

Freetown's first Climate Action Strategy

2022-2030



*"There can be no global
impact without local action."*

Mayor Yvonne Aki-Sawyerr OBE,
Freetown City Council



Foreword from the Mayor

Yvonne Aki-Sawyerr OBE, Freetown City Council

It is generations of hard work that has transformed what was once a modest haven for freed slaves in 1792 into a bustling city in 2022. Freetown is testament of our cultural diversity and religious tolerance; and it drives the economic output of our great nation.

However, our great history – and the even greater future that we have been working towards through the Transform Freetown agenda – hangs in the balance as our city becomes more and more vulnerable to the effects of climate change. As this global phenomenon unfolds, the resources that are meant to support our development are now posing a threat to that development due to climate change. As a city that lies along the Atlantic on the west coast of Africa, rising sea levels and sea deoxygenation threaten coastal settlements whose livelihoods are closely linked to our marine resources. As climate-driven rural-urban migration continues, our forest-covered mountains are continuously decimated for new settlements, putting biodiversity at risk, reducing air quality and water availability, exacerbating the urban heat island effect, and just as importantly, limiting our tourism potential.

There are countless other ways in which climate change leaves our city reeling and these are not unique to Freetown. Although Africa is only responsible for 2-3% of the world's global emissions, many other sub-Saharan cities like Freetown are most affected. Climate change does not discriminate. When it hits, its effects are felt by everyone and therefore we all bear the responsibility to do what is necessary to help reverse the changing climate. As a member of the C40 Cities Leadership Group, it is my firm belief that we all must play our part; governments, lawmakers, mayors, corporations and every individual.

I am delighted that the city of Freetown is playing its part, which starts by our commitment to Deadline 2020 (net zero emissions and climate resilience) and embarking on this worthwhile journey of developing a Climate Action Plan – our blueprint on how we will consistently contribute to national, regional and global efforts to reduce carbon emissions and build climate resilience. This Plan details how Freetown will contribute to this fight, and how everyone – from businesses to individuals – will work together to reach our goal of cutting down on carbon emissions and creating a sustainable way of life for all.

The Plan focuses on feasible projects that prioritise the grassroots and introduces policies and ideas that will help the city to move forward with the already existing consequences of climate change. The Plan, which strongly aligns with the Government of Sierra Leone's Nationally Determined Contribution (NDC) and National Adaptation Plan (NAP) and mirrors Freetown City Council's Transform Freetown Agenda, follows the two-pronged approach of implementing mitigation and adaptation measures in the fight against climate change. Freetown will focus on urban energy, mobility and sanitation as part of its mitigation efforts; and on ecosystems and land restoration, disaster risk management, water and urban planning to foster adaptation.

Freetown's spirit of resourcefulness and innovation will be useful in our battle against climate change. Even as we prepare to undergo a citywide change, I acknowledge that our global goal cannot be met through the actions of one city alone. Therefore, I am extremely glad to be a part of a group of cities that are committed to making the necessary changes to save our environment. I look forward to implementing this Plan, and to the hopeful future of a sustainable world.

Foreword from C40 Cities

Hastings Chikoko, Managing Director of Regions and Mayoral Engagement & Regional Director for Africa, C40 Cities

Freetown has witnessed first-hand the devastating effects of climate change in deadly landslides, flooding and coastal erosion. Climate change is threatening the lives of Freetonians and particularly of those who are most vulnerable. While being one of the lowest emitters of greenhouse gas emissions (GHG) of cities on the African continent, Freetown joined the C40 Cities Leadership Group in November 2019 and has ever since taken on a lighthouse role for climate action - far beyond the African continent.

As a member of the group, the city embarked on a path to develop its first Paris compatible climate action strategy by setting high ambitions to reduce GHG emissions and adapt to climate risks at a significant pace, while improving the well-being of its residents. In creating this first city-led climate action strategy, Freetown provides a key building block for the city's resilient and low-carbon development path. The strategy complements the Government of Sierra Leone's ambition under the Paris agreement, supports limiting global temperature rise to 1.5°C above the average pre-industrial temperature, and strengthens protection of its people and systems from the impacts of climate change.

With limited resources, developing this strategy wasn't an easy task for the city. The city, supported by C40, showed great perseverance, ambition and innovation to develop a strategy that is not only becoming a working document for the city's newly established Climate Action and Disaster Risk Management Unit, but that is also in line with C40's Climate Action Plan Framework criteria.

I would particularly like to acknowledge and appreciate Mayor Yvonne Aki-Sawyerr's strong and dedicated leadership on climate change, including but not limited to her role as a Vice-Chair on C40's Steering Committee, representing the Innovator Cities.

With this strategy, we hope to have planted a seed that allows us to grow and learn from each other in the fight against climate change. We look forward to continuing this engagement to ensure that this transformational plan is implemented, and our dream of a low-carbon and climate-resilient future is realised.

Table of Content

Foreword from the Mayor	3
Foreword from C40 Cities	4
Table of Content	5
Abbreviations	7
Acknowledgements	7
<i>f</i>	8
1. Setting the Scene: Climate Action in Freetown	9
1.1. City Profile	10
1.2. Freetown's approach to climate action planning and the development of its first strategy	14
Broader climate policy landscape at national and city level	15
Vision and Principles	17
Stakeholder Engagement Process	18
2. The Facts - Climate Action Evidence Base	20
2.1. Greenhouse Gas Emissions Inventory and Air Quality Analysis	21
2018 Baseline overview (overall picture, sectoral, biogenic, data limitations)	21
Links to Air Quality analysis	23
Comparative analysis (Proportion of national, GHG per capita, GDP, land area and benchmarking compared to other cities in the region / similar context)	24
Forecast BAU and assumptions	25
Scenarios (existing-and-planned and ambitious)	28
Existing-and-planned actions and implications	28
Ambitious assumptions and implications	29
Residual Emissions and Deadline 2020 Commitment	32
2.2. Climate Risk Assessment	34
Climate Profile of Freetown	35
Rainfall	35
Temperature	36
Significant Climate Hazards in Freetown	36
Heat	37
Impact of Heat in Freetown	37
Floods	38
Impact of Flooding in Freetown	39
Prioritisation of Impacts from a Community Perspective	40
Landslides and Erosion	41
Impact of Landslides and Erosion in Freetown	41
Prioritisation of Impacts from a Community Perspective	42
	5

Sea Level Rise and Coastal Erosion	43
Impact of Sea Level Rise and Coastal Erosion in Freetown	43
Prioritisation of Impacts from a Community Perspective	44
Climate Risk Assessment and Prioritisation	44
3. Delivering results and evaluating impact – creating an enabling environment	45
3.1. Climate governance, institutional arrangements at FCC and cooperation with partners	46
3.2. Human Resources at FCC	50
3.3. Financing Climate Action in Freetown	50
3.4. Monitoring, Reporting & Evaluation	52
3.5. Communication and Outreach	54
4. From Transform Freetown to Climate Actions	55
4.1. Vision 1: Developing climate resilient communities in Freetown by promoting the safety of communities in the face of climate change and extreme climate events	58
DRM & Climate Resilient Infrastructure Program	60
Long List of Actions for DRM	60
4.2. Vision 2: Increasing Freetown's climate resilience to heat impacts and becoming a more liveable, cool and sustainable city for its people	63
Heat Program	64
Long List of Actions for Heat	64
4.3. Vision 3: Developing climate resilient communities in Freetown by enhancing nature in our urban environments and the natural ability of ecosystems to buffer climate change impacts	66
Ecosystem-based Adaptation through Urban Nature-based Solutions Program	67
Long List of Actions for Ecosystem-based Adaptation through Urban Nature-based Solutions	68
4.4. Vision 4: Creating water security for all users and uses in Freetown	69
Water Program	71
Long List of Actions for Water	72
4.5. Vision 5: Freeing Freetown from waste and developing a smart and sustainable waste management system that enables and fosters quality of life and livelihoods for communities	73
Sanitation Program	76
Long List of Actions for Sanitation	77
4.6. Vision 6: Building a cleaner, safer and more equally accessible transport system	79
Urban Mobility and Urban Planning Program	82
Long List of Actions for Urban Mobility and Urban Planning	83
4.7. Vision 7: Transitioning to a clean, accessible and equitable city energy system	86
Urban Energy Program	89
Long List of Actions for Urban Energy	90
Additional supporting internal documents	92
References	92

Abbreviations

AFRICAB	African Capacity-Building
BAU	business-as-usual
CA & DRM	Climate Action and Disaster Risk Management
DRM	Disaster Risk Management
EDSA	Electricity Distribution and Supply Authority
EGTC	Electricity Generation and Transmission Company
EPA	Environmental Protection Agency
EWS	Early Warning Systems
E&P	existing and planned
GDP	gross domestic product
GHG	greenhouse gas
GoSL	Government of Sierra Leone
GVWC	Guma Valley Water Company
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
LPG	liquefied petroleum gas
LST	land surface temperature
MDAs	Ministries, Departments and Agencies
MLPCE	Ministry of Lands, Country Planning and Environment
MoE	Ministry of Energy
MoEnv	Ministry of Environment
MoHS	Ministry of Health and Sanitation
MoTA	Ministry of Transport and Aviation
MTNDP	Medium Term National Development Plan
NAP	National Adaptation Plan
NDC	Nationally Determined Contribution
NDMA	National Disaster Management Agency
NGO	non-governmental organisation
NPAA	National Protected Areas Authority
NTB	National Tourist Board
REDD+	Reducing Emissions from Deforestation and Forest Degradation
SDGs	Sustainable Development Goals
SL Met	Sierra Leone Meteorological Agency
SLRA	Sierra Leone Road Authority
SLRSA	Sierra Leone Road Safety Authority
SOPs	Standard Operating Procedures
UHI	urban heat island
WHO	World Health Organisation

Acknowledgements

Few accomplishments are as important as those that meet milestones which set clear paths to sustainable futures. In the past few years, the science and facts of climate change and its impacts have been seen and felt in Freetown. Negatively impacting lives, destroying properties and threatening economic growth and livelihoods, especially of the vulnerable and large informal sectors of the city.

Developing this first climate action strategy would not have been possible without the commitment of the Mayor of Freetown, Yvonne Aki-Sawyerr OBE and dedicated efforts of the Freetown City Council's administration and its units, led by Gabriel Holloway, Climate Action and Disaster Risk Management Unit; Mustapha Kemokai, Environment and Sanitation Officer and Abdul-Karim Marah, Development Planning Officer; as well as the Mayor's Delivery Unit,

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1. Setting the Scene: Climate Action in Freetown

Cities are as vulnerable as they are powerful in the context of climate change. Cities are also the largest emitters of the greenhouse gases (GHGs) leading to climate change, producing approximately 70% of global emissions.¹ At the same time and while cities are recovering from the impacts of the Covid-19 pandemic, urban growth shows no sign of slowing and poses more pressure than ever on cities to not only deliver services, but to do so in the face of more frequently occurring climate-related disasters. According to the United Nations World's Cities Report 2018, in early 2000, the world counted 371 cities with at least 1 million inhabitants; by 2018 that number rose to 548 and is projected to reach 706 in 2030. 48 out of the 706 cities will pass the 3 million inhabitant threshold by 2030.

Freetown is currently home to more than 1.1 million residents and is one of the most densely populated cities in West Africa. Even though Freetown is among the lowest emitters of GHG emissions of capital cities on the African continent, it is one of the cities that is most vulnerable and susceptible to the effects of climate change. If the world is unable to stem and reverse the levels of GHG emissions and adapt to the existing effects of climate change, cities like Freetown will be among the worst affected and will see rising temperatures, rising sea levels and more frequent and severe disasters. Therefore, it is critical that Freetown takes action now to build climate resilience and adopt a climate-friendly development trajectory.

In November 2019, the City of Freetown joined the C40 Cities Climate Leadership Group and committed to delivering on the highest ambitions of the Paris Agreement: the development of a pathway towards GHG emission neutrality latest by 2050, set ambitious interim targets for 2030 and demonstrate how the city will adapt and improve its resilience to climate hazards. Freetown is using its commitment to being a net zero emissions² city by 2050 to demonstrate leadership, and to leverage support for improving the liveability of the city and the well-being of its residents. This commitment will complement the Government of Sierra Leone's (GoSL's) mitigation commitments and efforts and address the city's primary development needs. These commitments and ambitions are well aligned with and contribute to the vision of the GoSL. They feed into and are informed by the country's first Medium Term National Development Plan (MTNDP) (2019-23), the GoSL's recently updated and submitted Nationally Determined Contribution (NDC) and the National Adaptation Plan (NAP), and enable the localisation of the GoSL's ambitions. This Climate Action Strategy is the city's first attempt towards delivering on its commitment and complementing the work of the GoSL, and will be one of many more to come. It presents innovative solutions for adaptation to risks and climate hazards, such as flooding, coastal erosion and landslides, while simultaneously strengthening mitigation efforts that will ensure the city's development follows a green and sustainable path.

This first strategy shows how economies that invest in climate action can achieve a multitude of wider benefits as well. There are numerous benefits associated with pursuing net zero emissions beyond the city's contribution to the global effort to curb climate change. In Freetown, reducing GHG emissions will also result in a reduction in air pollution, improved health and sanitation, urban greening and stimulating green growth. Examples of this include

¹ C40 Cities (2021)

² Net zero refers to a state of balance between anthropogenic emissions and anthropogenic removals. In the case of cities this implies net-zero GHG emissions rather than net-zero CO₂ emissions, as the former also includes non-CO₂ GHGs. Although 'carbon neutrality' is often used interchangeably with 'net zero emissions', the two are not the same. When entities claim carbon neutrality they may be counterbalancing CO₂ emissions with carbon offsets without necessarily having reduced emissions by an amount consistent with reaching net zero at the global or sector level ([refer to Science Based Targets \(SBT\)](#))

waste beneficiation and recycling, localisation of renewable energy supply – which has the added benefit of reduced dependence on volatile fossil fuel prices – and associated local economic opportunities in the energy sector. Investing in green infrastructure generates jobs and stimulates economies. Air pollution has a complex and interactive linkage with climate change. It has also been identified as a priority focus in Freetown. Actions that reduce GHG emissions reduce air pollution, resulting in a decrease in the occurrence of residents' health issues associated with air pollution and reduces the cost and societal burden of associated health care. The associated impacts on human health, and the economic costs of implementing climate actions have been shown to be much lower than the health care costs that would be incurred in the case of no action.³

Climate action can allow Freetown to deliver a higher quality of life for its residents with greater prosperity and better health. The visions, goals and actions promoted within this strategy directly align with the Sustainable Development Goals set forth by the UN. The strategy helps tackle a range of issues related to affordable housing, poor healthcare, water access, air quality, income generation and energy access. By prioritising climate action, Freetown can tackle climate change, while improving the prosperity of vulnerable residents and addressing economic inequality: actions such as the cable car, are not only an ambitious measure to reduce transport related GHG emissions; it is also an action that improves connectivity across the city and accessibility to public services, particularly for vulnerable residents - as public, in comparison to private transport, is more affordable - providing new opportunities and helping to reduce inequality in the long term.

1.1. City Profile

Freetown, Sierra Leone's capital, is a city with potential opportunities for many. It is home to the nation's legal, business and diplomatic communities. Its cultural richness, historical landmarks and bustling population make it arguably one of the most captivating destinations in West Africa. Yet, Freetown has for years faced many challenges.

The city is located at 8.48 latitude and 13.23 longitude and at an elevation of 49 metres above sea level. The city is situated in the Western Area Region (Figure 1) on a mountainous peninsula, which is approximately 38 km long and 16 km wide, with a topographic relief of over 700 metres above sea level. It is placed between the sea and hills, which, coupled with climatic conditions, makes it particularly vulnerable to natural disasters. Annual flooding during the rainy season severely restricts the mobility of Freetonians and can, in extreme cases, lead to climate induced displacement within the city. In August 2017, severe flooding led to mudslides where over 5,900 people lost their homes, with 500 confirmed deaths and over 800 people missing.⁴

³ C40 Cities (2021)

⁴ Information retrieved from [reliefweb](https://reliefweb.int/) on 25.10.22.



Figure 1. Western Area Region Map (Source: Freetown City Council, 2022)

Administratively, Freetown is the Western Area Urban District and while generating almost 30% of the country’s gross domestic product, it houses 15% of its population (approximately 1.1 million) on 82 km², which is less than 1% of the total land area of Sierra Leone. Hence, with 12,959 inhabitants per km² Freetown is very dense (Figure 2) and one of the most densely populated cities in West-Africa.⁵ If current patterns of population growth and urbanisation continue, that density, according to estimates, may almost double to 25,000 residents per km² by 2028⁶; and population growth with a rate of 4.2 percentage points translates into approximately “45,000 new residents in the next year, and 535,000 residents in the next decade”.⁷ Figure 3 shows Freetown’s urban expansion rates (2015-2021) and estimations for Freetown’s population in 2028 per planning area.

⁵ SLURC and UCL (2021)

⁶ MLCPE and FCC (2014)

⁷ World Bank (2018a)

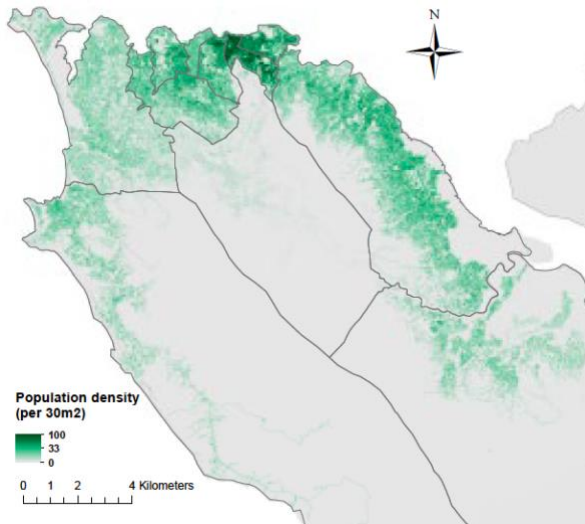


Figure 2. Population Density (Source: OSM building data, World Bank Freetown City Hazard and Risk Assessment (2018), 2015 Sierra Leone Census; retrieved from World Bank (2018a), Freetown Urban Sector Review: options for growth and resilience.)



Figure 3. Western Area Urban Planning Areas (in blue), Western Area Urban Wards (in black), including estimations of population in 2028 per planning area and urban expansion rates from 2015 to 2021 (Source: Freetown City Council, 2022)

However, Freetown's growth has not been evenly spread. Rather, population densities vary enormously and the city has become fragmented. Internal displacement during the civil war (1991-2002) across the country and migration in search of employment opportunities in Freetown has contributed to the population growth of the city. While economic migration to Freetown has persisted over time, their impact on the city's population is and will further be reinforced by rural urban migration associated with climate change disruptions.⁸

The city has not only grown dramatically in population in recent years, but also in built-up area. The latter increased at an annual rate of 5.1% between 1974 and 2014, mostly in an unplanned

⁸ UN-Habitat (2011)

and unstructured manner - particularly in medium to high risk areas for environmental hazards (see Figure 4 and 5). Often the most vulnerable residents reside within these areas and might, as a result, risk being exposed to continuous cycles of climate-induced destruction and displacements. Thereby, migrants, in particular, might end up trading socio-economic risks associated with life in rural areas for climate related risks within the city.

