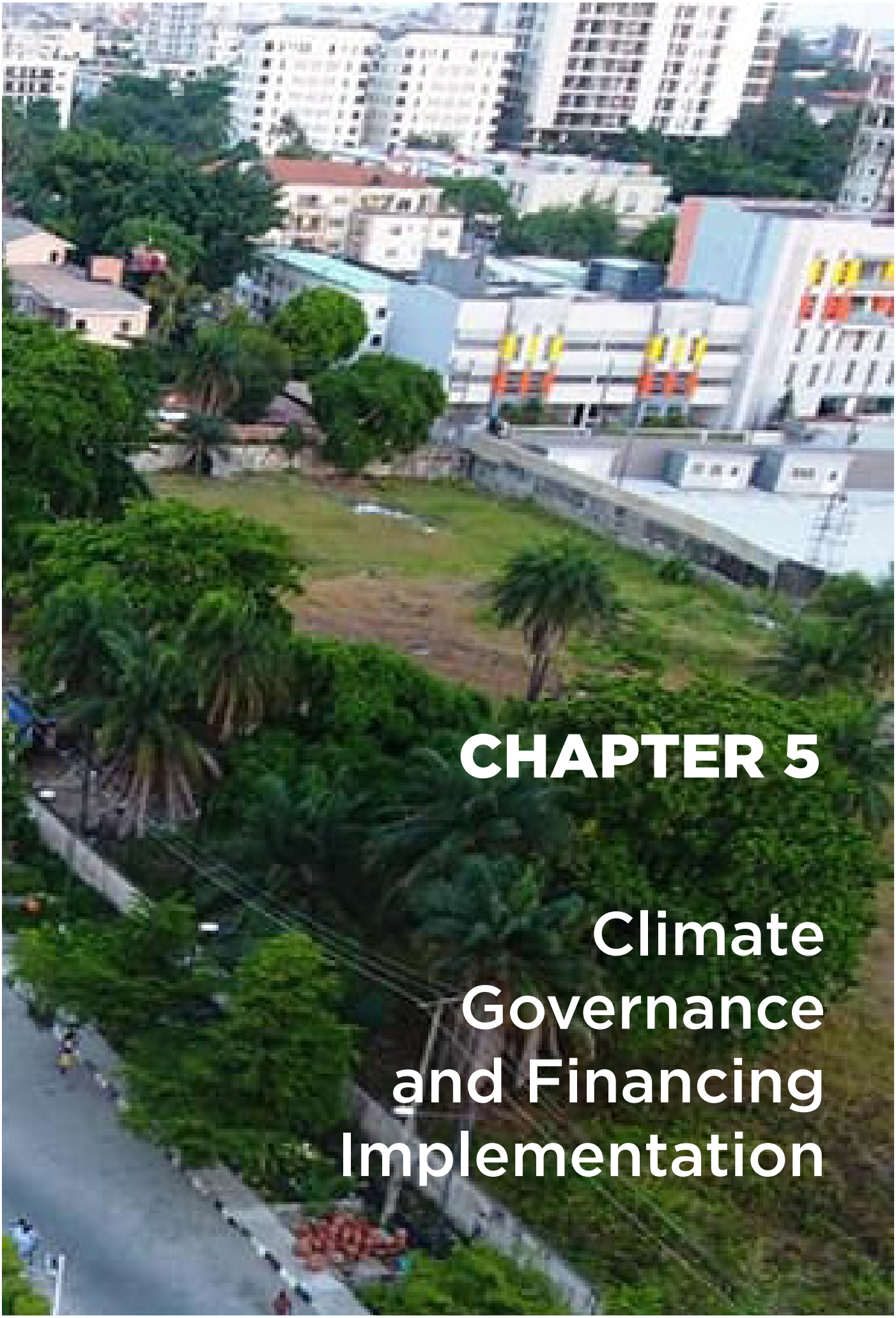


Figure 9: Summary of Lagos climate actions



CHAPTER 5

Climate Governance and Financing Implementation

5.1 City Governance Structure

The Lagos State Government is the primary driver for developmental change in the State. Headed by the Governor, Mr. Babajide Sanwo-Olu, it develops policy, leads the planning, direction and management of development strategies, and oversees the implementation of most developmental works and services. It also operates social, economic and environmental infrastructure. service delivery to citizens to support living in the State.

The proposed governance structure for the Climate Action Plan will support Lagos State's goals by:

- Setting and reviewing policy direction and monitoring progress;
- Ensuring accountability for realising the vision of the Plan;
- Ensuring adequate technical and professional guidance;
- Providing oversight to ensure resources are used efficiently;
- Promoting synergies among relevant stakeholders in line with their mandates; and
- Facilitating resource mobilisation.

5.2 Proposed structure of the State Climate Change Council

The Council shall be chaired by His Excellency, The Governor. Its members will include The Honourable Commissioners of Environment & Water Resources, Energy & Mineral Resources, Finance, Economic Planning & Budget, Waterfront & Infrastructure Development, Transportation, Justice, Education, Agriculture, Health, Physical Planning & Urban Development, Special Duties, Women Affairs & Poverty Alleviation, and Science & Technology. The Council shall be responsible for overall decision making on climate change issues. It will recommend adaptation and mitigation measures to be implemented in the State, subject to final approval by the State Executive Council.