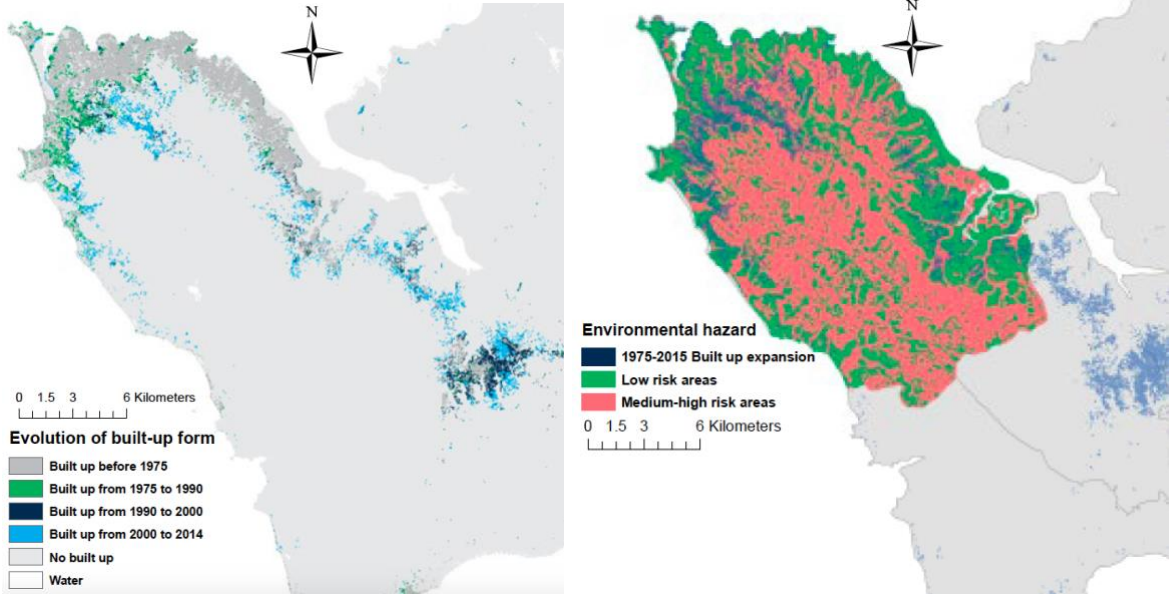


Figure 4. (left) Evolution of built-up area (Source: Global Human Settlement Layer (GHSL) 1975-2015 (2018 update), retrieved from World Bank (2018a), Freetown Urban Sector Review: options for growth and resilience.)

Figure 5. (right) Environmental hazards and urban expansion on the 1990-2015 period (Source: World Bank Freetown City Hazard and Risk Assessment (2018) and Global Human Settlement Layer (GHSL) 1975-2015 (2018 update); retrieved from World Bank (2018), Freetown Urban Sector Review: options for growth and resilience)

Freetown’s dense and growing population, in addition to its geography - surrounded by hills and the ocean - brings with it a series of development challenges, which are exacerbated in the light of climate change. There is a lack of access to essential services such as water, sanitation and healthcare. Informal settlements develop across the city in unsafe areas, resulting in the urban poor being particularly susceptible to shocks such as flooding, diseases and climate induced displacement.

With a contribution of almost 30% to the country’s GDP, Freetown is not only the capital but also the economic centre of Sierra Leone. Freetown’s economic importance is in part due to it being the main port of entry, while also being the business centre of the country, housing the majority of businesses which benefit from agglomeration effects. Economic activities can roughly be divided into the following: wholesale and retail trade (38%), industry (construction and manufacturing) (16%), agriculture (fishing and cropping) (6%), other services (finance, transport and hospitality) (40%).⁹ Freetown and other urban areas such as Bo, Kenema and Makeni supply the majority (over 70%) of waged employment in Sierra Leone.¹⁰ 87% of jobs in Freetown belong to the tertiary sector.¹¹

In Freetown 37% of the population is multidimensionally poor, which is below the national average of 68.3%.¹² While performing relatively well within the national context and having

⁹ SLURC and UCL (2021)
¹⁰ MLCPE and FCC (2014)
¹¹ MLCPE and FCC (2014)
¹² Statistics Sierra Leone (2017)

made notable progress since the post-war period, it is noteworthy to mention that these numbers are far from indicating prosperous livelihoods across all pockets of society in Freetown. A breakdown of the multidimensional poverty index by socioeconomic characteristics indicates that Freetown has the lowest education deprivation with only 7% of the population deprived in literacy (compared to with more than 30% in all other districts), and 21% deprived in school attendance (compared to the national average of 42%). Figure 6 below provides further statistics on the standard of living indicators from the 2015 Sierra Leone Population and Housing Census, with Freetown corresponding to Western Urban.

District	Deprived of electricity	Poor cooking fuel	Rate of over-crowding	Poor flooring material	Poor sanitation	Poor water situation	Deprived of durable assets	Deprived of employment
Kailahun	98.4%	99.7%	53.9%	73.9%	81.1%	38.4%	60.2%	1.6%
Kenema	88.9%	99.3%	59.9%	57.9%	73.1%	25.2%	62.4%	2.9%
Kono	97.0%	99.6%	50.8%	69.2%	69.3%	45.7%	66.6%	4.2%
Bombali	87.9%	99.3%	38.2%	62.5%	68.1%	37.9%	66.8%	4.0%
Kambia	98.5%	99.4%	32.5%	71.1%	67.1%	59.8%	60.7%	2.0%
Koinadugu	99.1%	99.7%	42.2%	76.8%	61.6%	60.8%	72.0%	1.4%
Port Loko	94.6%	99.0%	42.2%	60.8%	79.3%	49.8%	66.1%	4.8%
Tonkolili	98.0%	99.4%	37.0%	72.3%	71.9%	61.4%	70.4%	3.3%
Bo	88.0%	99.3%	56.7%	52.7%	70.2%	27.3%	63.7%	4.3%
Bonthe	99.2%	99.7%	49.4%	74.0%	86.9%	64.8%	57.9%	3.1%
Moyamba	99.2%	99.5%	43.3%	74.4%	65.0%	64.8%	67.1%	2.5%
Pujehun	99.2%	99.6%	65.1%	74.7%	79.3%	44.4%	64.7%	5.5%
Western Rural	86.5%	98.4%	61.1%	13.3%	60.8%	20.3%	55.3%	11.7%
Western Urban	34.7%	96.4%	63.9%	2.5%	60.3%	19.9%	53.9%	14.6%

Figure 6. Standard of Living Indicators (Source: Statistics Sierra Leone, 2015 Population and Housing Census)

Furthermore, according to a 2016 report from the World Bank Group on Urban Resilience “Up to 77 million urban residents could fall back into poverty by 2030 in a likely scenario of high climate impacts and inequitable economic growth. This is a conservative estimate based on a USD 1.25 poverty line which is applied nationally and often understates urban poverty in cities.”¹³ Hence, making climate action a key driver to sustainably reduce poverty in the long term.

1.2. Freetown’s approach to climate action planning and the development of its first strategy

Developing Freetown’s first climate action strategy has not been an easy task, particularly with many pressing needs often taking centre stage. However, since Freetown became a C40

¹³ World Bank (2018a)

member city and committed to Deadline 2020¹⁴ in November 2019, its climate action planning pathway gained momentum. While unique, it is a pathway that is guided by international standards, including compatibility with the Paris Agreement which is intended to limit global warming to a maximum of 1.5 degrees Celsius and assure climate resilience by 2050. Freetown’s pathway and strategy was developed according to C40’s Climate Action Planning Framework¹⁵, a standard developed specifically for cities aiming to do their part to meet the goals of the Paris Agreement. As a result, this strategy considers climate change mitigation and adaptation in an integrated way, identifying interdependencies to maximise efficiencies; sets evidence-based, inclusive and deliverable goals and targets for achieving transformational mitigation and adaptation, centred on an understanding of the city’s powers and wider context and establishes a transparent process to monitor delivery, communicate progress and update climate action planning, in line with the city’s governance and reporting systems. Figure 7 below presents the different steps across the past years.

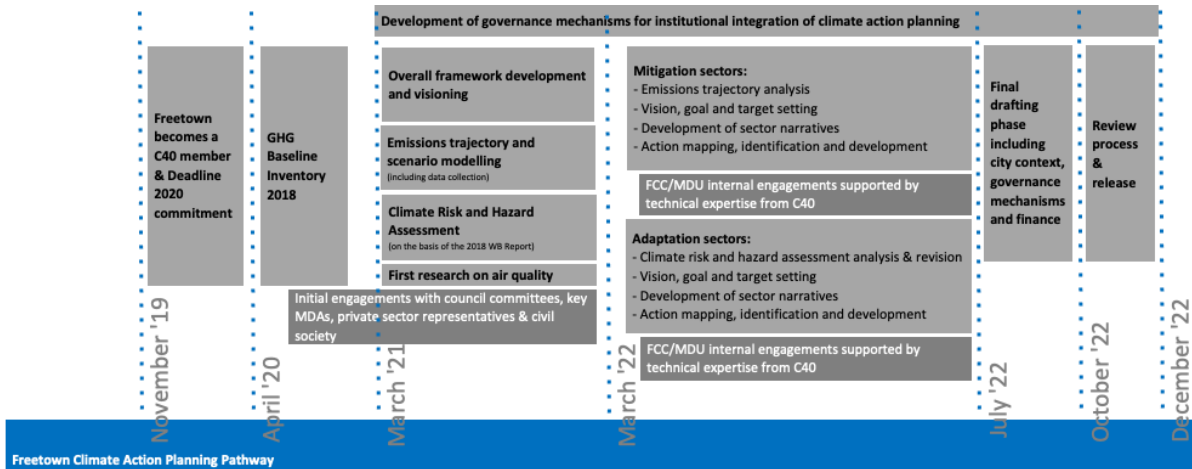


Figure 7. Own compilation of Freetown’s climate action planning pathway, November 2019 to December 2022

Broader climate policy landscape at national and city level

Freetown’s first climate action strategy builds and complements key subnational and national strategies, policies and frameworks. In Sierra Leone, local government operates in a single tier with 15 district councils and seven city councils - one of them being the Freetown City Council. All 22 local councils are governed by the Local Government Act from 2004¹⁶, which gives councils legislative, financial and administrative powers.¹⁷

For the city, apart from the 2004 Local Government Act, the Transform Freetown Agenda¹⁸ is the backbone of Freetown’s climate work and guides the structure of this first strategy. The Transform Freetown Agenda is the first of its kind for Freetown and a reflection of a mindset to inspire change. The eleven Transform Freetown priority sectors are grouped within four clusters – Resilience, Human Development, Healthy City and Urban Mobility – and respond to the challenges of climate change across all aspects of urban life (see Figure 8).

¹⁴ For further information on Deadline 2020 refer to [C40’s resource centre](#).
¹⁵ For further information on C40’s Climate Action Planning framework refer to [C40’s knowledge hub](#).
¹⁶ The 2004 Local Government Act can be retrieved [here](#).
¹⁷ Further information on the local government system in Sierra Leone can be found [here](#).
¹⁸ For further information refer to retrieve the Transform Freetown Agenda together with various update reports, go to: <https://fcc.gov.sl/transform-freetown/>

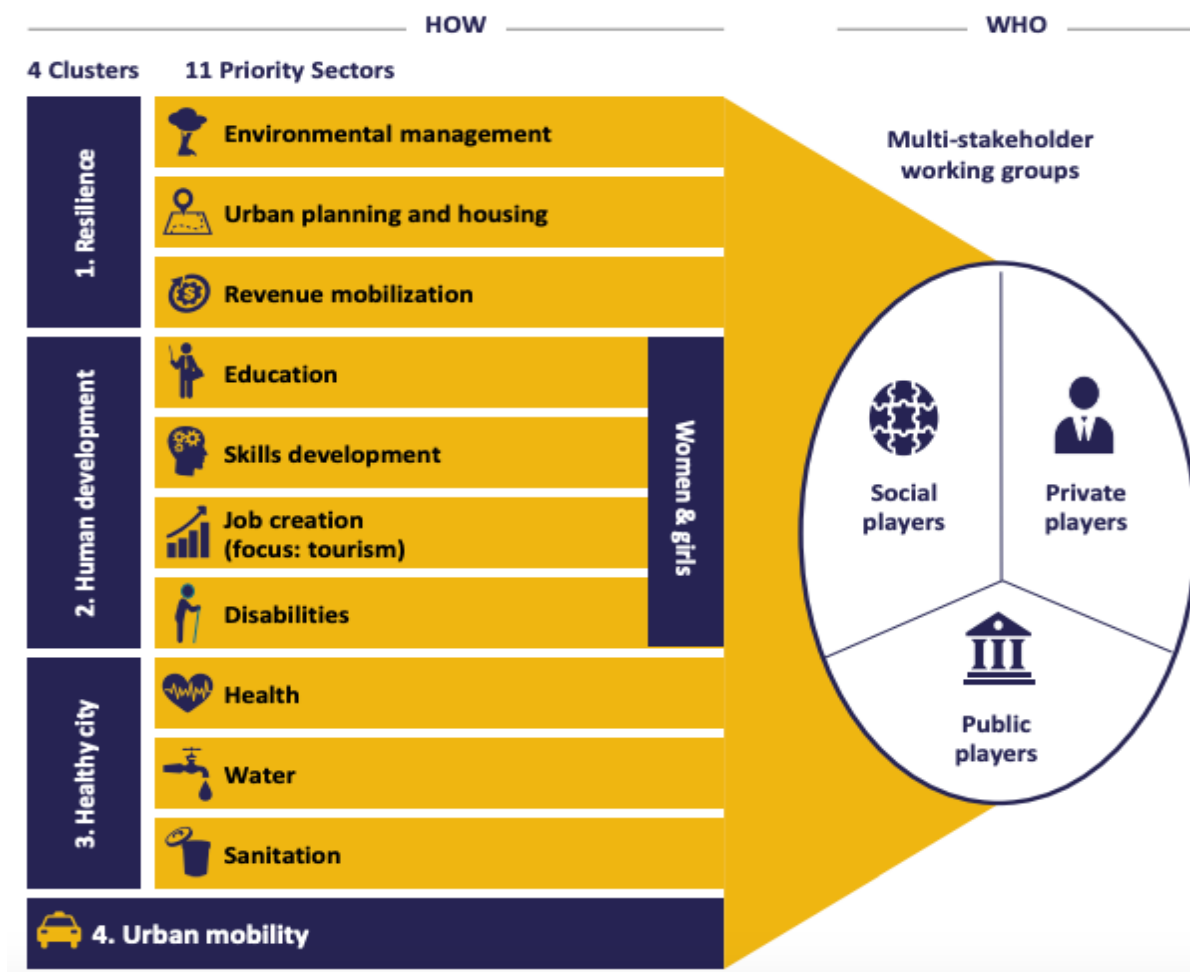


Figure 8. Transform Freetown priority clusters and corresponding sectors, retrieved from Transform Freetown 3rd Year Report.

Additional policies that are of relevance for climate action developed and shaped directly by the city include the city's planning policies: the Freetown Structure Plan, Western Area Structure Plan as well as specific Local Area Action Plans. All three are, at the time of writing, either under revision or being newly developed. From a sectoral perspective this list can be further expanded by the FCC Facilitator's Guide and Standard Operating Procedures (SOPs) for fire safety, as well as future flood evacuation plans for DRM; a Heat Action Plan, which is to be developed as part of the work of the recently appointed Chief Heat Officer; any sanitation related sector strategy, including a future strategy for plastics as well as sanitation by-laws; future drought response plans to safeguard access to water, the yet to be developed Sustainable Transport Management Strategy and policies in relation to the yet to be devolved building control and permit functions.

At the national level, the country's MTNDP (2019-2023)¹⁹ sets the broader framework with its four overarching goals of 1) a diversified, resilient green economy; 2) a nation with educated, empowered, and healthy residents capable of realising their fullest potential; 3) a society that is peaceful, cohesive, secure, and just and 4) a competitive economy with a well-developed infrastructure and eight corresponding priority clusters: 1) Human capital development 2) Diversifying the economy and promoting growth 3) Infrastructure and economic competitiveness 4) Governance and accountability for results 5) Empowering women, children,

¹⁹ The GoSL's MTNDP (2019-23) Volume I can be accessed [here](#).

and persons with disabilities 6) Youth employment, sports, and migration 7) Addressing vulnerabilities and building resilience 8) Means of implementation.²⁰

Within the climate space, a number of documents frame the broader context, most notably the recently updated NDC and NAP of the GoSL. In its most recently updated NDC the following long-term goals for mitigation are envisioned: a reduction in CO2 emission levels to 5% by 2025, 10% by 2030, and 25% by 2050, with a transformational shift toward a low-emission development pathway, by targeting priority sectors, implementing REDD+ (Reducing Emissions from Deforestation and Forest Degradation) as well as promoting innovation and technology transfer for sustainable breakthroughs in energy and waste management.²¹ Within the NAP the GoSL articulates its adaptation goal: Sierra Leone reduces vulnerability by half by 2030 through increased risk awareness, improvements in rule compliance, increased institutional capacity and an integrated gender-responsive approach to adaptation in development policy and programmes across sectors and scales.²²

Apart from numerous sector specific strategies and policies, which are listed in the corresponding sectoral section; additionally, the following list²³ presents a chronological order of relevant national government climate strategies and plans that inform the present strategy within the city:

- 2007 National Adaptation Program of Action, First National Communication to the UNFCCC
- 2012 National Climate Change Policy Framework (NCCP), Second National Communication to the UNFCCC
- 2015 Nationally Determined Contribution, National Climate Change Strategy and Action Plan
- 2018 Third National Communication to the UNFCCC
- 2019 NAP Framework
- 2020 NAP Communications Strategy, Fourth Generation Poverty Reduction Strategy
- 2021 Updated NDC and NAP

Vision and Principles

In Freetown, approaches ideally involve multiple stakeholders including the GoSL, civil society, the private sector, NGOs and international development partners. Further, the most important stakeholders and partners are Freetown's residents, including poor and marginalised groups, such as those living in informal settlements. The development of the Transform Freetown Agenda, for example, involved focus group discussions with 15,000 residents. The spirit of the development of the Transform Freetown Agenda is also brought forward to the city's approach to climate action planning:

Freetown's climate actions are developed by our communities, businesses, and government to pursue urgent climate mitigation and adaptation actions towards building a healthy, sustainable city for current and future generations.

This vision builds on three guiding principles. First, each action creates **ownership through collaboration**, resting on the belief that "the whole is greater than the sum of its parts". Private sector, public sector, and civil society actors engage in climate action planning processes and own climate actions across sectors and activities. Second, actions are **innovative solutions** to climate-induced challenges. In a context, within which human and financial resources are limited, thinking outside of the box is a must and a vital ingredient to become a beacon of climate leadership. Third, climate actions foster **social and behavioural change**. More

²⁰ GoSL's development plan prior to the MTNDP (2019-23): National Development Plan – the Agenda for Prosperity (2013-2018)/Third Generation Poverty Reduction Strategy Paper (2013-2018)

²¹ GoSL (2021b); further information on Sierra Leone's emissions profile can be accessed [here](#)

²² GoSL (2021a)

²³ GoSL (2021a)

specifically, they induce long-term behavioural change to raise awareness about climate change, planting seeds of knowledge through public education to underscore the urgent need for climate action in Freetown.

Stakeholder Engagement Process

With the vision and principles in mind, while acknowledging limitations, the stakeholder engagement process for the present strategy was based on three pillars. First, the strategy carries forward the work of the past and honours the extensive engagement as part of the Transform Freetown Agenda process that has taken place in 2018. As such, the priority clusters and sectors have been looked at through a climate lens and adjusted as well as expanded on the basis of research conducted by the FCC as part of the development of the GHG inventory, emissions trajectory modelling exercise, research on the city’s air quality, as well as the city’s climate risk and hazard assessment.

Further, on the basis of an extensive stakeholder mapping, three types of engagements were held directly in order to inform the content of this concrete piece of work. The FCC engaged its councillors and created a council committee for Climate Action and Disaster Risk Management. Technical work sessions were held with members of FCC’s administrative arm, the Mayor’s Delivery Unit, as well as technical staff from C40. A number of initial external engagements with main government and civil society representatives also took place - virtually and in person.



Image 1. One of the first Climate Action and Disaster Risk Management Council Committee Meeting in late 2021



Image 2. Left: Initial engagement with civil society representatives in early 2021; Right: Initial MDA briefing session, taking place at the new City Council building in February 2021

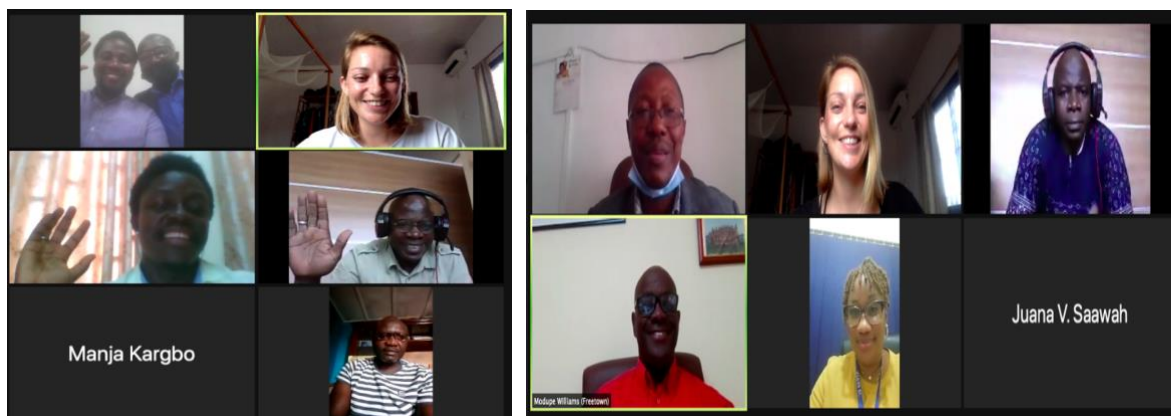


Image 3. Left: Virtual engagement with Sierra Leone Meteorological Agency in July 2021; Right: Virtual engagement with Statistics Sierra Leone in July 2021

Lastly and most importantly, FCC continuously leveraged opportunities to transfer the important message of the urgent need for climate action and to strengthen the climate lens within various sectors at different levels through its ongoing engagements as part of its Transform Freetown initiatives. Likewise, the Transform Freetown initiatives were a gateway to access information and data necessary for this strategy. For example, climate action was embedded within a number of conferences, such as the SDG 11 conference organised by FCC in May 2021, technical workshops, including for example the workshop on tech in DRM organised jointly by FCC and the Tony Blair Institute in March 2022 and the Urban Shift City Lab organised as part of the wider Urban Shift program in June 2022, and partnership engagements, such as the Mayor of Kannifing’s visit to Freetown. At the community level, as part of the #FreetownTheTreeTown campaign, FCC trained community ambassadors for climate change into communities to complement reforestation efforts and initiate behavioural change at community level. Even the global Covid pandemic has not stopped the council from deepening engagement with its communities. In response to meeting restrictions, digital town halls meetings at ward level were introduced, using WhatsApp as a communication platform for participatory budgeting. Ward residents are able to discuss their communities’ needs and vote on the use of funds within their wards. Also, the Covid response plan emphasised the importance of exploring solutions to challenges from bottom up, supporting social infrastructure and enabling entrepreneurship. In Freetown, rainwater is harvested in order to enable handwashing, as an example of a context-appropriate solution developed in collaboration with local communities, thereby creating a level of community dynamic and engagement, which will be maintained beyond the pandemic.

While each of the engagement pillars have been invaluable to the process, the council would have preferred to engage more intensively in a direct manner, particularly with key MDAs, civil society actors and the private sector. In order to honour this wish and acknowledge the limitations of less than ideal engagement processes, the council looks at this strategy only as a stepping stone to sustainably integrate climate action planning at the local level. In Freetown where everyone is often preoccupied with putting out fires (literally and figuratively) and generally responding to short term crises of one form or another, every bit of effort that goes towards long-term planning is incredibly valuable. It may seem like a less than ideal engagement process, but at the same time this strategy could almost be considered luxury and allows Freetonians to keep an eye trained on the end goal - a climate safe future for all.



Image 4. Left: Sierra Leone Delegation at Urban Shift City Academy Kigali, May 2022; Right: Tech in DRM Workshop, February 2022

2. The Facts - Climate Action Evidence Base

This chapter presents the evidence base for Freetown’s climate ambition for mitigation and adaptation. Chapter 2.1 covers FCC’s first Greenhouse Gas (GHG) inventory, developed for the 2018 calendar year. The work is complemented by the first ever evidence on air quality and its interlinkages with GHG emissions. Further, Chapter 2.2 presents Freetown’s Climate Risk and Hazard Assessment. Thereby, the FCC benefited from the work done by the World Bank and the GoSL in 2018 as part of Sierra Leone’s Multi-City Hazard Review and Risk Assessment. This work was further complemented by a qualitative review of additional key literature and a community perception survey undertaken by the FCC in 2021 and at the beginning of 2022, which together identified climate induced risks and hazards as well as their impacts and informed the adaptation goal and targets presented below.

On the basis of the derived evidence for climate mitigation and adaptation, this first climate action strategy brings forward clear goals and targets:

Mitigation

Goal Freetown uses its commitment to being a net zero emissions city by 2050 to demonstrate leadership, and leverage support for improving the liveability of the city and the health and well-being of its residents. This commitment will complement the national government’s mitigation commitments and efforts, and address the city’s primary development needs with regards to energy, transport, sanitation and waste management.

Target Reduce GHG emissions by at least 44% by 2050 compared to the base year (2018) level and an interim target of 13% below base year levels by 2030.

Adaptation

Goal (1) Create climate resilient people, infrastructure and city systems by 2030,
(2) Build the institutional capacity and enabling environment required to adapt to climate-related hazards and natural disasters by 2030.

Target (1) Significantly increase funding allocated annually to adaptation projects by 2030 as compared to base year (2020)²⁴ by both directly increasing the council’s budget allocation to budget lines relevant for adaptation and indirectly increasing the Council’s budget for adaptation projects through the cooperation and development of partnerships with external funders supporting adaptation projects.
(2) Establish a functional and well-funded climate action and disaster risk management unit in the City by 2030.

²⁴ In the base year 2020, the council’s own source expenditure allocated to the environmental department and expenditures associated with adaptation activities (approx. 90% of expenditures within the budget line “cleaning others”) account for approximately 795 million SLE.

2.1. Greenhouse Gas Emissions Inventory and Air Quality Analysis

2018 Baseline overview (overall picture, sectoral, biogenic, data limitations)

The first ever city-wide GHG inventory for Freetown was completed in 2020 based on data from the 2018 calendar year. This citywide inventory was developed in accordance with the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (the GPC), and is the first step towards understanding the emissions profile of the city. The inventory forms the basis for the subsequent emissions trajectory and scenario modelling used to identify mitigation strategies and quantify GHG reductions and formulate emissions goals. Mitigation strategies are made up of a series of actions aimed at reducing the city's contribution to GHGs, and at the same time driving the development of a cleaner, more equitable and environmentally sustainable city.

The inventory helps to take track of emissions levels over time and also provides insights into the activities in the city that drive emissions, such as transportation, waste and energy use in buildings.

The GPC requires that cities, at a minimum, report emissions in the following areas:

- **Stationary energy:** fuel burned to produce energy for use in buildings (residential, commercial and industrial), including solid/liquid fuels (Scope 1) as well as electricity supplied to buildings by the grid (Scope 2).
- **Transportation:** fuel burned to produce energy for travel, including liquid fuels (Scope 1) as well as energy supplied by the grid to electric motors (Scope 2)
- **Waste:** emissions from the treatment of solid waste (e.g. waste disposed of in informal or managed landfills, open burning) and wastewater (e.g. wastewater treated in septic tanks, water treatment plants, or discharge into latrines or water bodies within the city limits).

These three sectors are generally the largest sources of GHG emissions in urban areas. Other sectors, such as agriculture, forestry, land-use (AFOLU) and industrial process and product use (IPPU) are also important, but according to the GPC standard, reporting them is optional.

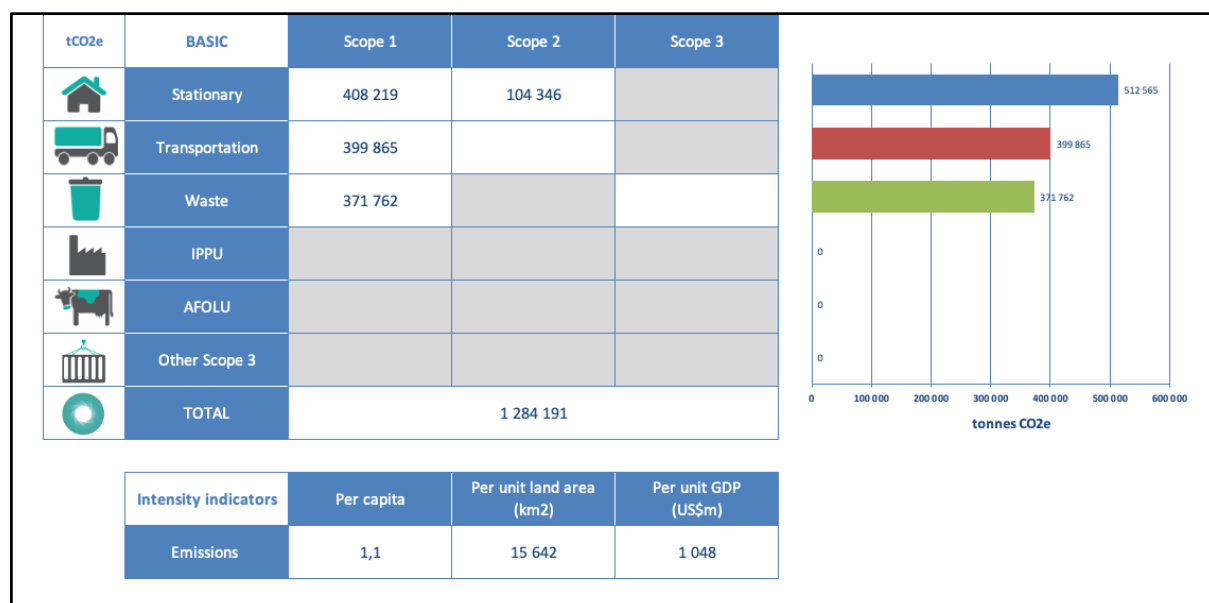


Figure 9. Distribution of Greenhouse Gas Emissions for the City of Freetown, 2018 (Source: CIRIS, 2020)

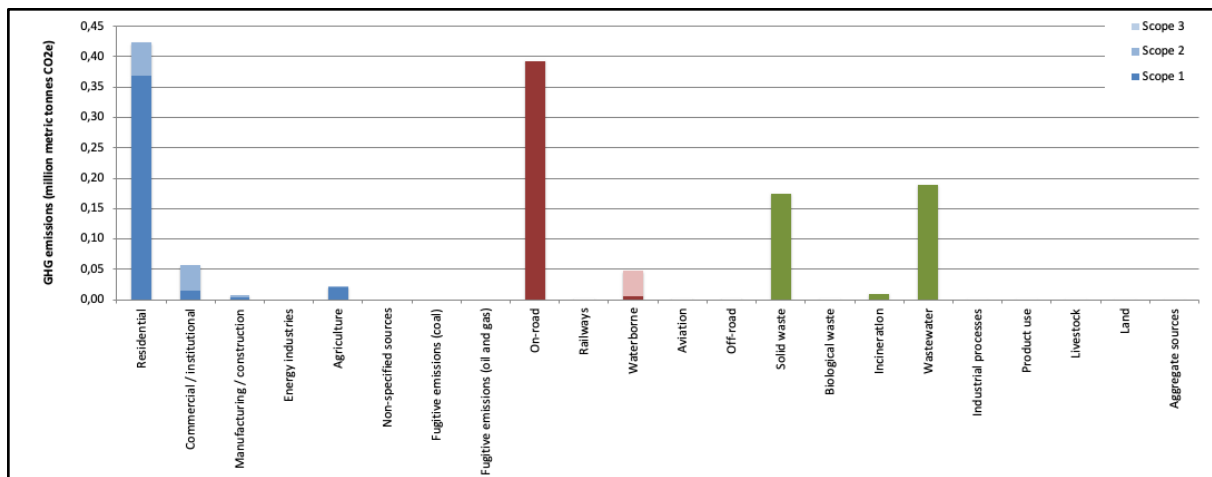


Figure 10. Greenhouse Gas Emissions by Sub-Sector and Scope, 2018 (Source CIRIS, 2020)

According to the GHG inventory, Freetown generated an estimated total of 1,284,191 tCO₂e during the year 2018. The emissions total contains a proportion of biogenic CO₂ amounting to 329,247 tCO₂e. Biogenic emissions (CO₂b) in Freetown arise from the combustion of wood and charcoal. Because these emissions are of a biogenic origin, they are not included in the official reported GPC inventory which has a total of 954,944 tCO₂e, however they are included in the analysis in order to better reflect the impact of the use of these fuels has on air quality and human health in the city. The biogenic emissions are also included in the emissions scenario modelling due to its relative importance in the city. Including these sources in the future modelling enables an analysis of the impact of measures, such as shifting from charcoal to cleaner sources of fuel for cooking.

The main source of emissions is the use of energy within the city boundary. Stationary energy emissions are mostly attributable to the residential sector and they contribute 40% to the total citywide emissions (or 512,565 tCO₂e). Transport and waste are also major contributors, and respectively contribute 31% (or 399,865 tCO₂e) and 29% (or 371,762 tCO₂e). The waste emissions are approximately evenly split between solid waste and wastewater generated and disposed within the city boundary.

92% of GHG emissions take place as a result of direct fuel combustion within city limits (scope 1) while the remaining 8% comes from electrical energy consumption in buildings and industries. Scope 2 emissions due to electricity consumption account for 20% of emissions from the stationary energy sector. Figures 9 and 10 above show the distribution of GHG emissions for Freetown in 2018 and GHG emissions by sub-sector and scope.

Emissions from the stationary energy sector are particularly high due to the high contribution of emissions from the use of charcoal and other fossil fuels for cooking and for heating water. There are two further sources of GHG emissions that are not included in the GPC inventory totals. The first is an amount of 33,989 tCO₂e from energy generated inside the city boundary that feeds into the national grid. These emissions are from fuel oil combusted by the Karpower ship, which contributes to local air pollution. A second source of emissions is an amount of 41,542 tCO₂e from waterborne navigation (departing ships refuelling with marine fuel oil). Due to the transboundary (Scope 3) nature of these emissions they are not included in the totals of a BASIC inventory.

It is important to note that the inventory was based upon the best available data and a number of assumptions, however there are multiple opportunities to improve the quality of the inventory in the future. Access to better inventory data sources is synonymous with improving planning capabilities, decision making and access to financial support for actions across the represented sectors.

Links to Air Quality analysis²⁵

Integrating air pollution management and climate action planning is an important opportunity to increase the ambition of climate change mitigation while improving health and wellbeing for residents. Air pollution and climate change have many complex interactions and are closely linked. Some pollutants (such as black carbon) directly contribute to both climate change and air pollution, which then has impacts on human health.²⁶

In Freetown, air quality has not yet received significant attention by officials at subnational and national level. Consequently, most of the air quality data that is available is based on short term and irregular measurements, using air samplers. A low-cost PM sensor was installed by Sierra Leone Standards Bureau in January 2021 with concentrations of PM_{2.5} and PM₁₀ measured every 2 minutes. Similarly, assessments of the health impacts of air pollution have been largely informal and limited to household sources²⁷. Nevertheless, the GoSL's Environmental Protection Agency (EPA) conducted a report on the impact of urban traffic on the ambient air quality in Freetown. The EPA studied the impact of vehicular traffic on the ambient air quality along a single carriage road on one side (Kissy Road) and dual carriage road (Wilkinson Road). The hourly peak values revealed astonishingly high levels that could be considered unacceptable. A remote sensing model estimates PM_{2.5} concentrations in Freetown at an annual average of 20-53 µg/m³. Further, using Pathways-AQ and Freetown's baseline GHG emission inventory, an annual average population-weighted PM_{2.5} concentration of 4.6 µg/m³ for Freetown in base year 2018, or approximately 17% of the PM_{2.5} concentration expected, was modelled. Figure 11 below shows the available data points.

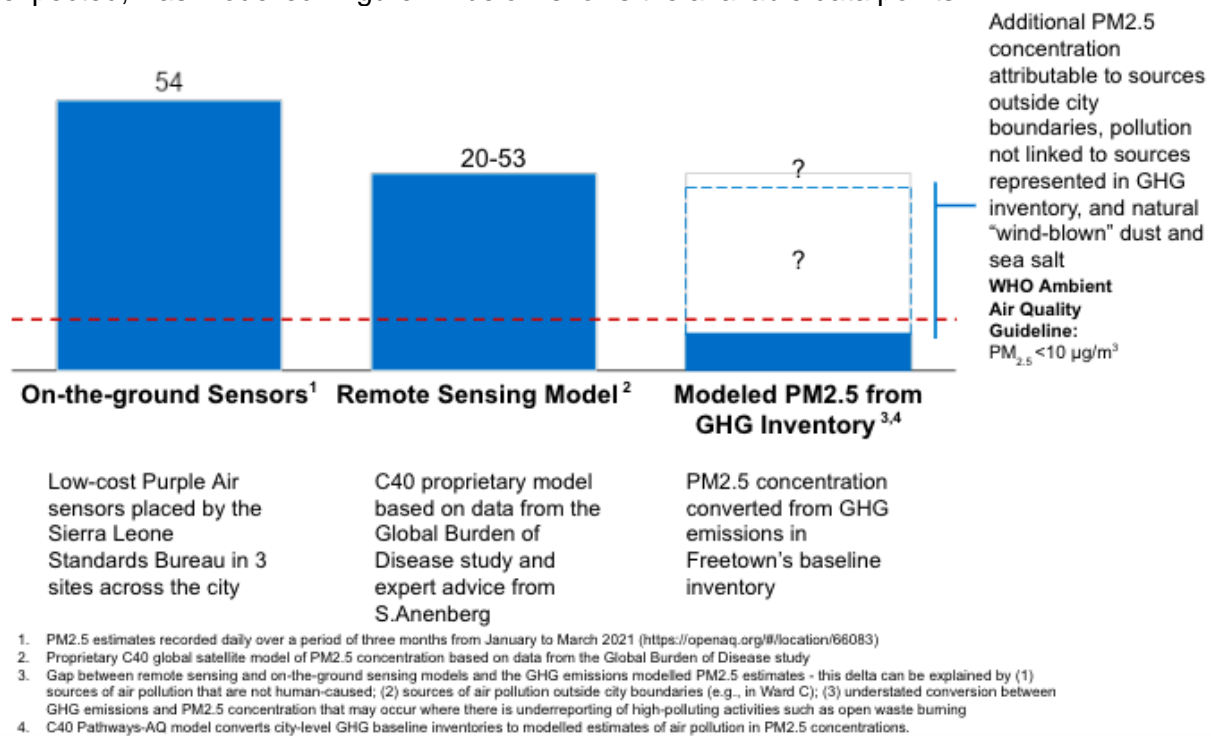


Figure 11. Own illustration of preliminary CAP-AQ analysis representing Freetown's PM_{2.5} concentration annual average estimates from three estimation methods, µg/m³

While there is no large scale air quality monitoring system, these individual data points and an analysis on the basis of the 2018 GHG inventory provide first insights on PM_{2.5} concentrations in Freetown and their sectoral distribution. The Pathways-AQ analysis revealed that on-road

²⁵ Note that the information in this section is based on the briefing memo prepared by C40 staff "Air Quality Implications of Climate Action: Preliminary Analysis for Freetown", compiled first in June 2021 and updated in October 2022.