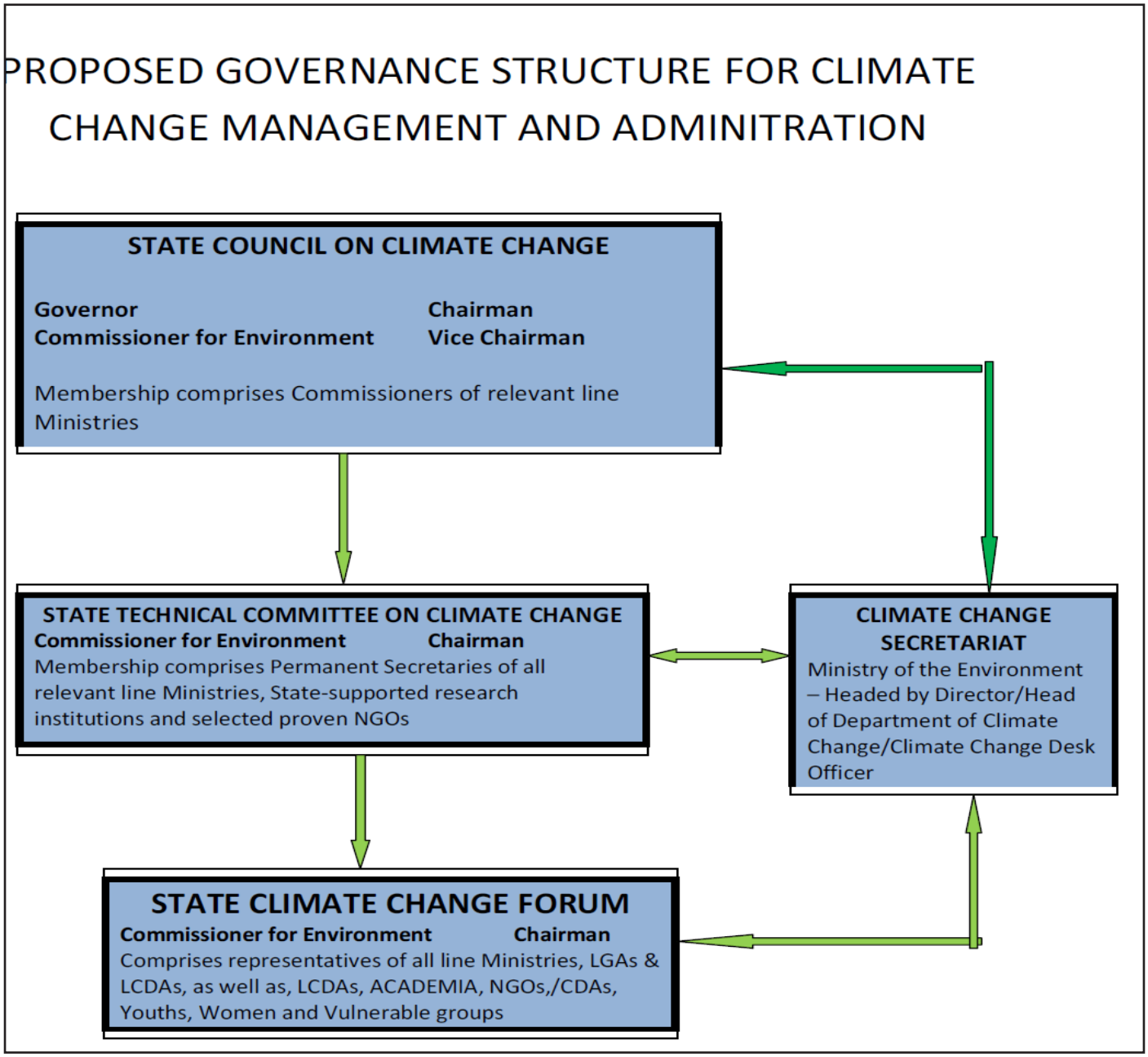
5.3 Proposed structure of the State Climate Change Forum

The Forum shall be chaired by the Honourable Commissioner of Environment & Water Resources and act as a consultative forum. It will comprise all stakeholders involved with climate change issues in the state, including but not limited to representatives of all line ministries, MDAs, LGAs, LCDAs, NGOs, inter-governmental organisations (IGOs), civil society organisations (CSOs), the media, academia and Environment Ambassadors.

The forum will have the mandate to bring to fore issues and concerns related to the impact of climate change on human wellbeing and the environment.

5.4 Proposed structure of the Secretariat

The Secretariat will have the responsibility of coordinating all implementation activities by various MDAs. It will be hosted by the Office of Environmental Services in the State Ministry of the Environment and Water Resources. The Secretariat will be staffed by a Director, who will be responsible for managing the activities of the three governance entities (The State Climate Change Council, State Technical Committee and State Climate Change Forum). The Secretariat will also serve as a clearinghouse for all knowledge and materials relating to climate change in the state, including documents, data, agreements and instruments.



PROPOSED GOVERNANCE STRUCTURE FOR CLIMATE CHANGE MANAGEMENT AND ADMINISTRATION

5.5 Gender Mainstreaming

The Lagos State Government is committed to gender mainstreaming as an integral part of the planning and execution of all its climate change initiatives. This will ensure that it takes into account the implications of any intervention for both men and women.

In order to mainstream gender considerations into climate action, Lagos State will:

- Where possible, design climate change initiatives in the State based on gender-disaggregated data;
- Provide capacity building for climate change policymakers, decisionmakers, planners, project implementation staff and project managers to develop attitudes, tools and methodologies for gender-sensitive policies;
- Achieve a balance in the representation of women and men in decision-making bodies on climate change by increasing the number of women in influential positions through awareness raising and capacity building;
- Undertake gender impact assessments to assess the implications of any intervention in the area of climate change for men, women and vulnerable groups;
- Carry out specific needs assessments for women prior to the introduction of climate change technologies in strategic areas that affect women, such as water use, lighting, cooking and heating, food preservation, grain milling, small/micro enterprises for income generation and agriculture.

5.5.1 Sources of funding and financing for climate action

A common barrier to the implementation of climate actions is a lack of finance. State budgets are limited and certain climate change projects require budgeting and financing mechanisms that differ from those used for traditional projects. For this reason, an effective Climate Action Plan requires a detailed plan for financing each action. Lagos State can explore various sources of finance. The potential funding routes available to support the Lagos CAP are presented in the following table.

FUNDING ROUTE	TYPE OF FUNDING
Internal	-State Government Budget -State Government with support of PPP -State Government loans and grants in collaboration with PPP -Community saving groups -Finance raised through taxes -User fees -Transfers and bonds within the municipality and through other spheres of government

FUNDING ROUTE	TYPE OF FUNDING
External	-International sources such as bilateral and multilateral donors -Concessional finance and funds -Co-financing through public-private partnerships -Market-based approaches -Private sector investments

The State Government will aim to source funding within its own budgets and to achieve budgetary mainstreaming, i.e., to align the goals and targets of the CAP with the State budget. The process of budgetary mainstreaming should be considered a priority for the State as it will both ensure financial support for CAP actions and reduce the likelihood of carbon lock-in and maladaptation as a result of poor investment strategies.

The State Government is the primary driver of developmental change in the State; it provides overall direction, leads strategic planning and establishes the economic infrastructure required to support policy implementation. The State Government is headed by the Governor, who acts as the policymaker. The Office of the Governor is responsible for the effective coordination of all Government activities, including finance. The Climate Change & Environmental Planning Department of the Ministry of the Environment and Water Resources will put forward approved climate change actions for budget allocation by the Ministry of Economic Planning and Budget (MEPB). This funding must subsequently be approved by the Lagos State House of Assembly.

The following table outlines potential funding mechanisms available to Lagos State and indicates the financing entity, source, mechanism, funding cycle and projects to which these funding routes apply.

FINANCING ENTITY	SOURCE TYPE	FINANCE MECHANISM	FUNDING CYCLE	PROJECT
State Government	Domestic	Annual budget	For CAP actions that are budgeted for in the Lagos State Goverment annual budget, the Parastatal Monitoring Office and the LSG Auditor's Office monitor the budget allocations.	• Waste Reduction and Management • Enhancement of Sewage/Wastewater Treatment Systems • Improvements to energy efficiency (and uptake of small-scale renewables) in Existing Buildings • Enhancing Fuel Efficiency via Switch to Hybrid/Electric Vehicles • Enhancing Fuel Efficiency via Switch to Biofuels • Enhancing Vehicle Efficiency through Emissions Standards • Promoting a Modal Shift to Mass Transit • Promoting a Modal Shift to Non-Motorised Transit (NMT)
Private Sector - Foreign direct investment - Private investments PPPs / joint ventures	International & Domestic	Grant / Loan	Funding agreed under contract with private organi-sation	• Construction of sanitary landfill in Epe by USA Visionscope
International aid & bilateral - World Bank - GCF - Climate Investment Fund (CIF) - African Development Bank (AfDB) - Global Environment Facility (GEF) - German Ministry of Cooperation & Development - Canadian Government European Development Fund	International	Grant / Loan	Varies depending on donor organization	• Grant - Development of Renewable Energy • Grant - Expansion of Green Energy and Biofuels (GEB) Bio-refinery project • Loan/Grant - Energy efficiency and mass transit urban transport • Grant - Promoting clean energy investment through Ministry of Power and five states • Multilateral Grant - Bus-based mass transport support through the Nigeria Urban Transport Project • Private sector loans for electricity generation

Table 2: Lagos State funding mechanisms

5.5.2 Human resources in leading CAP agencies

To successfully deliver climate action, the Lagos State Government's ministries, departments and agencies require the appropriate structures, functions and powers to control or influence assets and services. To help identify opportunities for accelerating efficient and effective delivery, the governance and administrative (e.g. civil service/ city agencies) structures and functions of the city and the city's powers relevant to climate action delivery are mapped in this section of the report. The following diagram outlines the governance structure of the Lagos State Office of Environmental Services, part of the State Ministry of the Environment and Water Resources. The CAP falls under the responsibility of the Climate Change & Environmental Planning Department as shown in the figure below.