²⁶ Further information can be accessed through Malley, C., et al. (2019)

²⁷ Mailman (n.d.)

transport is the largest contributor of PM_{2.5} concentrations, from activity accounted for in the inventory. It accounts for 35% of the total city-wide PM_{2.5} concentration that is modelled in Pathways, which is mainly attributed to minibuses. The on-road transport sector is followed by the residential sector with 22%. Within the residential sector, most of the pollution is primary PM_{2.5} (and some VOCs) from stationary energy - wood and charcoal burning. Primary PM_{2.5} makes up roughly 15% total annual PM_{2.5} concentration. The waste sector is the third largest source of PM_{2.5}, accounting for 17%. It is followed by grid electricity, which accounts for 15% of the total city-wide PM_{2.5} concentration. It can mainly be attributed to the non-renewable electricity for the city that comes from the powership of Karpower, located within the city boundary. However, more ground-based air quality monitoring is urgently needed to better understand the exact magnitude of air pollution issued in the city and sectoral contributions.

Comparative analysis (Proportion of national, GHG per capita, GDP, land area and benchmarking compared to other cities in the region / similar context)

The city’s total emissions correspond to 1.1 tCO₂eq/inhabitant (including the biogenic component and 0.8 tCO₂eq/inhabitant excluding the biogenic component), which is very low by global standards. Nevertheless, Freetown likely contributes to a major proportion of the national emissions total given that it is the economic hub of the country. The per capita GHG emissions are the lowest of all C40 Cities on the African continent which have an average of 3.5 tCO₂eq/inhabitant.

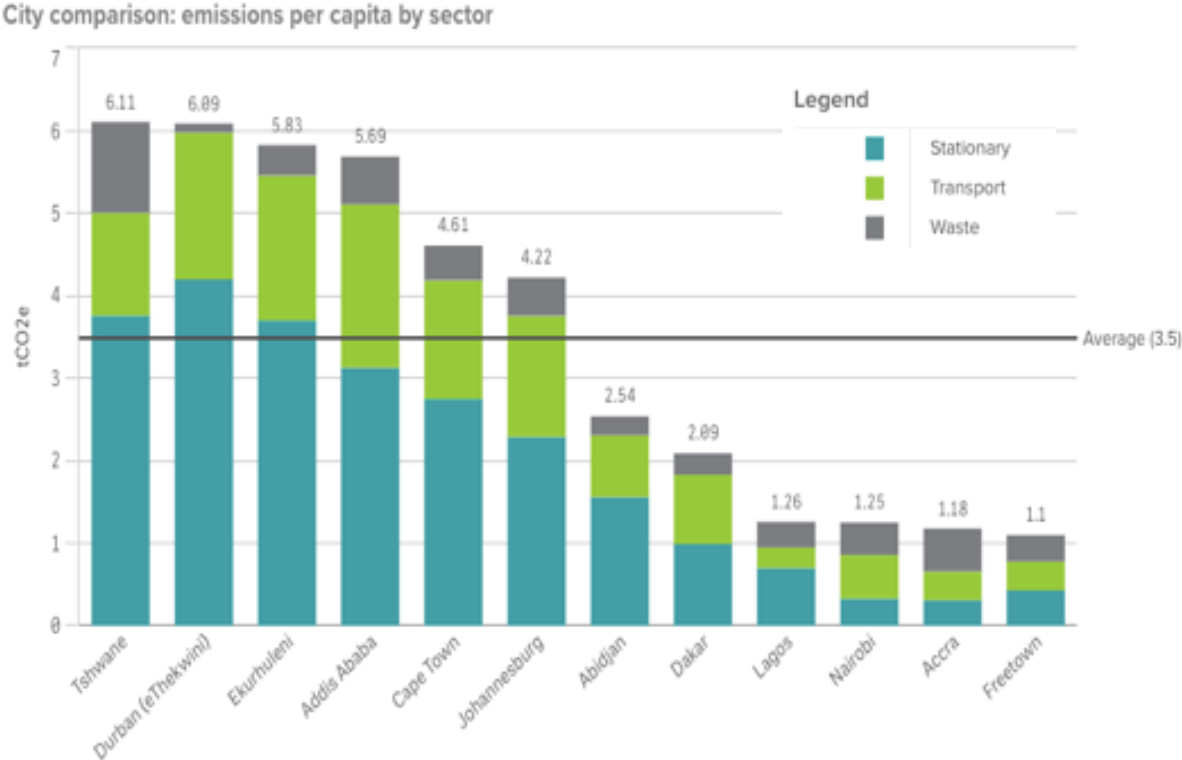


Figure 12. GHG emissions per capita by sector based on the most recent inventories for each of the C40 cities on the African continent. (Source: C40 Knowledge Hub)

From an air quality perspective, the figure below shows that, while Freetown has the lowest per capita GHG emissions in comparison with other African C40 cities, it scores relatively high on the population weighted PM_{2.5} concentration.

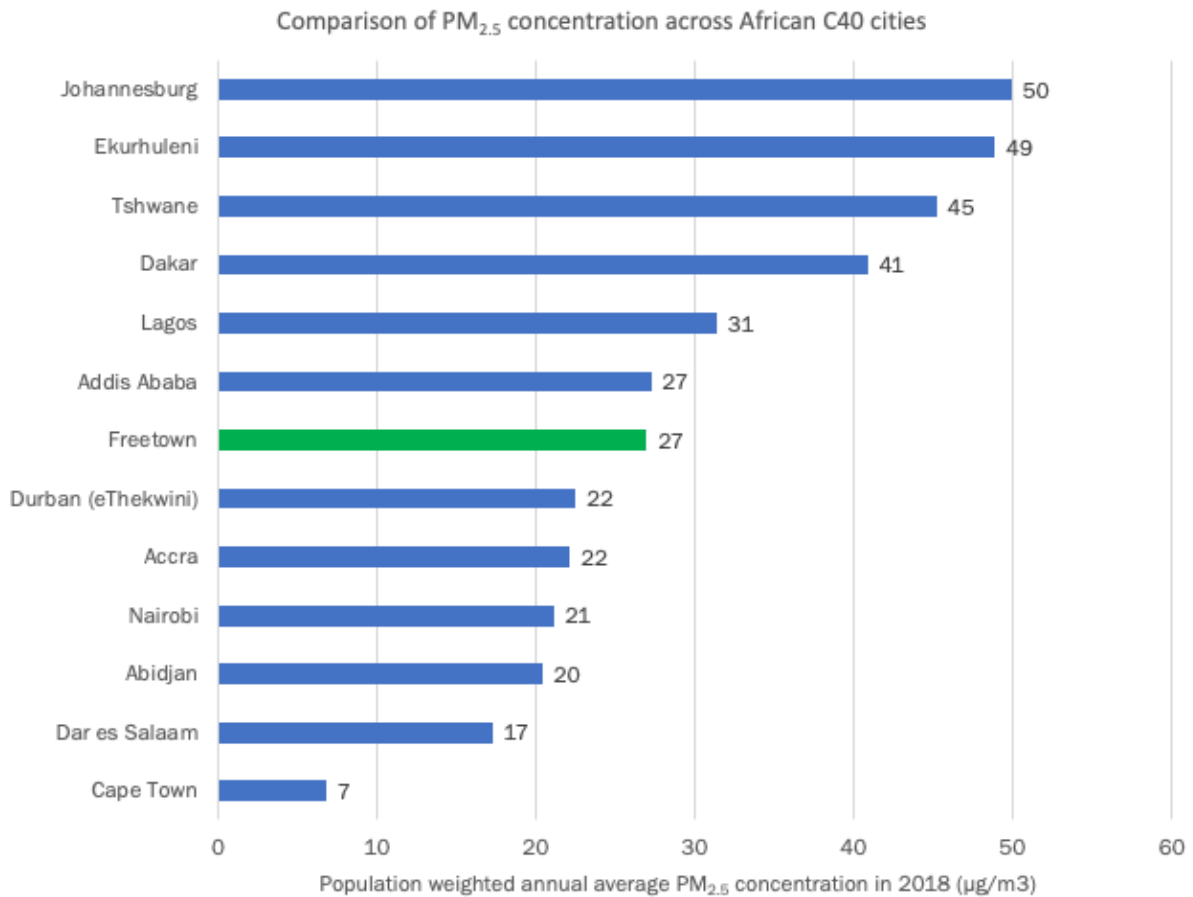


Figure 13. Comparison of PM_{2.5} concentration across African C40 Cities (Source: C40 and van Donkelaar A, et al. (2021). Monthly Global Estimates of Fine Particulate Matter and Their Uncertainty. Environmental Science & Technology, doi:10.1021/acs.est.1c05309)

In sum, for the case of Freetown, the low per inhabitant footprint is more indicative of suppressed demand for energy and mobility services than it is of ecological sustainability, however a clean development pathway presents an opportunity to maintain a relatively low carbon footprint in global terms while improving the quality of lives of city residents, particularly also from an air quality perspective.

Forecast BAU and assumptions

Freetown's commitment to the Paris Agreement means aiming to achieve net zero emissions by 2050 and setting an interim emissions target for 2030. The BAU scenario, presented in Figure 13, represents a projection of emissions growth if no climate action is taken by the city, which forms an important basis for determining the actions required to meet the goals of this Strategy (including the intention to meet the goals of the Paris Agreement).

The BAU trajectory is evaluated using a combination of population and economic growth forecasts as these are the factors that have historically driven increases in the activities that produce GHG emissions. Customised growth factors were derived for each of the sectors based on weighted average composite outlooks for national economic growth (World Bank Data) and population growth (based on historical census data with city capacity limits in the long-term). Separate growth factors were applied for the periods 2018-2030, and 2030-2050.

The resultant growth factors were applied to each of the main sectors according to the following table²⁸:

Sub-sector	Annual growth rate 2018-2030	Annual growth rate 2030 - 2050
Residential Energy	2.9%	1.2%
Commercial & Institutional Buildings	5.0%	2.1%
Energy for Agriculture, Forestry and Fishing	3.7%	1.5%
On-road transportation	4.5%	1.9%
Waterborne transportation	4.6%	1.9%
Waste production	2.4%	1%

Table 1. Composite growth factors for the BAU emissions trajectory

The relatively high growth factors also acknowledge the need for meeting current levels of suppressed demand for energy. According to the projections (Figure 14), the BAU scenario indicates that if no climate action is taken, Freetown’s emissions by 2050 will be nearly twice the 2018 levels. GHG emissions could increase from 1,284,191 tCO₂e in 2018 to 1,621,555 tCO₂e in the short-term to 2025, 1,929,325 tCO₂e in 2030, and 2,565,621 tCO₂e in 2050.

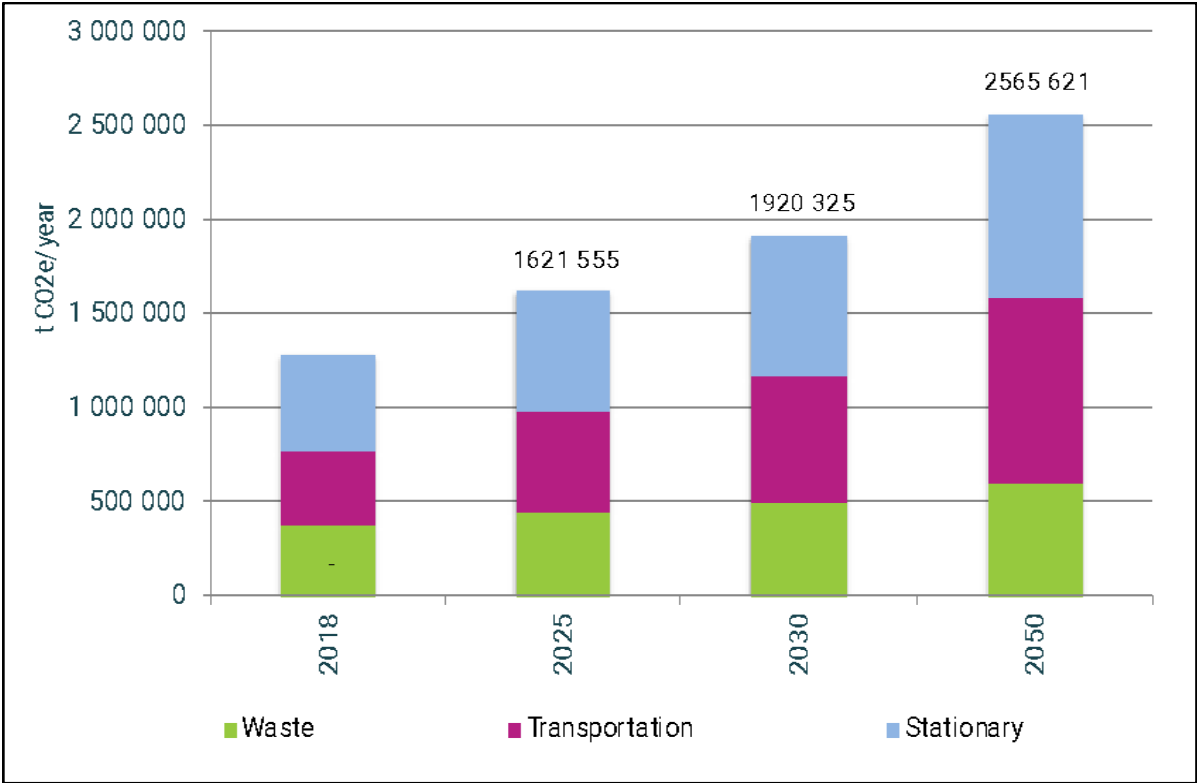


Figure 14. Freetown's Business-as-usual GHG Emissions Forecast.

Further, from an Air Quality perspective, under a BAU scenario PM_{2.5} concentrations are, alongside GHG emissions, expected to increase (Figure 15), degrading air quality further and hence causing serious health issues for Freetown’s residents. Over time (2018-2050), the on-road sector is expected to increasingly degrade air quality, with its modelled contribution growing from 1.6 µg/m³ in 2018 to 4 µg/m³ in 2050. It is followed by the grid electricity sector, that is electricity production, which has a growing impact on air quality, from 0.8 µg/m³ in 2018

²⁸ For each sector, an appropriate weighting of the outlooks - adjusted to urban / national relevance - for population growth (2.4% per annum from 2018 to 2030 and 1% from 2030 to 2050) and GDP growth (5% per annum from 2018 to 2030 and 2.08% per annum from 2030 to 2050). The weighting was selected according to the extent to which each sector’s growth is driven by population versus GDP. For example, for 2018 to 2030, based on studies from other cities, on-road transportation has a weighting of 0.2 of the population growth and 0.8 of the economic growth = 4.5%) and Commercial & Institutional Buildings have a weighting of 0 for the population growth and 1 for the economic growth = 5%.

to 1.7 $\mu\text{g}/\text{m}^3$ in 2050. Thereafter, the residential sector has the next largest impact, moving from 0.6 $\mu\text{g}/\text{m}^3$ in 2018 to 1.1 $\mu\text{g}/\text{m}^3$ in 2050.

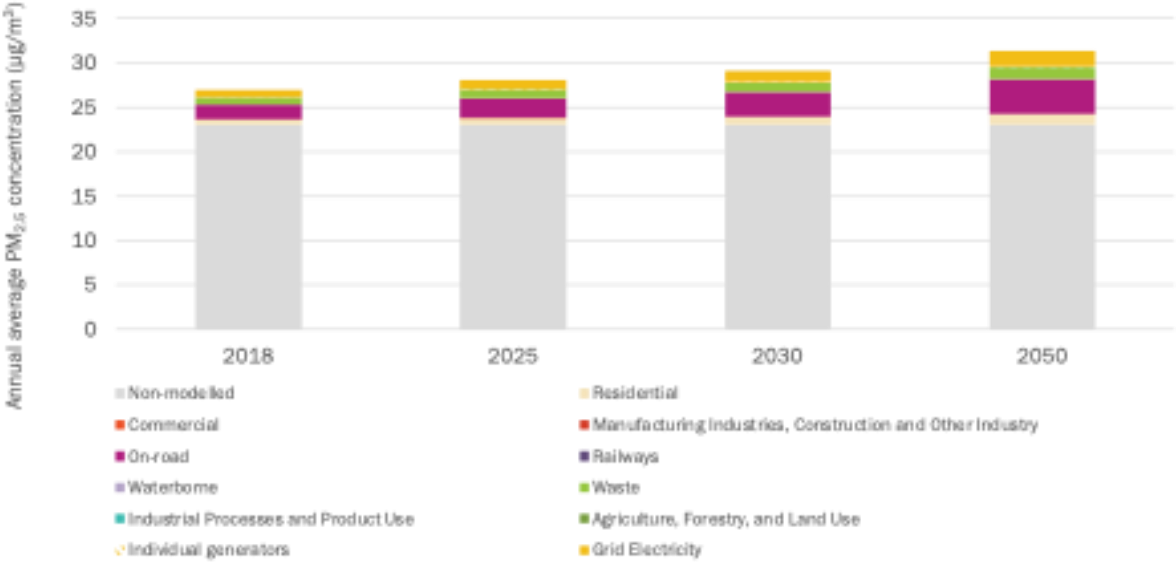


Figure 15. Sectoral contributions to baseline annual average $\text{PM}_{2.5}$ concentrations in Freetown, 2018-2050. Note. The grey bar represents the total $\text{PM}_{2.5}$ concentrations that are expected based on the global model which takes into account national/regional data. The coloured bars represent $\text{PM}_{2.5}$ concentrations from emission sources that are found in the GHG inventory. They are far from corresponding to the total expected $\text{PM}_{2.5}$ concentrations, as there are a number of different sources that are not modelled, such as sea salt, dust, small inside-of-the-city sources, as well as outside-of-the-city sources. For the time horizon 2050, the $\text{PM}_{2.5}$ concentration represented by the grey bar is below the concentration modelled based in the GHG inventory, as the city staff is expecting the city to grow more than what the global model is estimating

Similarly, existing data and research on the health impacts of air pollution in Freetown is also limited. Figure 16 below provides insights on the relative risk of disease at varying levels of $\text{PM}_{2.5}$ concentrations. On the basis of the Pathways-AQ analysis premature deaths related to worsening air quality were estimated on a sectoral level. With the uncertainty and gaps of the presented data in mind, the model attributes the largest number of premature deaths to the on-road sector in 2018 as well as in 2050; this is followed by the residential and waste and then the power generation sector for 2018 as well as 2050.