OFFICE OF ENVIRONMENTAL SERVICES ORGANOGRAM

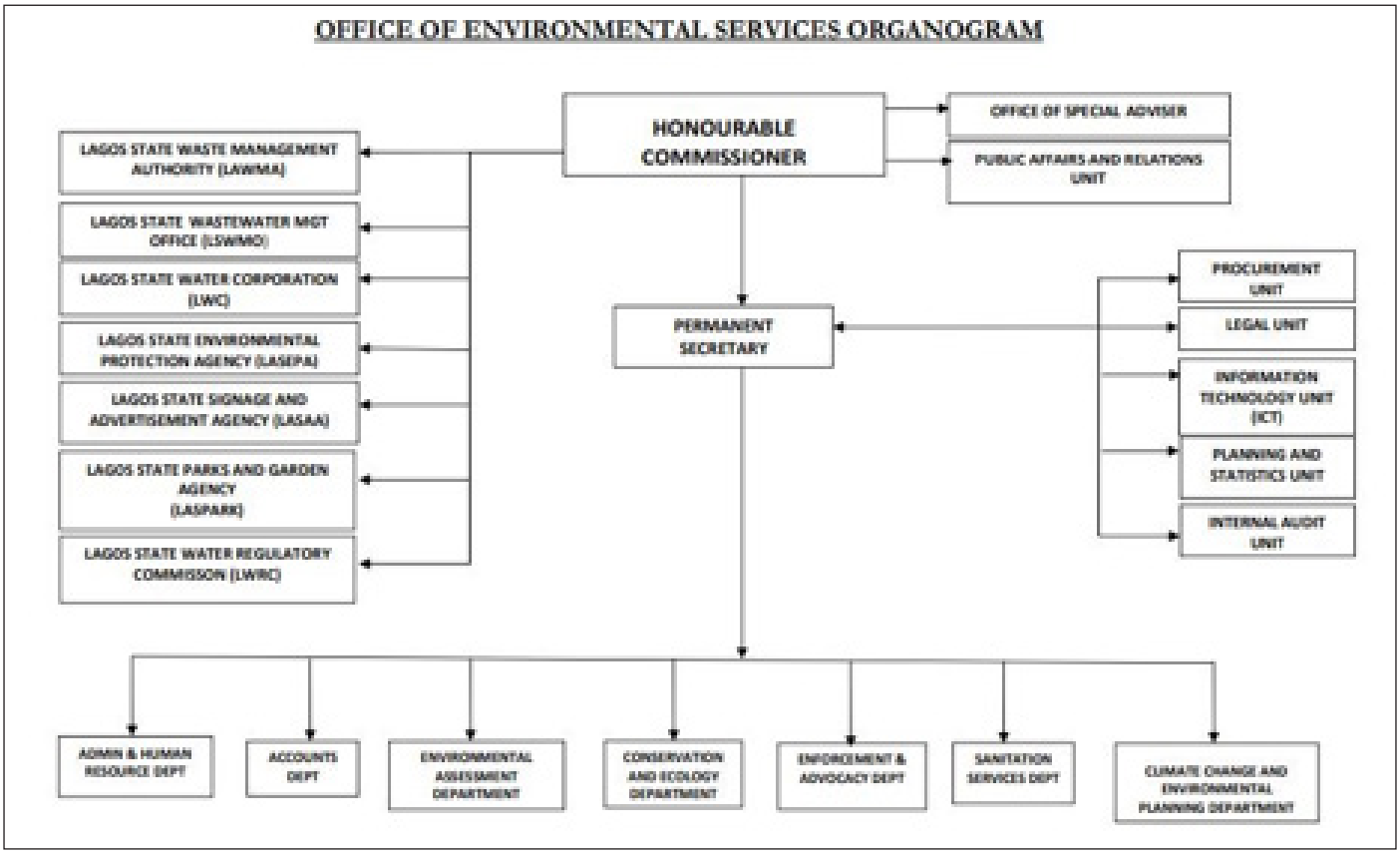


Figure 1: Office of Environmental Services Organogram

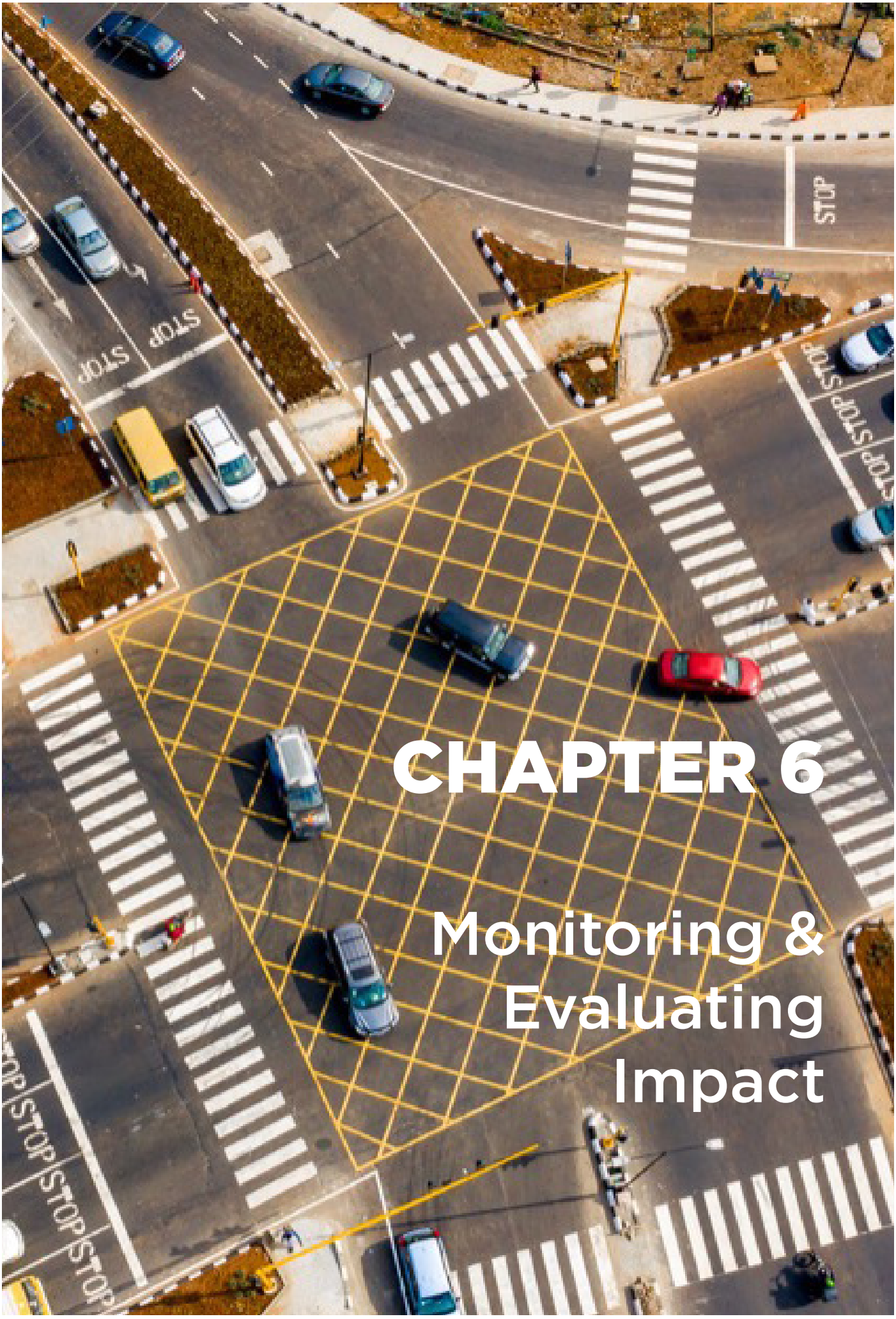
As mentioned previously, the State Government is the primary driver of development in the State, however Ministry of the Environment & Water Resources (MoE & WR), is one of the most distinct contributor as she is responsible for the planning and implementation of state polices on environmental management and has the mandate to propose climate change mitigation and adaptation actions. Depending on their focus, climate actions may be undertaken by several State Government Ministries and Agencies, including the Ministry of

Energy and Mineral Resources, Ministry of Housing (MoH), LAWMA, Lagos State Parks & Gardens Agency (LASPARK), LAMATA and Lagos State Environmental Protection Agency LASEPA. The following table confirms the key organisations responsible for implementing the CAP and outlines their roles. The table also compares the current staff levels within each organisation as well as the estimated staff numbers required to implement the actions in the CAP.