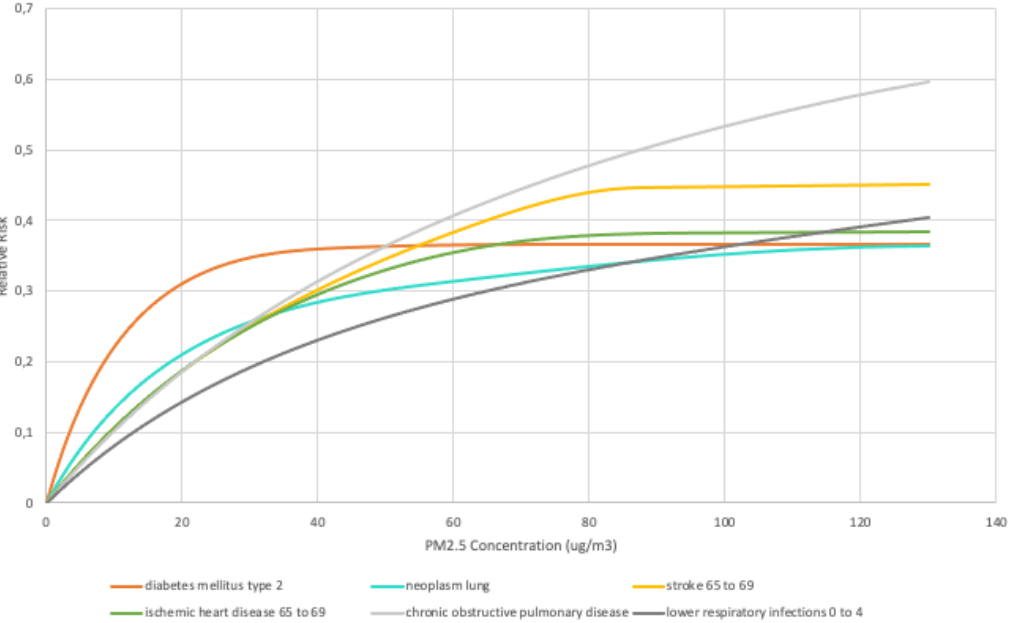


Figure 16. Relative risk of disease at varying levels of $\text{PM}_{2.5}$ concentration; adapted from C40 analyses; Global Burden of Disease study

Effective control of air quality pollutants could result not only in a reduction in GHG emissions, but also in significant improvements to the health outcomes of particularly the most vulnerable communities who often reside in areas that are more exposed to lower air quality, i.e. close to highly congested streets and/or the two large dump sites located within the city. Ultimately, improvements in health outcomes could result in fewer premature deaths from heart and respiratory diseases, which ultimately also help to improve the socio-economic lives of people.

Scenarios (existing-and-planned and ambitious)

The actions outlined in this plan are guided by the development of future emission scenarios for the city that identify priority sectors and actions, using C40's *Pathways* Scenario Planning Tool. *Pathways* is a city-wide emission reduction planning tool that assists cities to model emissions trajectories, identify the emission reduction target(s) and priority mitigation strategies. These priority actions collectively aim to achieve maximum emission reductions (and associated co-benefits) in the city.

The reference year of the scenarios corresponds to the 2018 GHG inventory and the forecast extends to 2050, with 2030 being a key intermediate target year. The scenarios were developed based on a combination of desktop research, taking into account existing city and national programmes policies and plans and consultation via a series of sectoral engagements with members of the Mayor's Delivery Unit, and the input of C40's technical advisors. Due to limitations on the quality and availability of data used to compile the baseline inventory, and the need to make several assumptions about the plausibility of the goals and mitigation strategies, the scenarios should be viewed as indicative rather than prescriptive. However, they can also be construed as being the best available evidence for guiding the development of the strategies and actions in this plan.

The uncertainty relating to the feasibility of the goals and strategies increases the further one looks into the future, however the sectoral goals in the short-term are based on actions that are either already underway or that have already been planned. As this is Freetown's first attempt at climate action planning, the pathway to net zero emissions as an end goal will come into sharper focus in future iterations of this plan and once the strategies and goals are tested in the implementation phase.

Existing-and-planned actions and implications

Existing and planned (E&P) actions will reduce future emissions, compared to the BAU, but emissions will continue to grow from the base year, though much slower from 2030 onwards as the effect of lower population growth combined with the actions reducing the carbon-intensity of energy sources, increased energy efficiency and some measures in transportation. Emissions from the waste sector are only minimally addressed according to current plans. The E&P Scenario takes into account all of the actions currently planned by the city and by the national government with regards to electricity generation, cooking fuels and technologies, transport and waste management. One of the reasons that the E&P scenario does not lead to a meaningful reduction in emissions is because prior to the development of this plan, only limited measures have been put in place to facilitate a large scale energy transition that allows residents to meet their (currently unmet) energy needs using clean and renewable sources of energy. Full details of the assumptions made for this scenario are included in the technical annex.

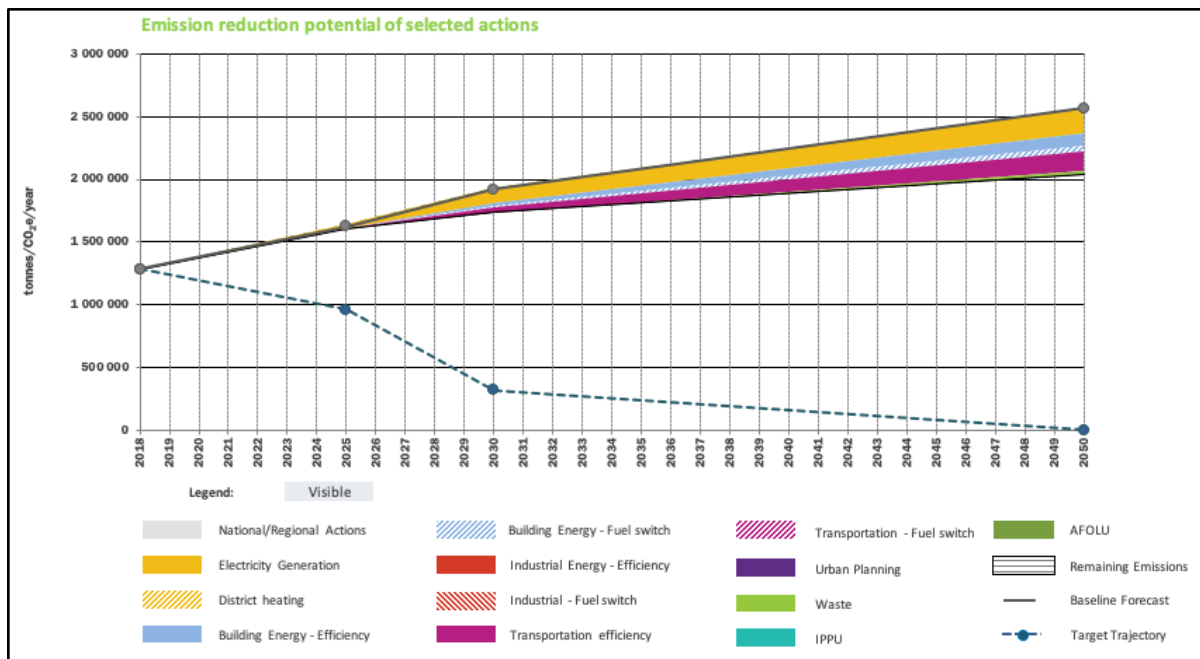


Figure 17. Emissions reduction pathway to 2050 based on Freetown's existing and planned actions.

The E&P scenario would result in the following emission levels in each of the target years:

- 2025 of: 25% above the base year level
- 2030 of: 35% above the base year level
- 2050 of: 59% above the base year level

By 2050, 38% of the reductions in emissions will come from the decarbonisation of the electricity grid, a further 27% from expected energy efficiency measures, 29% from planned actions in the transport sector and the remaining 6% from actions anticipated in the waste sector.

While the E&P actions go some way to reducing the BAU emissions by 2050, there is still a net increase in the city's emissions outlook expected. An ambitious scenario has therefore been developed to enable a reduction in emissions with the ultimate goal of net zero emissions by 2050.

Ambitious assumptions and implications

The ambitious scenario goes further from the E&P scenario to include further ambitious (but achievable) actions that the city can implement and is aligned with the actions that have been prioritised in this first climate action strategy. The ambitious scenario achieves significant reductions compared to the BAU scenario, in the buildings, industrial transport and waste sectors through initiatives that improve efficiencies and switches from fossil fuels to renewable energy. This scenario illustrates that it is possible to achieve reductions in the short term compared to the BAU scenario as a result of national efforts to bring online more sources of renewable power together with efforts aimed at improving cooking fuels and switching vehicle fuels. These efforts are contingent on increased availability of electricity to meet the demands of these services. Although the goal of net zero emissions can be seen as viewed as a significant undertaking for a city in a least developed country, any remaining emissions over the entire time horizon can be viewed as an opportunity to transition towards systems that are creating a new sustainable economy, even though the city is starting at a relatively low emissions per capita base

Future iterations of this scenario may be able to bridge the gap through capitalising on affordable cleantech development options, increased commitment of other key stakeholders

to do their part in contributing to Freetown’s vision, and importantly strengthening capacity, and exploring financing options for net zero emissions development.

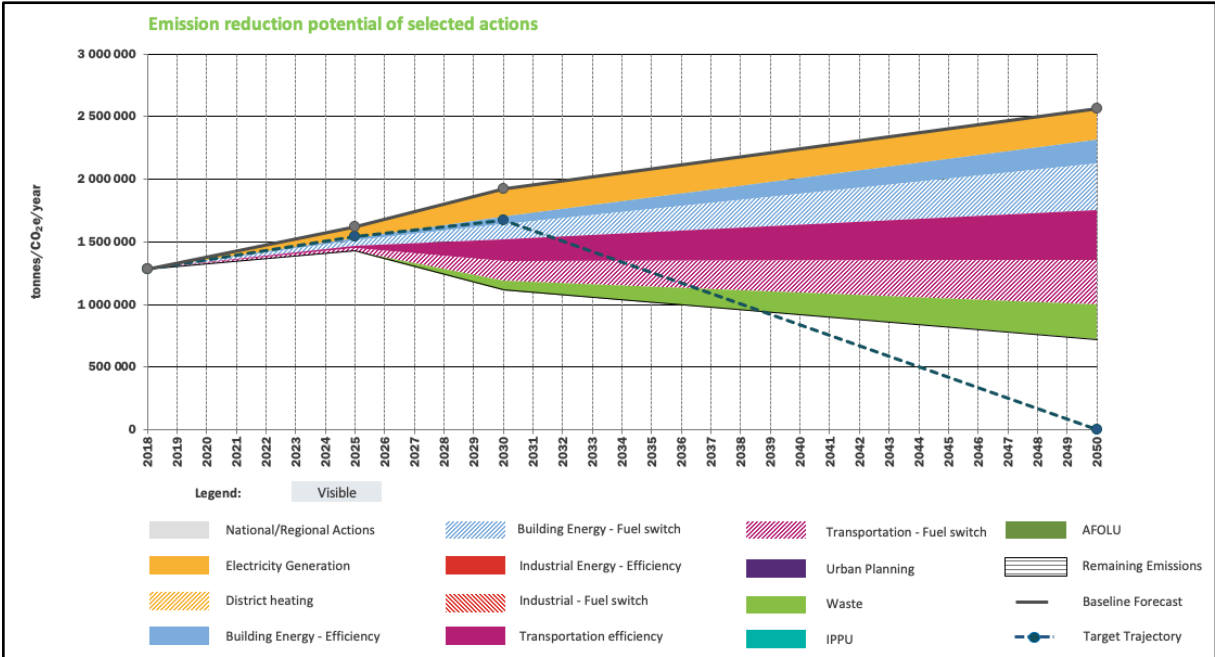


Figure 18. Freetown’s GHG emission reduction pathway according to a scenario of ambitious action

The ambitious scenario would lead to the following emissions outlook:

- Increasing by 11% to a peak above the base year level by 2025
- Decreasing to 13% below the base year level by 2030
- Decreasing by 44% below the base year level by 2050 with 56% of the emissions remaining

By 2050, 14% of the reductions in emissions will come from the decarbonisation of the electricity grid (however most of the decarbonisation potential takes place in the earlier years). Under this ambitious scenario a further 31% is from expected energy efficiency measures, 40% from planned actions in the transport sector and the remaining 15% from actions anticipated in the waste sector by 2050. Table 2 presents these figures in more detail.

Theme	Target	2018	2025	2030	2050
Transition to a clean, accessible and equitable city energy system	% share of grid electricity from renewable sources (hydro and solar PV)	58%	75%	100%	100%
	% of informal households switching from charcoal to cleaner fuels (electricity) for cooking with LPG as a transition fuel	0%	10%	30%	100%
	% of formal households switching from charcoal to cleaner fuels (electricity) for cooking with LPG as a transition fuel	0%	13%	38%	100%
	% of new buildings shifting to electricity for cooking instead of charcoal	0%	11%	38%	100%
	% of commercial buildings floor area shifting to efficient lighting	0%	15%	40%	80%

	technologies (LED and compact fluorescent)				
Building a cleaner, safer and more equal transport system	% of trips taken by Cable Car	0%	0%	20%	31%
	% of trips taken by regulated bus service	8%	11%	12%	14%
	% of trips taken by cycling	0%	1%	4%	6%
	% of trips taken by moto-taxi or mini-bus	79%	76%	56%	43%
	% of trips taken by private vehicle	4%	4%	3%	3%
	% of light-duty trucks electrifying	0%	4%	8%	30%
	% of motorcycles and moto-taxis electrifying	0%	10%	30%	70%
	% of private vehicle electrifying	0%	5%	18%	55%
	% of buses using alternative fuels (biodiesel and electricity)	0%	5%	30%	70%
	% of mini-buses using alternative fuels (biodiesel and electricity)	0%	10%	35%	60%
Smart and sustainable waste management system	% of paper waste recycled	20%	25%	50%	80%
	% of plastic waste recycled	25%	40%	60%	100%
	% of food waste composted	0%	15%	40%	70%
	% of landfill gas captured	1%	1%	25%	50%
	% of wastewater treated with an advanced treatment technology (Activated sludge treatment and/or anaerobic digestion with biogas capture)	0%	20%	35%	40%

Table 2. Greenhouse gas mitigation strategies under a scenario of ambitious action.

Even under high levels of ambition, reaching net zero emissions under the prevailing resource and technology paradigm in Freetown's context presents a significant additional challenge. Under the ambitious scenario there are remaining emissions in all sectors (as indicated in the graph below). However, the city is not dissuaded by the current paradigm and endeavours to seek out ways of mitigating these residual emissions through re-planning efforts, pursuing technological advancement, and importantly seeking out support for financing further high-impact actions and working together with the national government where the city's mandate is limited.

To address the forecasted residual emissions by the target year of 2050, the major opportunities for doing so are in enhancing the shift to alternative or electric powered transit vehicles (buses and BRTs) and seeking ways of further improving wastewater treatment. There are also close to 137,000 tCO_{2e} expected to be remaining in 2050 from the persistent reliance on charcoal and wood as sources of fuel in the residential sector. There are also air quality and resultant health impacts that will continue as a result of the current and anticipated future reliance on charcoal and fossil fuels for cooking and for transport respectively, so these are areas which will need to be prioritised in future iterations of this strategy. There are also residual emissions in the solid waste sector that indicate opportunities for improving the management of organic waste (in particular food waste).

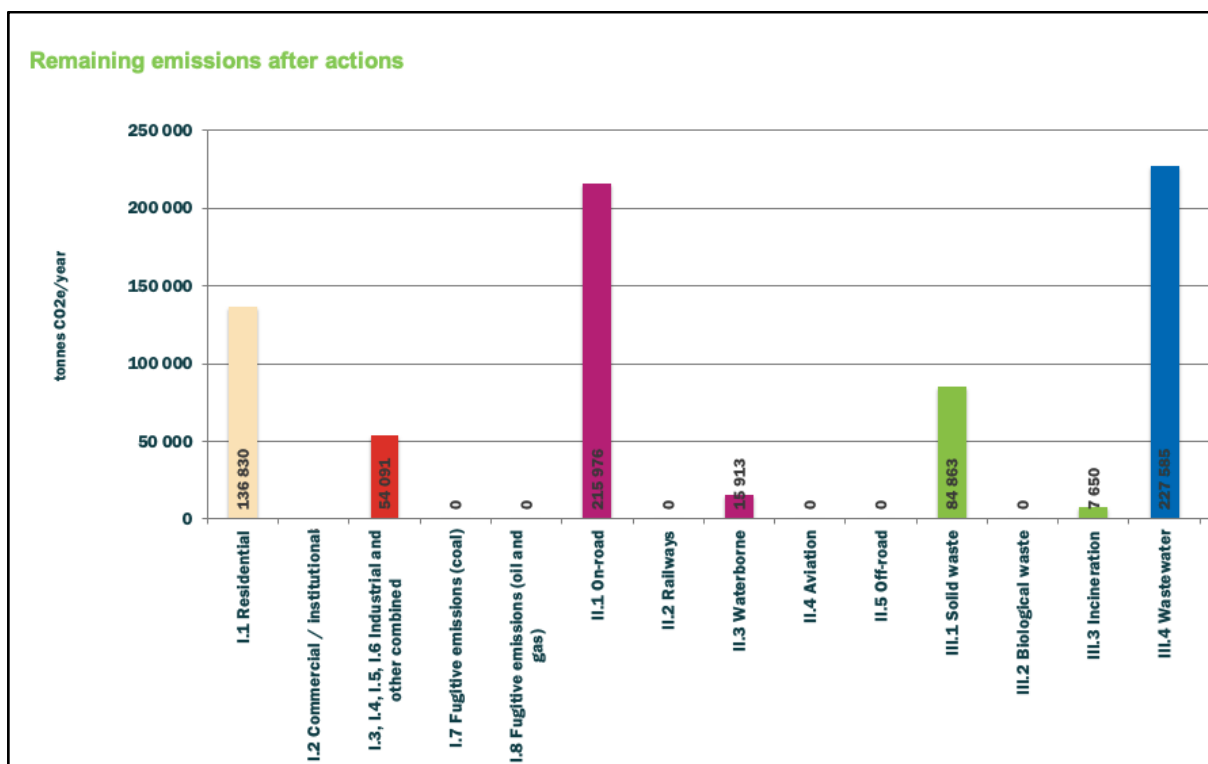


Figure 19. Remaining emissions in 2050 under a scenario of ambitious action in Freetown.

Residual Emissions and Deadline 2020 Commitment

Freetown is committed to supporting the goals of the Paris Agreement and Deadline 2020. Therefore, the city has set a target to reduce emissions 13% by 2030 compared to 2018-levels, and will work towards net zero emissions by 2050. Based on the Pathways analysis which recognises the current suppressed demand for energy and transport services (and the need to prioritise meeting these needs in the medium-term), Freetown unconditionally commits to achieving the targets identified in the Ambitious Scenario. These targets are a 13% reduction by 2030 and a 44% reduction by 2050 compared to the base year of 2018 (Table 3).

Freetown nonetheless remains committed to the net zero goal of the Deadline 2020 commitment, however achieving this is highly conditional on receiving the necessary support and cooperation of key stakeholders to overcome the barriers identified below. Together with its development partners and funders the city will seek to revise these targets in line with the Deadline 2020 targets in the next iteration of this strategy. It is anticipated that once the strategies and goals are tested in the implementation phase, the pathway to net zero as an end goal will come into sharper focus in the next and subsequent iterations of this plan.

	2018	2025	2030	2050
Emissions by scenario (tCO₂e)				
BAU	1,284,191	1,621,555	1,929,325	2,565,621
E&P	1,284,191	1,605,612	1,733,815	2,040,320
Ambitious	1,284,191	1,428,136	1,113,044	721,149
Emissions increase (+) or reduction (-) compared to the base year of 2018				
E&P	N/A	+25%	+35%	+59%
Ambitious	N/A	+11%	-13%	-44%

Table 3. Freetown's Business-As-Usual, Existing and Planned and Ambitious scenario emissions trajectories

A graphic representation of these scenarios is shown in Figure 20, together with the emissions reduction that needs to be achieved to show adequate progress towards achieving an emissions reduction pathway in alignment with the Paris Agreement (as indicated by the purple line). As Freetown is considered a “late peaking” city in terms of the Deadline 2020 city typology, the E&P and ambitious scenarios make adequate in the short-term, exceeding the requirements in 2030 but further work is required to achieve an adequate emissions reduction by 2050.