LEAD AGENCY	TOTAL NUMBER OF STAFF	TARGET STAFF TO ACHIEVE CAP OBJECTIVES	ROLE IN CAP IMPLEMENTATION
Lagos State Goverment	37	50	The State Government has the power to directly implement measures related to climate change mitigation and adaptation in government-owned buildings and housing, public transport, solid waste management, wastewater, disaster management, agriculture and ecological sites.
Lagos State Ministry of Energy and Mineral Resources (MEMR)	7	10	The Ministry of Energy and Mineral Resources is responsible for ensuring energy efficiency in the city, government and private sector-owned existing buildings.
Lagos Waste Management Authority (LASWMA)	3	5	The Lagos Waste Management Authority is a regulator. It seeks to improve solid waste management through waste reduction by composting, landfill management and gas capture, and to enhance the resilience of water and sanitation systems.
Lagos State Ministry of Transport (MoT)	2	5	The MoT will aim to improve transportation systems through: • BRT development • Expansion of LRT • Construction of infrastructure and improvements, regulation and awareness campaigns to promote walking and cycling • Infrastructure for electric vehicles

LEAD AGENCY	TOTAL NUMBER OF STAFF	TARGET STAFF TO ACHIEVE CAP OBJECTIVES	ROLE IN CAP IMPLEMENTATION
Lagos State Ministry of the Environment and Water Resources (MoE&WR)	12	15	The Ministry of the Environment &Water Resources is responsible for managing and enhancing natural ecosystems in the city and can enact approaches that enable adaptation to the risks and impacts of climate change. Monitoring of relevant systems is undertaken by the Conservation and Ecology Unit.
Lagos State Ministry of Housing (MoH)	4	5	The Ministry of Housing is responsible for the implementation of energy efficiency measures in government projects and will advocate for the adoption of similar schemes in private developments.
Lagos State Ministry of Physical Planning and Urban Development (MPPUD)	4	5	Spatial development is the responsibility of the Ministry of Physical Planning and Urban Development.
Ministry of Works and Infrastructure (MoWI)	3	5	The Ministry of Works and Infrastructure is responsible for transport infrastructure in Lagos.
Ministry of Agriculture (MoA)	2	5	The Ministry of Agriculture is responsible for controlling and promoting agricultural production in the city and has the authority to promote measures which support farmers to help address climate change-related food security issues.

Table 2: Human resources available to deliver Lagos CAP



CHAPTER 6

Monitoring & Evaluating Impact

Lagos State can use Nigeria's existing monitoring, reporting and verification (MRV) system and capacities as a basis for the development of a CAP monitoring, evaluation and reporting (MER) framework. The Federal Ministry of Environment manages the national MRV system in collaboration with the other Federal Ministries, through the line MDAs and State Government representatives on the Inter-Ministerial Committee. The institutional framework for Nigeria's MRV is depicted in Figure 2.

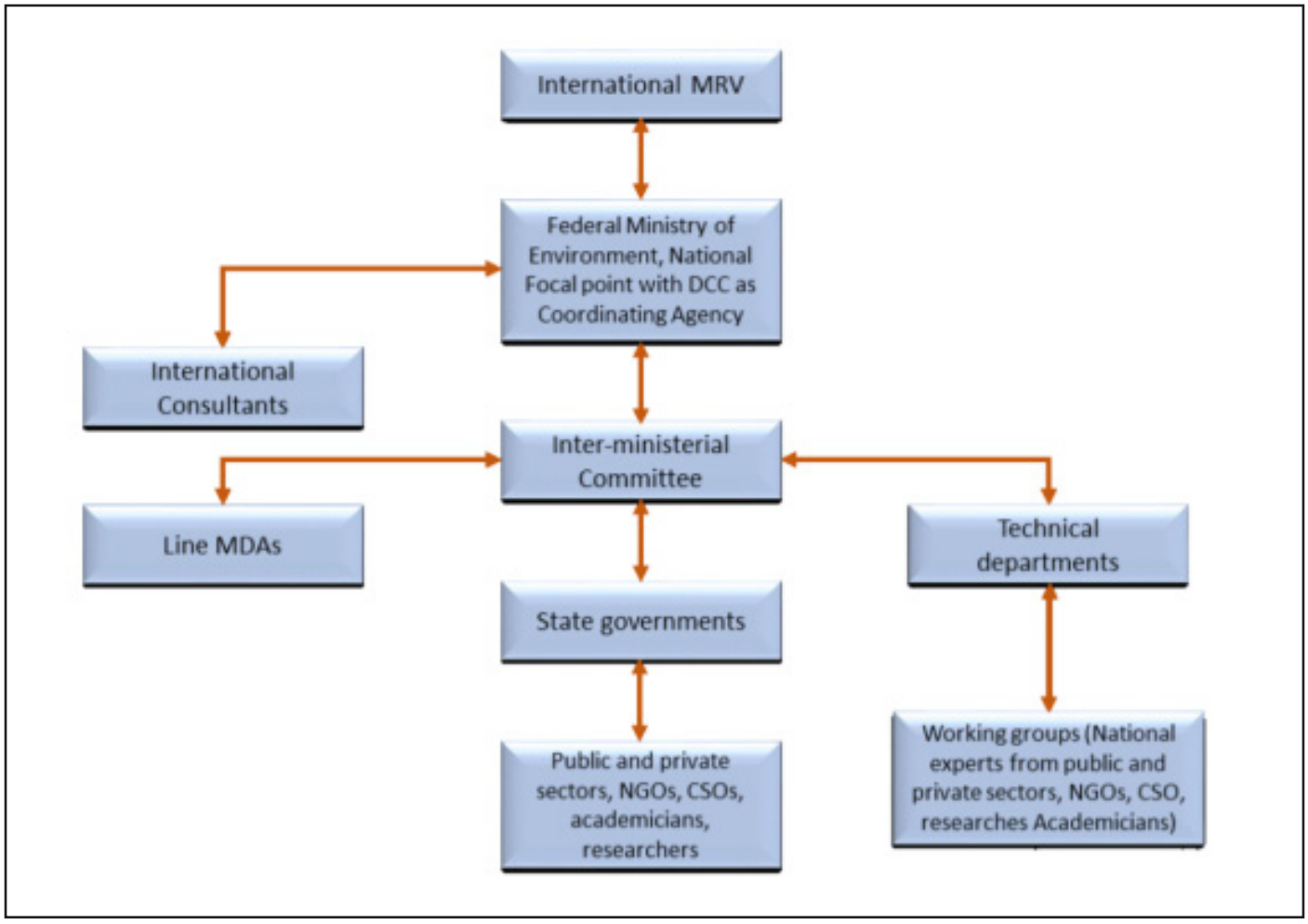


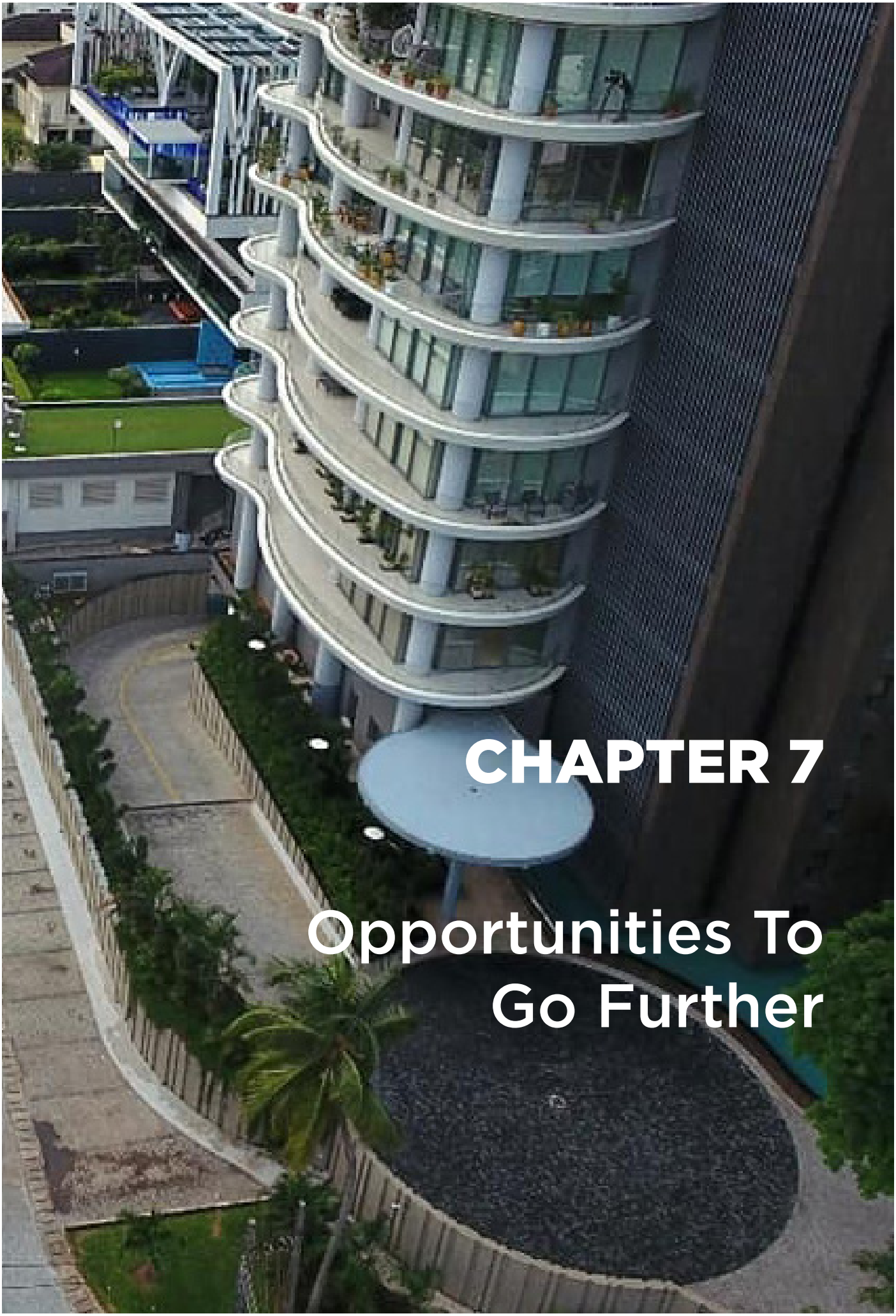
Figure 2: Institutional framework for Nigeria's MRV system

The Inter-Ministerial Committee provides a central coordination platform to harness the many relevant climate datasets that are available in different government departments and in private organisations. The committee meet regularly to receive reports from all line ministries, departments and agencies. The role of the Inter-Ministerial Committee will be to collate and integrate information on implementation of the various climate conventions from all concerned stakeholders, including on emissions, mitigation and support needed and received. Lagos State will consider opportunities to use the existing national MRV framework to support the MER system for the CAP. It will need to be supplemented with State-specific data to provide a more detailed understanding of the impacts of the CAP actions.