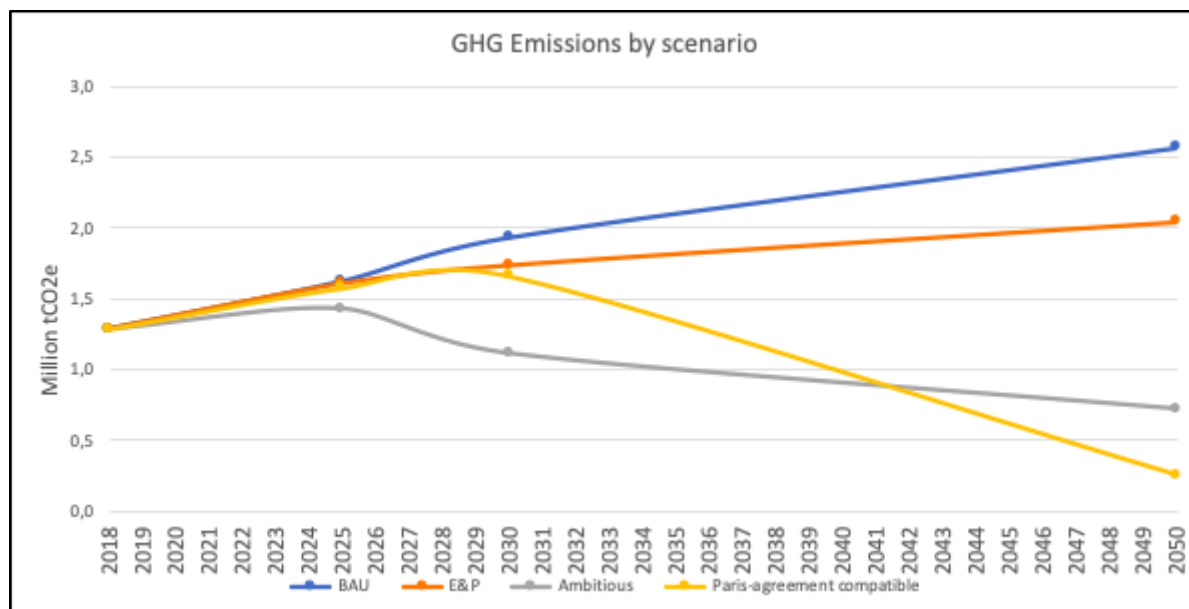


Figure 20. Freetown's emissions by scenario compared with Paris Agreement compatibility

Significant effort and support by local and international stakeholders will be required to not only meet the trajectory of an ambitious scenario, but to go further to align with the goals of the Paris Agreement. Some of the barriers that need to be addressed to meet the goals of an ambitious scenario (and to go further in pursuit of net zero emissions) include those outlined in the table below:

Barrier description	Example(s)
High capital cost	<ul style="list-style-type: none"> Installation and upgrades of wastewater treatment plants, role out of alternative waste water treatment technologies at scale and related operational costs; Landfill gas capture infrastructure; Electric vehicle cost and charging infrastructure cost; Electricity storage technology to support a renewables powered electricity grid.
Cultural acceptance	<ul style="list-style-type: none"> Attachment to the use of traditional fuels such as charcoal and wood for cooking.
Higher operational costs	<ul style="list-style-type: none"> Recycling and composting have a higher operational cost than landfilling and informal dumping.
Limitations to City's role as a potential advocator, collaborator or convenor	<ul style="list-style-type: none"> Shift to electric vehicles will require a ban on conventional vehicles, which is in national control; Grid decarbonisation is in national control; Much of the taxi fleet is in private or informal hands; Shift to electrification will require grid strengthening / upgrade.
Difficult to service / convert rapidly growing population and informal areas	<ul style="list-style-type: none"> Need to link communities to modern wastewater treatment, waste collection, electricity grid, etc. Informal housing roofs are not structurally sound for solar installations.

No current legislative and financial controls	<ul style="list-style-type: none"> Required where a shift may not be economical, e.g. electrification of industry, shifting away from fossil fuels for cooking, etc.
Lack of expertise	<ul style="list-style-type: none"> Technical expertise on planning for a grid with variable renewables

Table 4. Summary of barriers to ambitious climate mitigation actions

2.2. Climate Risk Assessment

Sierra Leone is a country that sits at the forefront of experiencing direct and indirect impacts of climate change, that bring stronger likelihoods of drought, fires, water shortages and extreme heat during the dry season and of flooding and landslides during the rainy season. For a better understanding of the magnitude, the figure below shows summary statistics of historical disasters in Sierra Leone.

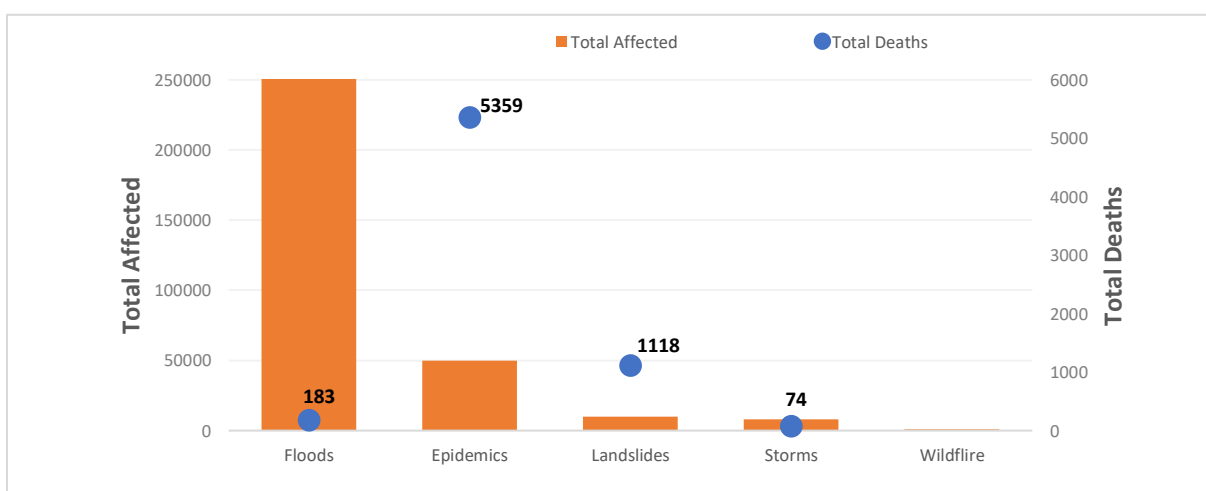


Figure 21. (Summary Statistics of Historical Disasters in Sierra Leone (1975-2020), adapted from World Bank Group & GFDRR (2020)

Similarly, over the past 15 years, residents of Freetown have witnessed first-hand the escalating trail of destruction left in the wake of floods, sea rise, mudslides, landslides and more. While Freetown has always experienced high temperatures, heavy rainfall and high humidity, the city's seasons were marked by two 'seasons': rainy and dry. However, in the past 10-15 years, the city has been characterised by more frequent and prolonged dry spells, and the rainy seasons is characterised by torrential rains resulting in flooding, as well as increasingly severe coastal floods due to the rising sea level.²⁹ The city is currently faced with increasing social vulnerability, as climate impacts continue to affect livelihoods, the economy, assets and infrastructure and the natural environment. There is an urgent need for the city to systematically understand how climate change is affecting the city's people, economy and ecosystems, and how this is likely to change in future, and to subsequently identify areas that need critical interventions.

The sections below present Freetown's Climate Risk Assessment - the base for the derived goals and targets for adaptation. This Climate Risk Assessment looks at the most prevalent

²⁹ Kpaka, G. (2020) . Loss and damage from climate change has pushed Sierra Leoneans far beyond their ability to adapt. Article published on [IIED Website](#). Kpaka is deputy director-general at the Sierra Leone Meteorological Agency within the Ministry of Transport and Aviation, and also the UNFCCC national focal point for Sierra Leone.

climate induced risks and hazards in Freetown: Flooding, Landslides and Erosion, Sea Level Rise and Coastal Erosion, Heat. These four risk and hazard categories are presented in further detail, also using maps from the 2018 World Bank Sierra Leone’s Multi-City Hazard Review and Risk Assessment. This is further complemented by a quantitative and qualitative impact analysis. The quantitative side has mostly been extracted from the World Bank report and presents for example estimates of the number of people affected, fatalities and direct losses to all buildings. The qualitative side shows climate impacts on the city’s social, economic and natural capital across twelve sectors, which were derived using desk-research and complemented by information from a community perception survey undertaken by the FCC in 2021 and at the beginning of 2022. This survey also yielded a prioritisation of impacts providing crucial information on the key risks for Freetown. A more detailed analysis is included in the Appendix.

Climate Profile of Freetown

The climate is tropical in Freetown. The city is characterised by warm temperature and significant rainfall for most months of the year (i.e. between May and November). The city has a short dry season, which has little effect on the overall climate. Outside of the rainy months, the climate is tropical and humid, with the hottest, driest months between December and March.

Rainfall

The average rainfall in Freetown is 3000mm per annum. As provided in the Figure below, the average rainfall has remained largely unchanged over the past 4 decades. While there is no clear trend, since 2016 the annual rainfall has been higher than the historical average.³⁰

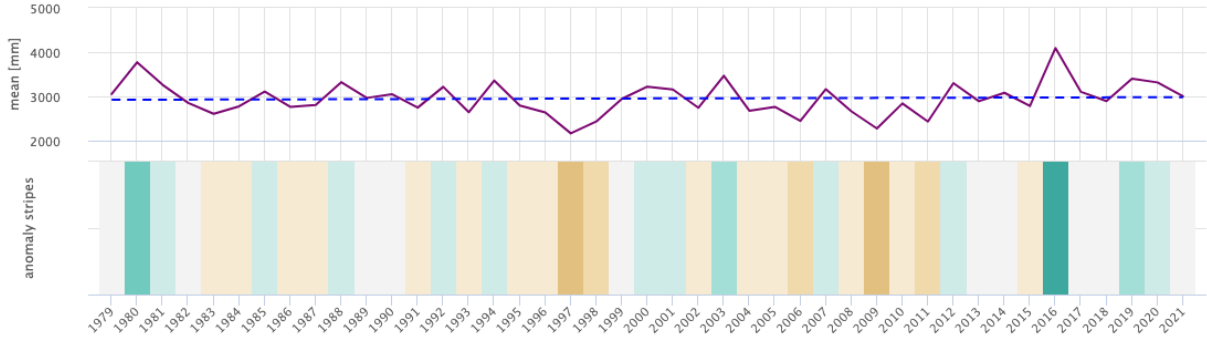


Figure 22. Mean Annual Temperature, Trend and Anomaly (1979-2022).³¹

The city experiences seasonal rainfall variability, with a rainy season between May and November, with the maximum precipitation in August. According to a study conducted by Taylor et al (2014), this trend has been observed since 1960, where the months of July, August and September are noted to have significant precipitation. This period is often characterised by recharge of surface and subsurface reservoirs.³² Historical rainfall averages for August in Freetown indicate that 530mm can fall within August. On the 14th August 2017 alone, one National Oceanic and Atmospheric Administration (NOAA) satellite recorded between 25-

³⁰ Meteoblue [Website](#). Climate Change: Freetown.
³¹ Meteoblue [Website](#). Climate Change: Freetown. The data source used is ERA5, the fifth generation ECMWF atmospheric reanalysis of the global climate, covering the time range from 1979 to 2021, with a spatial resolution of 30 km.
³² Taylor, E. T., Kamara, I. S., & Bockarie, A. (2014). Rainfall pattern in Freetown, Sierra Leone: from a retrospective viewpoint. In *Proceedings of the International Conference ADAPTtoCLIMATE, Nicosia, Cyprus* (pp. 27-28).

50mm of rainfall across the area encompassing Freetown, i.e. equivalent to the rainfall that might fall in the winter rainy season over an entire month in England.³³

Precipitation projections are less consistent, with slight increases projected.³⁴ According to the IPCC AR6 Atlas, up to a 10% increase in rainfall can be expected under RCP 2.6, and up to a 20% increase under RCP 8.5 by 2060. The IPCC also indicates a high confidence in increasing seasonal rainfall variability, as well as an increase in heavy precipitation events by 2060 (from a 1960 baseline).³⁵

Temperature

The average temperature in Freetown is 26°C. The yearly average minimum temperature for Freetown is around 23.8°C, while the average maximum temperature is 29.9°C.³⁶ December is the warmest month with an average of 26.6°C, while August has the lowest average temperature of the year, at 24.4°C. As shown by the dashed blue line (at the top) and the red warming strips (at the bottom), the temperature trend is positive and it is getting warmer in Freetown due to climate change, it is evident that Freetown’s average temperature has increased over the past 40 years.³⁷

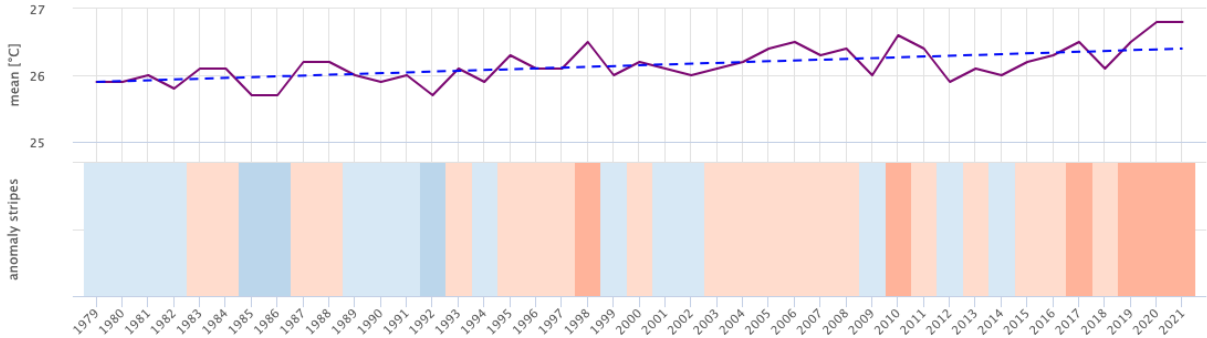


Figure 23. Mean Annual Rainfall, Trend and Anomaly (1979-2022).³⁸

According to the IPCC AR6 Atlas, there is high confidence that the average temperature in Freetown and surrounding areas will increase. The mean temperature is projected to increase by up to 2°C by 2100 under RCP 2.6, while under RCP 8.5 projections indicate over 2°C increase by 2060 and over 4°C by 2100 under RCP 8.5 (from a 1960 baseline). The number of days with maximum temperatures over 35°C are expected to increase by 2060 under RCP 2.6, while under RCP 8.5 an increase in days over 40 °C can be expected to increase.³⁹

Significant Climate Hazards in Freetown

³³ Worldbank (2020). Disaster Management Diagnostic Note: Sierra Leone. Available [here](#).

³⁴ Worldbank (2020). Disaster Management Diagnostic Note: Sierra Leone. Available [here](#).

³⁵ IPCC AR6 Interactive Atlas. Available [here](#).

³⁶ Tarawally, M., et al. (2018)

³⁷ Meteoblue [Website](#). Climate Change: Freetown.

³⁸ Meteoblue [Website](#). Climate Change: Freetown. The data source used is ERA5, the fifth generation ECMWF atmospheric reanalysis of the global climate, covering the time range from 1979 to 2021, with a spatial resolution of 30 km.

³⁹ IPCC AR6 Interactive Atlas. Available [here](#).

Heat

Freetown is at **particularly high risk for heat stress** compared to other parts of Sierra Leone due to the **urban heat island (UHI) impact**. The UHI impact results in **higher air and land surface temperatures in urban areas** compared to rural ones. **UHI causes include:** Abundance of near-surface energy emissions (e.g. vehicle exhaust), Replacement of natural land with impervious surfaces (e.g. pavement).

The high temperatures are concentrated in the northern parts of the city, as shown in the maps.⁴⁰ The rising temperature patterns observed between 2000 and 2018 may proceed through 2030 (Figure 24).

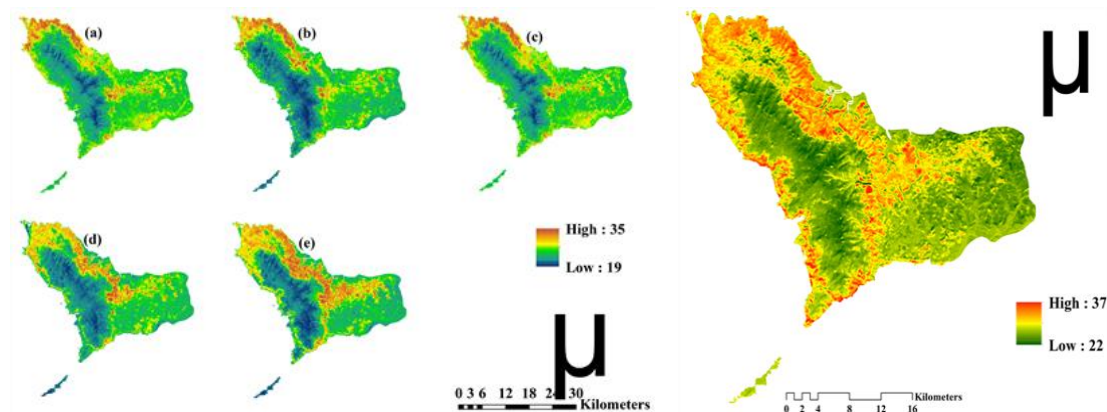


Figure 24. LST maps of Freetown city on different dates ((a) 26 Dec 1988, (b) 9 Mar 1998, (c) 3 Feb 2000, (d) 22 Feb 2010, (e) 12 Feb 2018) and LST map of Freetown city for 2030 Retrieved from: Mustafa E.L. (2020) Predicting of Land Surface Temperature Distribution in Freetown City, Sierra Leone by Using Polynomial Curve Fitting Model. *Journal of Geographic Information System*, 12(5). <https://doi.org/10.4236/jgis.2020.125031>

Locally, the predictions for South-eastern regions where low-density residential areas are found are moderately cooler than Northern-eastern regions where high-density residential areas are found. Urban expansion development will be accompanied by surface temperature increments, especially in Freetown's western metropolitan area. Predictions demonstrate that land surface temperatures underneath 32°C will possibly stay common in the northern half, while the extension of high-density built-up areas will bring about high surface temperatures (over 35°C) in eastern regions.⁴¹

Impact of Heat in Freetown

Extreme heat is known as the “silent killer” because it is both more deadly and less visible than other climate risks like flooding (Climate and Development Knowledge Network, 2021)

Heat stress has many negative impacts, including:

- Exacerbating pre-existing health conditions; amplifying the negative health impacts of air pollution; contributing to drought by boosting evaporation from the soil; increasing the likelihood of wildfires; facilitating spread of vector-borne diseases by giving insects a better breeding environment
- At least 2 deaths, directly linked with extreme heat, were reported to have occurred in Freetown recently

⁴⁰ Mustafa E.L. (2020)

⁴¹ Mustafa E.L. (2020)

- Children/new-borns (33%), the elderly (28%) and street traders/market women (18%) are among the **THREE MOST** vulnerable groups to the effects of extreme heat;
- 94% of respondents say Freetown is hotter now compared to five years ago and 82% report that they are very sensitive to extreme heat

The impact of heat on different sectors is provided below:

Sector	Impacts
SOCIAL CAPITAL	
Education	Heat impedes students' ability to focus on work and have negative impact on learning outcomes
Health	Heat facilitates the spread of vector-borne diseases, exacerbates pre-existing health conditions and causes new conditions entirely such as heat stroke.
Sanitation	Heat stress increases people's need for hygiene, increasing the need for clean water
Formal & informal residential buildings	Homes without cooling/ventilation mechanisms and/or built with heat trapping construction material can exacerbate already existing and cause new health conditions.
NATURAL CAPITAL	
Coastal/ Marine ecosystem	Negative impacts on coastal plant life which can cascade into negative impacts across the coastal marine ecosystem.
Land	Accelerated evaporation destabilizes the soil and increases the risk of landslides; Urban farming becomes challenging and costly.
Air quality	Sustained high temperatures amplify the negative health impacts of air pollution
Water	Heat stress can reduce water resources by increasing evaporation rate
ECONOMIC CAPITAL	
Energy	Heat stress will lead to increased demand for cooling (through fans or A/C units). Prolonged periods of heat increase maintenance requirements for energy infrastructure
Tourism	Prolonged periods of high temperatures can discourage tourism and increase need for investment into refurbishment of existing hotel infrastructure for cooling purposes.
Transport	High temperatures can lead to increased maintenance requirements for vehicles and a need for cooling system in public transport arises.
Agriculture & fishing	Heat damages agricultural production, risking economic livelihoods and altering the market (supply and price). Heat is dangerous for workers and negatively impacts both their health and productivity

Floods

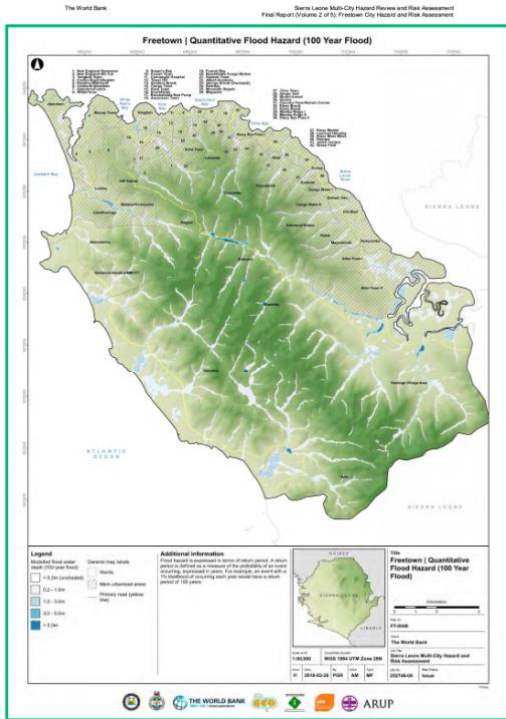
Floods are most common in the **rainy season between May and November** but can occur at any time. Flood events in Freetown can be particularly damaging due to the **city's steep terrain, which can cause rapid 'flash' flood events** in the natural river channels. In **low-lying, coastal areas**, floods, which coincide with storm events or high tides, have **the potential to become more widespread**. The natural river channels, valleys, river deltas and broad low-lying near coastal areas of the city have been highlighted as high flood hazard zones. Flooding in the natural channels is mainly due to rapid runoff of surface water made worse by deforestation of upper catchment areas. In many **parts of Freetown**, river drainage channels are blocked by debris and/or are severely narrowed by solid waste. Flooding risk in Freetown is concentrated where **urban development has occurred along the natural river channels** and their floodplains and on the low-lying areas close to the coast. The table below presents the highest at risk Wards in Freetown:

Wards with the highest number of flooding fatalities:	Lumley, Juba, Susan's Bay Hotspots: Natural river valleys & low lying channels: Kamayama, Dworzark, Kissy Bypass Congo Market, Ascension Town
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Wards with the highest number of people affected by flooding:

Kroo Town
Brookfield-Congo Market

The quantitative flood hazard maps (see Figure 25 below) indicate that the medium and high flood hazard zones for all of the modelled return periods⁴² are concentrated along the natural river systems (river channels and their immediate floodplains) of Freetown.



In general, as the modelled flood return period increases, the spatial extent of the flood hazard and the modelled flood depth increases but the spatial pattern of flooding largely remains the same. In places, modelled flood depths for the 20 year return period indicate up to 5.0 m flood water depth. A comparison of the modelled 100 year flood with the 1,500 year flood highlights that more channels in the upper catchments become zones of medium-high flood hazard. This hazard is likely to be intensified and risk increased if communities continue to deforest and build in the upper catchments.

Figure 26 below provides an indication of the extent of deforestation between 1986 and 2017. The flood hazard close to the coast indicates 1.0 to 3.0 m of flooding for the 100 and 1500 year return period. According to the IPCC AR6 Atlas, there is high confidence that Freetown and surrounding areas will continue to experience an increase in heavy precipitation and pluvial floods in future.⁴³

Figure 25. Quantitative Flood Hazard 100 Year Period (p.7). For better quality and further explanatory graphics review the original source: <https://documents1.worldbank.org/curated/en/151281549319565369/pdf/130797-v2-Final-Report-Volume-2-of-5-Freetown-City-Hazard-and-Risk.pdf>



Figure 26. Two Landsat satellite images highlight the extent of deforestation between 1986 (left) and 2017 (right). Healthy vegetation is shown in red, unhealthy vegetation and urban areas are grey; the right-hand image also shows the Regent-Lumley disaster (p.66). For better quality and further explanatory graphics review the original source: <https://documents1.worldbank.org/curated/en/151281549319565369/pdf/130797-v2-Final-Report-Volume-2-of-5-Freetown-City-Hazard-and-Risk.pdf>

Impact of Flooding in Freetown

⁴² The return period is the expected length of time between two rainfall events that exceed a specific magnitude. A 20 year return period is sometimes referred to as 1 in 20 year flood event.

⁴³ IPCC AR6 Interactive Atlas. Available [here](#).

Of all of the people impacted by disasters in Freetown from 1982 – 2012, 90% of them were impacted by flooding (UNDP, 2012).

Impact of flooding events in Freetown (annual average):

# people affected ⁴⁴	3,011
# fatalities ⁴⁵	9
Direct loses to all buildings	~\$2.5 million USD

The impact of flooding on different sectors is provided below:

Sector	Impacts
SOCIAL CAPITAL	
Education	Flooding damages educational facilities, prevents access to schools and makes travelling in the rainy season dangerous, particularly for the dis-advantaged
Health	Increased flooding damage to healthcare facilities and increases exposure to water-borne diseases (e.g. cholera, dysentery), and vector borne diseases (e.g. malaria).
Sanitation	Heavy rains and corresponding runoff block drainages (waste disposal), such that flood events disrupt sanitation, storm-drain disposal and sanitation services.
Formal & informal residential buildings	Heavy rains and flooding impact settlements in the upper-catchment and low-lying areas and could potentially lead to climate induced displacements. Pollution and illegally disposed waste, leads to flooding particularly in areas inhabited by the most vulnerable population and those living in informal settlements.
NATURAL CAPITAL	
Coastal/ Marine ecosystem	Flooding in coastal areas may alter water quality and negatively impact marine life breeding grounds in coastal waters.
Land	Heavy rains cause silt to flow down mountain slopes and create unstable patches of land, contributing to the potential for landslides
Water	Flood incidents contaminate fresh water sources with seawater, wastewater and other potentially water sources.
ECONOMIC CAPITAL	
Energy	Flood water can damage distribution and transmission infrastructure (e.g. lines carrying power to communities).
Tourism	Increased flood incidence can discourage tourists from visiting, and damage tourism infrastructure (e.g. hotels, boardwalks in low-lying mangrove areas, restaurants, etc.)
Transport	Extreme floods damage transport facilities and road infrastructure; Floods and heavy rains can hamper traffic flow and make the roads impassable for people and goods.
Agriculture & fishing	Flood water damages already small yields from urban household farms. Disruptions to marine ecosystems in coastal areas can interrupt fishing activity.

Prioritisation of Impacts from a Community Perspective

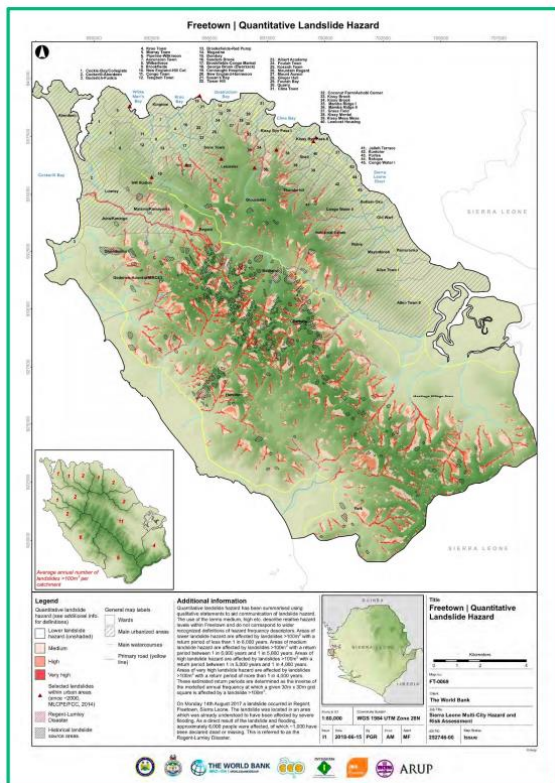
Food shortage due to low yields	Very high
Water contamination due to flash floods	Very high
Spread of contagious diseases	Very high
Slow pace of development due to destruction of existing infrastructures due to river and flash floods	Very high
Erosion due to flash floods	High

⁴⁴ People affected refers to individuals that experienced material loss, bodily harm, or loss of life as a direct result of a disaster.

⁴⁵ Fatalities refers to individuals that lost their life as a direct result of a disaster.

Landslides and Erosion

In Freetown frequent landslides often occur after heavy seasonal rainfall leads. The City's landscape of mountain valleys have significant topographic relief (hundreds of metres), are steep-sided and densely forested in some areas. However, in some areas deforestation further threatens the stability of the slopes. As a result, landslides occur frequently in the rainy season and it is normal for the valley floors to become blocked with boulders.



While landslide hazard has existed in Freetown for a long time, **the risk has increased significantly in recent years due to communities settling in landslide-prone areas and the increasing pressure urban growth is placing on the city.**

The August 2017 Regent-Lumley was one the largest recorded landslides in Freetown, **affecting about 6,000 people, of whom about 1,000 have been declared dead or missing.** The highest landslide hazard zones are **within the natural river channels/mountain valleys** particularly in the **upper catchment areas**. The high landslide hazard occurs in the channels and mountain valleys because the **landslides initiate on the steep surrounding slopes**, run downslope to the valley, with debris accumulating and travelling down the valley.

Figure 27. Quantitative Landslide Hazard (p.8). For better quality and further explanatory graphics review the original source: <https://documents1.worldbank.org/curated/en/151281549319565369/pdf/130797-v2-Final-Report-Volume-2-of-5-Freetown-City-Hazard-and-Risk.pdf>

As the landslide hazard in Freetown is a combination of intense rainfall events, river flooding uncontrolled buildings and urban expansion, Freetown has to tackle landslide hazard holistically to reduce future impacts. As indicated above, the IPCC AR6 Atlas indicates a high confidence of an increase in heavy rainfall events in Freetown in the future. While projections on landslide risk have not been provided, Freetown's history of landslide risk occurring during or immediately after heavy rainfall events means that there is a high probability that this will continue in future. The table below presents the highest at risk Wards in Freetown:

Wards with the highest number of landslide fatalities:	New England-Hill Cot, New England-Hanneson, Dworzack, Quarry, Coconut Farm, and Kissy Brook Hotspots: Steep slopes, and mountain valleys - e.g. Thunderhill
Wards with the highest number of people affected by landslides:	Tengbeh Town, Foulah Town, Magazine, Bombay, Kossoh Town, Ginger Hall, Quarry, and Coconut Farm

Impact of Landslides and Erosion in Freetown

While the annualised impact of landslides is lower than that of flooding, the Regent-Lumley disaster demonstrates the high destructive capacity of a single powerful landslide

Impact of landslides and erosion in Freetown (annual average):

# people affected ⁴⁶	140
# fatalities ⁴⁷	11
Direct loses to all buildings	~\$350,000 USD

The impact of landslides and erosion on different sectors is provided below:

Sector	Impacts
SOCIAL CAPITAL	
Education	Landslides can cause damage to education facilities.
Health	Landslides can destroy facilities and facilitate the spread of water-borne diseases by destroying water sanitation systems.
Sanitation	Landslides interrupt sanitation services, destroy sanitation systems, and introduce contaminants into community soil and water supplies.
Formal & informal residential buildings	Deforestation and flooding causes landslides which damage buildings and settlements and can lead to climate induced displacements of entire communities.
NATURAL CAPITAL	
Coastal/ Marine ecosystem	Smaller landslides near rivers can alter the land composition near riverbanks and negatively impact fish breeding grounds
Land	Landslides can leave land in the affected area very unstable even after residents attempt to rebuild their communities there
Water	Landslides can contaminate drinking water as a result of the material and silt carried into water supplies, damaging the already limited water distribution networks.
ECONOMIC CAPITAL	
Energy	Landslides can damage utility facilities, by making soil unstable, impacting the transmission and distribution system.
Tourism	Landslides can discourage tourists from visiting and they can cause damage to tourism infrastructure (e.g. hotels).
Transport	Landslides can disrupt traffic flow and the movement of people and goods; landslides damage road infrastructure and terrain stability.
Agriculture & fishing	Landslides reduce agricultural productivity, destroy seed stock and introduce contaminants to the soil. Landslides near rivers can damage marine ecosystems and interrupt fishing activity.

Prioritisation of Impacts from a Community Perspective

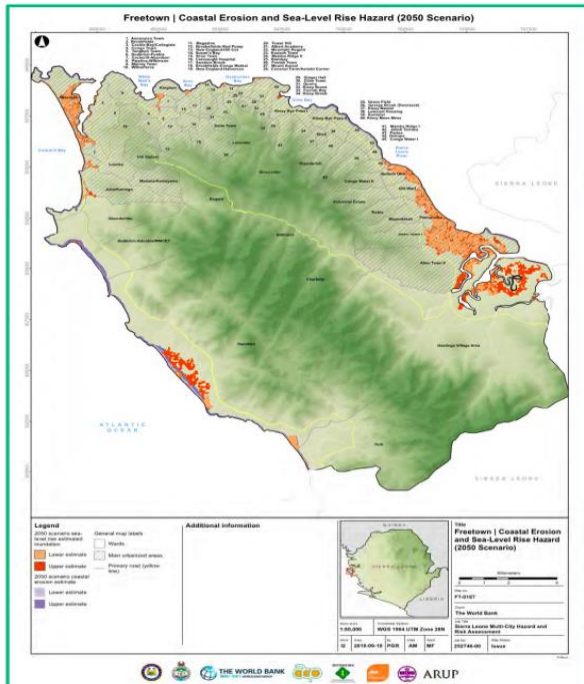
Water contamination	Very high
Food shortage and starvation due to damage to farms and gardens	High
Spread of contagious diseases	High
Slower development	High
Erosion	High

⁴⁶ People affected refers to individuals that experienced material loss, bodily harm, or loss of life as a direct result of a disaster

⁴⁷ Fatalities refers to individuals that lost their life as a direct result of a disaster

Sea Level Rise and Coastal Erosion

The IPCC AR6 Atlas indicates a high confidence that sea level rise in Freetown's coastal areas will likely continue. In addition, coastal flooding, coastal erosion and marine heatwaves are also likely to continue.⁴⁸



Sea level rise in 2050 in Freetown using the RCP8.5 climate change scenario is estimated to be +0.26m, which is slightly higher than the global mean sea-level rise calculated using RCP8.5 of +0.25m. This means that at the highest astronomical tide, the sea level would be approximately 2m above the current mean sea level by 2050. The World Bank Study, estimates that if you include storm surge or wave run-up in urban settings, the 2050 scenario sea-level could be 3m to 4m above the current global mean sea level.

Figure 28. Coastal Erosion and Seal Level Rise Hazard 2050 Scenario (p.9). For better quality and further explanatory graphics review the original source: <https://documents1.worldbank.org/curated/en/151281549319565369/pdf/130797-v2-Final-Report-Volume-2-of-5-Freetown-City-Hazard-and-Risk.pdf>

The World Bank finds that **at least 20,000 people live along the coastal areas of Freetown** that will be **gradually inundated** as the sea-level rises. In many cases, communities moved to the coast due to **lack of affordable land** in other parts of the city. Sea level rise and coastal erosion hazard and risk in Freetown is concentrated where urban development has occurred very close to the shoreline, on natural and reclaimed land.

The table below presents the highest at risk Wards in Freetown:

Wards with the highest coastal erosion risk in terms of direct loss to buildings:	Aberdeen, Murray Town, Kingtom, Connaught Hospital, Cline Town Hotspots: coastal parts of city, particularly low lying areas
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Impact of Sea Level Rise and Coastal Erosion in Freetown

The World Bank expects sea level rise and coastal erosion to cause considerably more economic damage than flooding or landslides by 2050

Impact of sea level rise and erosion in Freetown (annual average):

# people affected⁴⁹	596
Direct losses to all buildings	~\$5.4 million USD

⁴⁸ IPCC AR6 Interactive Atlas. Available [here](#).

⁴⁹ People affected refers to individuals that experienced material loss, bodily harm, or loss of life as a direct result of a disaster.

The impact of sea level rise and erosion on different sectors is provided below:

Sector	Impacts
SOCIAL CAPITAL	
Education	Schools in coastal communities may be forced to close or reduce capacity which will decrease access to education.
Health	Health care facilities in coastal communities may be forced to close or reduce capacity which will decrease access to health care.
Sanitation	Sea level rise will lead to more migration throughout Freetown, further complicating efforts to collect waste. Also, as the sea level rises the water table rises as well, making it very difficult to provide sanitation or have a proper septic tank.
Formal & informal residential buildings	Coastal erosion and rising sea levels risks displacing communities by rendering their homes unliveable.
NATURAL CAPITAL	
Coastal/ Marine ecosystem	Sea level rise is correlated with ocean temperature rise, and this temperature increase negatively impacts marine ecosystems like coral. Also, animals in swampy areas may be impacted by increased salinity of swamp environments due to sea level rise.
Land	Swamp land may be negatively impacted by intrusion of saltwater due to sea level rise
Water	Sea level rise decreases the quantity and quality of available groundwater due to intrusion of seawater.
ECONOMIC CAPITAL	
Energy	Sea level rise and coastal erosion can damage utility facilities, and can cause changes in Freetown's population distribution which will require changes to the electricity distribution and transmission system.
Transport	Sea level rise and coastal erosion can threaten the integrity of certain roads. Also, changed population distributions caused by displacement can lead to new road traffic flows and worsen traffic congestion.
Agriculture & fishing	Sea level rise can increase salinity of water used on farms and damage agricultural produce. Also, sea level rise and the correlated increase in sea temperature will impact life and have a potentially negative impact on fish catch

Prioritisation of Impacts from a Community Perspective

Damage of Coastal Infrastructure after coastal flooding/excessive beach erosion	Very high
Displacement of people after the decline of land by excessive beach erosion/coastal flooding	High
Damage of coastal ecosystem due to excessive beach erosion	High
Increased fresh water scarcity after saltwater intrusion	High
Decreased tourism activities due to seaweed invasion and biodiversity loss after the damage of Coastal/Marine Ecosystem and total disappearance of the Island	High

Climate Risk Assessment and Prioritisation

On the basis of the Climate Risk Assessment the following key risks for Freetown can be identified:

- Flooding and landslides cause the most annual fatalities
- Coastal erosion and sea-level risk are likely to result in fatalities in the future
- Flooding affects most people and economic sectors
- Coastal erosion and sea level rise will result in the highest financial losses
- Heat causes health issues and death, particularly for the most vulnerable.