Suggested indicators are presented in the action tables in this report. These will need to be approved and finalised, based on the availability of existing data. All monitoring indicators should be quantifiable, and where possible, historical timeseries data should be

used to provide a baseline prior to the implementation of actions. Monitoring indicators are to be collated in a data collection exercise, and will be accompanied by the following:

- **Data source:** The nature of the data collected (e.g. Transport modal share to determine % trips by walking).
- **Data collection method:** How the data is collected (e.g. report, statistics table, company data, email contact or survey return).
- **Who collects the data:** The name and nature of the organisation that collects the data (e.g. the specific institution, department, company, or external organisation).
- **Start date:** The year the data was first collected or published (e.g. data collected since 2003).
- **Period:** Frequency with which the data is published or reported (e.g. annually, quarterly).
- **Cost of data:** Whether there is any cost associated with obtaining the data for the purposes of the CAP.



CHAPTER 7

Opportunities To Go Further

The Lagos CAP Scenario exceeds Deadline 2020 targets in the interim milestone years of 2025 and 2035, but is not sufficiently ambitious to meet the carbon neutrality target by 2050. The Lagos State Government's Climate Change & Environmental Planning Department has developed a conditional Extended Scenario, which would enable Lagos to achieve this goal. To develop the Extended Scenario, the city team conducted a review of the remaining emissions in the CAP scenario. In summary:

- Stationary energy consumption by the industrial sector is the largest contributor to remaining emissions under the CAP Scenario. The industrial sector relies on diesel to generate electricity and heavy fuel oil to generate heat. Both fuels are carbon intensive. Therefore, adding actions for an industrial fuel switch to cleaner fuels (such as electricity, natural gas or LPG) and/or industrial energy efficiency would reduce remaining emissions significantly.
- The second-largest source of remaining emissions is solid waste. Although it is challenging to further reduce these emissions, volumes of waste sent to landfills should be reduced as much as possible, ideally to zero. Large amounts of methane are created by organic waste in landfills. Methane production can further be reduced by separating wet and dry waste and implementing widespread composting.
- Waterborne transport emissions along with wastewater emissions remain high in 2050. These can be addressed through electrifying waterborne transport and modernising Lagos's wastewater treatment facilities.

The Extended Scenario presents strategies and targets that will achieve 83% reductions below BAU in 2050 – meeting D2020 targets. It should be noted that the Extended Scenario will not achieve 100% emission reductions by 2050, however it is expected the remaining emissions gap can be removed through improvements in existing, and the introduction of new, green technologies, not discussed in this report. Figure 12 illustrates the forecast emissions reductions under the Extended Scenario.

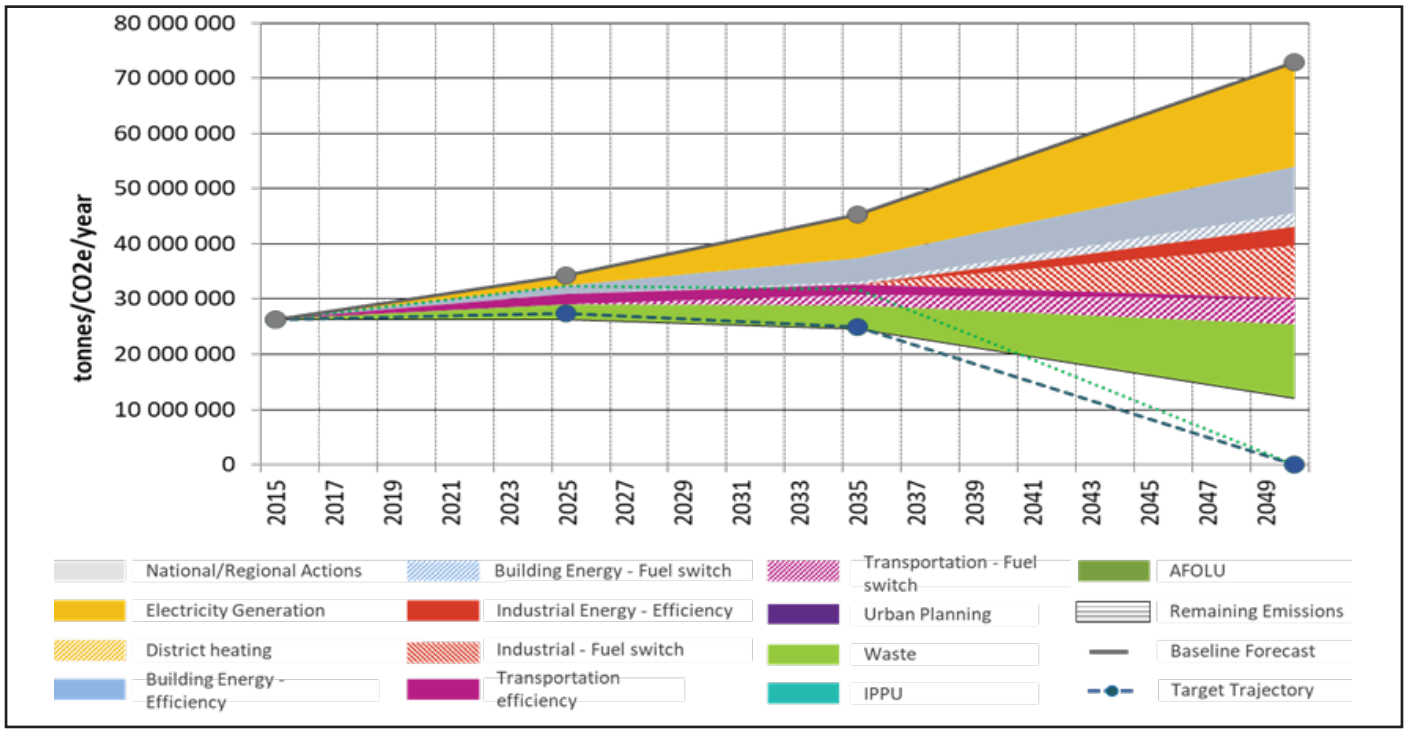


Figure 12: Extended scenario emissions reduction by strategy

The Extended Scenario is based on five key strategies, that will enable the State to increase its ambition beyond the CAP scenario, to achieve carbon neutrality in 2050:

1. Electrifying industrial operations;
2. Separating wet and dry waste, with widespread composting or organic waste reuse;
3. Stabilising the electricity grid to completely eliminate diesel generators;
4. Powering the grid with grid-connected distributed renewable energy;
5. Revising energy-efficient building codes to drive the adoption of efficient appliances and technologies.

The State will remain agile to adopt new technologies throughout the life of the CAP, as these become available. The low carbon technology landscape is anticipated to evolve rapidly in the coming decades, with particular areas of interest including carbon capture and storage, hydrogen technologies and effective offsetting schemes. The climate action plan will be periodically reviewed and updated, with the aim of closing the ambition gap through new mitigation methods and technologies, aiming to achieve net zero emissions in 2050.

Lagos State Government will also explore collaborating with the Forestry Research Institute of Nigeria to reduce the rates at which forests and trees are lost to deforestation and degradation as a result of urban demand for forestry products. Supporting reforestation efforts would positively impact Lagos's net emissions profile.

7.1 Acknowledgements

"Feeling gratitude and not expressing it is like wrapping a gift without giving it"- William Arthur Ward.

The Lagos State Government under the able leadership of Mr. Babajide Olusola Sanwo-Olu is immensely grateful to the C40 Cities Climate Leadership Group for the technical support that has positioned Lagos State amongst other great cities of the world to develop a Paris Agreement-compliant Climate Action Plan which highlights sector-specific climate actions to deliver a zero-carbon Lagos by 2050.

The C40 team of experts are duly appreciated viz; City Advisor for Lagos, Maximus Ugwuoke; former Technical Adviser for West Africa, Lia Nicholson; Senior Manager Climate Action Planning, Stephen Otieno; Head of Climate Action Planning Africa, Paul Jorgensen; Regional Director for Africa and Managing Director for Mayoral Engagement, Hastings Chikoko; and Deputy Regional Director for Africa, Gifti Nadi. We are grateful for their expertise and in-depth review of the process that ensured the completion of this document.

We would like to thank Ricardo Energy & Environment and Sustainable Energy Africa for their technical support for the scenario planning and modelling, which helped us determine the most suitable net zero pathway.

The contributions of the United Nations Development Program (UNDP) to the facilitation of the Climate Risk Assessment Project that enriched the adaptation section of the document is duly recognised and commended.

Our appreciation also goes to officials of the Ministry of the Environment and Water Resources, the lead city officials; Bankole Michael, Azeezat Afinowi-Subair, Yewande Seriki, Abbas Mohammed, and diligent thematic network officers from the Ministries of Energy & Mineral Resources, Transportation, Physical Planning & Urban Development, Economic Planning & Budget, Finance, and Agriculture. Furthermore, we are grateful to officers from the Lagos Metropolitan Area Transport Authority (LAMATA), Lagos Waste Management Authority (LAWMA), Lagos State Wastewater Management Office (LSWMO), Lagos State Electricity Board and a host of others for their active participation in the Climate Action Planning Workshops.

The State also appreciates members of private sectors associations like the Manufacturing Association of Nigeria, Association of Waste Managers of Nigeria, Lagos Urban Development Initiative, Policy Advocacy Project Partnership on Climate Change and other civil society organisations too numerous to mention.

Finally, special thanks to the numerous individuals not mentioned from the government, private sector and community interest groups that contributed knowledge and insights through the workshops and consultations over the past four years of the climate action planning process.

7.2 Acronyms

BAU	Business as usual
BNRCC	Building Nigeria's Response to Climate Change Project
BRT	Bus Rapid Transit
BUR	Biennial Update Report
CAP	Climate Action Plan
CBO	Community-based organisation
COP	Conference of Parties (to the UNFCCC)
CRA	Climate risk assessment
CSO	Civil society organisation
GCF	Green Climate Fund
GDP	Gross domestic product
GHG	Greenhouse gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
IBILE	Ikeja, Badagry, Ikorodu, Lagos Island and Epe
IGO	Intergovernmental organisation
INDC	Intended Nationally Determined Contribution
LAMATA	Lagos Metropolitan Area Transport Authority
LASEPA	Lagos State Environmental Protection Agency
LASPARK	Lagos State Parks & Gardens Agency
LASURA	Lagos State Urban Renewal Agency
LASWA	Lagos State Waterways Authority
LAWMA	Lagos State Waste Management Agency
LDC	Least-developed country
LGA	Local Government Authority
LCDA	Local Council Development Area
LRT	Light Rail Transit
LSEB	Lagos State Electricity Board
LSWAMO	Lagos State Wastewater Management Office
MDA	Ministry, Department & Agency
MEMR	Ministry Of Energy And Mineral Resources
MER	Monitoring, evaluation & reporting
MoE&WR	Ministry of the Environment & Water Resources
MoH	Ministry of Housing
MoT	Ministry of Transportation
MPP&UD	Ministry of Physical Planning & Urban Development
MRV	Monitoring, reporting and verification
MRF	Material Recovery Facility
NDC	Nationally Determined Contribution
NGO	Non-governmental organisation
NMTP	Non-Motorised Transport Policy
NREEEP	National Renewable Energy and Energy Efficiency Policy
OECD	Organisation for Economic Co-operation and Development
PPP	Public-private partnership
PSP	Private Sector Participants
PV	Photovoltaic
SEP	Stakeholder Engagement Plan
ULEV	Ultra-low emission vehicle
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change


JUSTICE
AND
PROGRESS