Hence, it is important to reduce risk caused by flooding and landslides, as lives are being lost and people affected city wide. The manner in which the city continues to grow and develop has a significant impact on the intensity of climate hazards. For instance, flooding and landslide hazard is likely to be intensified and risk increased if communities continue to deforest and build in the upper catchments and unstable hillslopes. Further, while not immediate, it will be important to start to plan to combat coastal erosion and the effects of sea level rise along the coast. Coastal change is starting to have a serious economic impact and this economic impact will increase in the future as the effects of climate change worsen. Heat is an increasing risk, affecting lives and livelihoods in the city.

In partnership with the health, community, recreational/ parks and environmental departments, as well as other relevant stakeholders and the central government, the city should develop and implement actions to respond to flooding, urban heat and the other climate risks.

Yet when developing actions to address these risks and hazards, the city’s adaptive capacity has to be taken into account and factored in. The table below identifies a number of barriers that constrain the city’s adaptive capacity:

Barrier description	Example(s)
High capital cost and limited funding	<ul style="list-style-type: none"> • Construction of drainages to prevent flooding; • Development of affordable housing in low-risk areas.
Cultural acceptance	<ul style="list-style-type: none"> • Climate induced relocation of communities due to predicted rising sea levels or unstable slopes in high-risk areas.
Higher operational costs	<ul style="list-style-type: none"> • Drainage clearance of waste and silt prior to the rainy season.
Limitations to City’s role as a potential advocator, collaborator or convenor	<ul style="list-style-type: none"> • Reforestation of water catchments outside of the Western Area Urban.
Difficult to service / convert rapidly growing population and informal areas	<ul style="list-style-type: none"> • Need to link communities to modern wastewater treatment, waste collection to prevent blocked drainages further downstream as a result of illegal dumping; • Informal housing roofs are not structurally sound for adjustments needed as a result of more extreme weather events.
No current legislative and financial controls	<ul style="list-style-type: none"> • Prevention of developments in low-lying or around upper catchment areas due to the ongoing devolution process, as part of which building control and permit functions have yet to be devolved to the subnational level.
Lack of expertise	<ul style="list-style-type: none"> • Technical expertise on planning for weather proof public infrastructure.

Table 5. Assessment of Freetown’s adaptive capacity

3. Delivering results and evaluating impact – creating an enabling environment

The implementation of climate actions for mitigation and adaptation requires financial and human resources, as well as supporting governance structures and corresponding institutional arrangements. However, it is evident that Freetown will face a number of challenges and barriers to implementing its climate actions. While in detail these are highly sector and action specific, they can broadly be grouped into a few wider categories. The first one relates to the

challenge that many of the required mandates for high-impact actions are not within the city's control. Secondly, costs, either for direct capital investment or subsequent operations and maintenance, often far outweigh the city's budget, making it dependent on external funding sources. Third, the city has limited human resources, as well as technical expertise to take on the numerous, often highly complex, actions required to enable fast-paced transformative change. Lastly, behavioural and cultural preferences could additionally place a toll on the implementability of actions, particularly also because climate action and its many interlinked benefits are not yet widely known amongst Freetonians.

When sworn in in 2018, Mayor Aki-Sawyers started off with limited financial and personnel resources - tax compliance was low and relevant talent yet to be developed. For FCC it became crucial to work past existing boundaries, think outside of the box and not limit itself to what was available to create an enabling environment for its first climate action strategy and will be of utmost importance to carry it forward to implementation. The following section brings more details on how Freetown is envisioning to address institutional/governance, human resources and financial aspects to climate action planning and its first climate action strategy.

Generally, any of the priorities and measures, as well as actions identified in this strategy will to some extent depend on and be strengthened through partnerships with relevant MDAs, implementing partners, NGOs and CSOs and will be ongoing processes to support the city's climate change response rather than finite tasks and responsibilities. In the past, such partnerships entailed, for example, but are not limited to technical assistance to the various FCC departments, financial assistance for large infrastructure projects, support through volunteers and fellows seconded under a variety of programs and peer-to-peer city exchanges within and beyond Sierra Leone.

3.1. Climate governance, institutional arrangements at FCC and cooperation with partners

As a city at the subnational level with limited mandates, under the authority of the national government as framed within the 2004 Local Government Act, some general uncertainties to implementation of this strategy will be ever present. In order to provide a better understanding of the context for implementation of this strategy, Table 6 below presents a high-level sectoral power (mandate) assessment.

1. Decarbonising the electricity grid	
1.1 Who owns and is responsible for the bulk power supply / generation for the city?	The Electricity Generation and Transmission Company (EGTC) is responsible for the generation of electricity and transmission at 66kV and higher at national and subnational level.
1.2 Who owns and is responsible for electricity / energy distribution systems in the city?	The Electricity Distribution and Supply Authority (EDSA) is responsible for the sub-transmission and the distribution network at national and subnational level.
2. Optimising energy use in buildings	

2.1 Who is responsible for promoting / ensuring energy efficiency in new buildings in the city (including both city-owned, other government and private buildings)?	Ministry of Lands, Country Planning and Environment (MLCPE); Environmental Protection Agency (EPA) at national and subnational level. Note that although devolution of these functions is provided for within the 2004 Local Government Act, building control and permit functions have yet to be devolved to the subnational level.
2.2 Who is responsible for implementing / controlling energy efficiency in existing buildings (including both city-owned, other government and private buildings)?	Ministry of Lands, Country Planning and Environment (MLCPE); Environmental Protection Agency (EPA) at national and subnational level. Note that although devolution of these functions is provided for within the 2004 Local Government Act, as part of the ongoing devolution process, building control and permit functions have yet to be devolved to the subnational level.
3. Enabling next-generation mobility	
3.1 Who owns and is responsible for transport infrastructure and transportation systems in the city?	Ministry of Transport and Aviation; Sierra Leone Road Safety Authority (SLRSA); Sierra Leone Road Authority (SLRA); Freetown City Council (FCC)
3.2 Who is responsible for spatial / development planning in the city?	MLCPE; EPA; National Protected Areas Authority (NPAA)
3.3 Who owns and is responsible for controlling the procurement / operation of public transport vehicles in the city?	SLRSA, SLRA
3.4 Who owns and is responsible for commercial freight systems in the city?	Ministry of Transport and Aviation (MoTA)
4. Improving solid waste management	
4.1 Who owns and is responsible for solid waste management infrastructure and operational systems in the city?	FCC
5. Enhancing resilience of drinking water & wastewater/sanitation systems	
5.1 Who owns and is responsible for bulk and distributed potable water supply infrastructure in the city?	Guma Valley Water Company, Ministry of Water Resources, Ministry of Health and Sanitation (MoHS)
5.2 Who owns and is responsible for wastewater / sanitation infrastructure in the city?	FCC
6. Managing disasters, risks & impacts of extreme weather events & sea level rise	
6.1 Who is responsible for disaster management in the city?	National Disaster Management Agency (NDMA) and FCC
6.2 Who is responsible for coastal infrastructure and / or risk management? (if relevant to your city)	Ministry of Fisheries, MoTA; NPPA, EPA, Ministry of Environment (MoE)
6.3 Who is responsible for storm water and / or river system management in the city?	MoE; Drainage related to EPA and SLRA; River System Mmgt: Guma Valley Water Company
6.4 Who is responsible for educating and empowering residents and businesses to become more resilient to the impacts of climate change, and respond effectively to extreme weather events?	EPA, NDMA, Sierra Leone Meteorological Agency (SL Met), FCC
7. Enhancing the resilience of natural capital	

7.1 Who is responsible for controlling or promoting / supporting agricultural production in the city?	Ministry of Agriculture and Forestry (MAF)
7.2 Who is responsible for controlling or promoting / supporting management of natural ecosystems and / or nature areas in the city?	EPA; NPPA, Ministry of Tourism, National Tourist Board (NTB), FCC

Table 6. High-level sectoral power assessment

Freetown’s efforts in addressing climate change rely heavily on the improvement of climate governance capacities to ensure that key stakeholders across the board are able to drive implementation at various levels of the FCC’s work. Local governments play an important role in advancing the GoSL’s climate commitments at the subnational level. Two key bodies within the FCC’s political and administrative framework are the Climate Action and Disaster Risk Management (CA&DRM) Council Committee and the CA&DRM Unit respectively, both newly constituted in 2021, as a result of a gap analysis in addressing climate action and resilience in local planning in Freetown. The Council Committee as well as the Unit are further complemented by the **MDU’s Environment & Climate Action Group and the Chief Heat Officer** that function as a technical support facility to the FCC, particularly the CA&DRM Unit. Further, all three aforementioned institutional components cooperate closely with the other sectoral council committees and administrative units as presented in the organogram of the FCC below.



Figure 29. FCC Organogram including the newly found CA&DRM Unit

Within the administrative arm of the FCC, the leading departmental unit for driving climate action is the **CA&DRM Unit**⁵⁰. The Unit will enhance efforts to identify sources and impacts of climate change and support disaster risk reduction by developing and raising awareness of strategy and policy issues, promoting the efficient and effective use of resources, and supporting policy formulation and implementation through the development of concrete actions, all of which will contribute to improved outcomes and greater cooperation between diverse stakeholders both internal and external to FCC.

Reporting to the Chief Administrator of the FCC (and relaying information to the Chairpersons of the CA&DRM Council Committee), the CA&DRM Unit leader’s responsibilities include

⁵⁰ Detailed ToRs for the Unit can be found in the Appendix.

strategic planning and implementation of actions, unit management and stakeholder engagement. Broadly, the strategic planning and implementation of actions area addresses the identification, development and implementation of policy priorities and strategies as they relate to climate change mitigation and adaptation and disaster risk, including both disaster risk reduction and disaster risk management components. Thereby, the Unit aims at ensuring that strategies and policies are coherent with international best practices and national development and poverty reduction strategies, for example the GoSL's MTNDP (2019-23), the NDC and the NAP. Unit management aspects relate to the development of the institutional council arrangements for promoting the integration of climate action and disaster risk management with particular focus on climate change mitigation and adaptation and disaster risk reduction policy priorities into FCC's establishment, budgeting and expenditure management; as well as the facilitation of trainings and workshops to strengthen capacities of key stakeholders in climate action and DRM. On the stakeholder engagement perspective, the unit focuses on the expansion of existing stakeholder analyses across international and local development partners and national MDAs to identify opportunities for collaboration and understand the interfaces between domestic resources and international funds for climate action and DRM as well as the roles and mandates of the institutions involved in climate and DRM actions. Also, the unit aims at representing FCC at national, regional and district levels in order to encourage effective coordination, resource allocations and delivery of climate and DRM related actions at district level.

The **CA&DRM Council Committee**'s⁵¹ mandate, led by its two Chairpersons, is to provide the FCC and the CA&DRM Unit with a local perspective on climate change initiatives. The Council Committee is formed by a group of Ward Councillors elected at the level below the district/city. Specifically, the CA&DRM Committee supports the FCC and particularly the CA&DRM Unit in identifying, developing, strengthening and delivering climate and DRM actions within their corresponding communities. The CA&DRM Council Committee is also the key body to approve the city's climate action strategies and to table it within the wider Council Committee Meeting, taking place on a monthly basis. As such, the Council Committee establishes and upholds two-way communication channels for climate-related topics between the FCC CA&DRM Unit and the local communities at Ward level.

In order to support climate action planning and implementation of this strategy, the following climate governance priorities can be identified:

- Explore options to integrate a youth council for climate action and disaster risk management at FCC;
- Strengthen the newly constituted bodies within the municipality;
- Deliver on the defined ToRs, for both bodies, the unit and the Council;
- Learning by doing: identify and implement opportunities for vertical and horizontal integration of climate action in Freetown;
- Liaise with external stakeholders to implement this strategy, develop future iterations and further advocate for climate mainstreaming across all sectors and levels of government.

⁵¹ Detailed ToRs for the Council Committee can be found in the Appendix.



Image 5. Left: One of the first CA&DRM Council Committee Meetings in 2021 at FCC and Right: Second CA&DRM Council Committee Meeting in November 2021 at FCC

3.2. Human Resources at FCC

FCC has a limited number of staff in its CA&DRM Unit to guide and support the further development and implementation of this strategy. Across all sectorial units and where possible FCC will develop its existing human resources through education, training and research to build the city’s capacity for climate action. Sub-national ownership of capacity building efforts is key to long-term impact, just as networking, partnerships and experience-sharing are important contributors. Capacity gaps at the FCC pose a challenge for the mainstreaming of actions into the city’s planning and budgeting. This is a result of technical gaps in areas such as research and city level (sectoral) data, risk modelling, vulnerability assessments and development of investment-ready projects.

In building the capacity of the local government and communities for climate actions, priorities are to:

- Provide foundational knowledge and skills in climate change. This will include raising awareness about the impact of climate change within the assembly, reiterating the mission of the CAP and the opportunities it provides for the city.
- Develop education and communication plans to support climate action planning and implementation within the city;
- Provide the platform for relevant staff to participate in professional networks devoted to climate change mitigation and adaptation to enable them to learn the best practices and have access to optimal tools for successful implementation;
- Invest in staff expertise and knowledge for climate action.

3.3. Financing Climate Action in Freetown

As part of the Transform Freetown Agenda, FCC has widened access to own-source and external financial resources through an innovative property rate reform, private sector partnerships, targeted development partner funding, building city-to-city networks and tapping into funding from philanthropists and the diaspora. Further, as part of our #FreetownTheTreeTown campaign FCC is showcasing its ambition to tap into yet uncovered resources by developing an impact investment scheme. The city offers the opportunity for corporate and institutional partners to donate to and invest in a socially and environmentally impactful initiative, focusing on climate resilience in Freetown. We are digitally tracking the growth of our trees using a customised tree tracker app and will create impact tokens based on the tree growing progress and success. Other financing options that we are also exploring

are the creation of municipal bonds, diaspora bonds as well as results-based financing schemes, that could further boost the city’s revenues over the long-term, supporting the implementation of the Transform Freetown Agenda and the fight against climate change.

Financing constraints pose a critical challenge since some actions will require high investments in order to bring about the desired change. Some of the identified actions may also present additional costs or may be viewed as a burden to the local economy, which is something that needs to be considered carefully within Freetown’s context and re-evaluated when needed. Hence, addressing climate change in Freetown will need financial support from the international community, banks and bilateral funds, alongside domestic funding from the national government budget and the private sector.

An internal analysis identifies seven key climate finance institutions as potentially relevant sources of climate finance for this strategy, additional to its bilateral partners. These finance institutions comply with two criteria⁵²: since 2010 they (1) have deployed international public climate finance through grants or concessional instruments; and (2) their strategy has involved supporting climate action in cities of LDCs in SSA. As part of the analysis and for future reference, a fact-sheet has been developed for each one of the seven climate finance institutions.⁵³

Climate Finance Institutions:	Example of projects supported by international public climate finance in cities of Sub-Saharan Africa
<u><i>Green Climate Fund</i></u>	Monrovia (Liberia) Metropolitan Climate Resilience Project – Coastal protection, Coastal Management and Diversified climate-resilient livelihoods ⁵⁴
<u><i>International Development Association IDA World Bank Group</i></u>	Resilient Urban Sierra Leone Project ⁵⁵
<u><i>Climate Investment Funds</i></u>	Scaling Up Renewable Energy Program SREP to increase access to renewable energy among vulnerable population, including poor urban households and peri-urban households in multiple LDCs of Sub-Saharan Africa (e.g., SREP Zambia ⁵⁶)
<u><i>Global Environmental Facility</i></u>	Landscape restoration for increase resilience in urban and peri-urban areas of Bujumbura, Burundi ⁵⁷
<u><i>Adaptation Fund</i></u>	Building urban climate resilience in south-eastern Africa (Madagascar, Malawi, Mozambique, Union of Comoros) ⁵⁸
<u><i>African Development Bank – Africa Climate Change Fund</i></u>	Removing barriers to climate finance access by local governments and municipalities in Senegal ⁵⁹
<u><i>Global Climate Change Alliance</i></u>	Climate Change and Integrated coastal zone management ICZM in Senegal ⁶⁰

Table 7. Climate Finance Institutions and corresponding examples of projects supported by international public climate finance in cities of Sub-Saharan Africa.

⁵² Criteria checked through the website of the climate finance institutions included in the list and through the following databases: [database of the UNFCCC on climate finance recipients parties](#), [OECD database on aid activities targeting Global Environmental Objectives Markets Climate Change Mitigation and Climate Change adaptation](#) and data published by Climate Finance update - [Climate Finance Regional Briefing Sub-Saharan Africa](#)

⁵³ The detailed overview of the funding vehicles and their alignment with Transform Freetown can be found in the Appendix.

⁵⁴ [Monrovia Metropolitan Climate Resilience Project – Coastal protection, Coastal Management and Diversified climate-resilient livelihoods](#)

⁵⁵ [World Bank Resilient Urban Sierra Leone](#)

⁵⁶ [SREP Investment Plan for Zambia](#)

⁵⁷ [Landscape restoration for increase resilience in urban and peri-urban areas of Bujumbura](#)

⁵⁸ [Building urban climate resilience in south-eastern Africa \(Madagascar, Malawi, Mozambique, Union of Comoros\)](#)

⁵⁹ [Africa Climate Change Fund Newsletter](#)

⁶⁰ [Climate Change and Integrated Coastal Zone Management in Senegal GCCA+](#)

As such, the priorities for the FCC to leverage climate finance include:

- Expand the base of own source revenue further and consider to directly increase the council's budget allocation to budget lines relevant for adaptation and mitigation, where possible;
- Train and build the capacity of technical staff to identify and develop bankable projects for climate actions and to use a climate lens in financing infrastructure projects at city level;
- Apply for global climate finance to implement climate actions, in collaboration with the GoSL, where relevant;
- Cooperate with development partners for targeted climate action implementation;
- Develop and strengthen partnerships with the private sector for implementation of climate actions;
- Continue the exploration of new models of cooperation and coordination for climate actions and;
- Identify opportunities for community led initiatives.

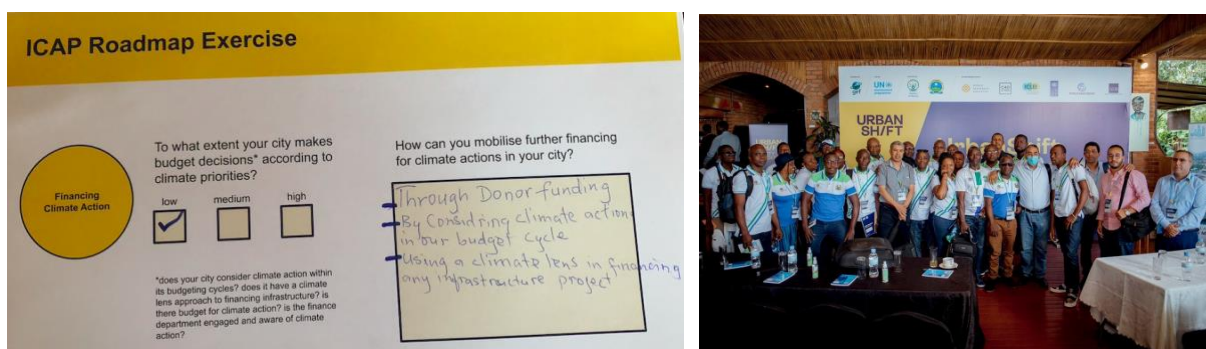


Image 7. Left and right: ICAP Roadmap Exercise Freetown, Sierra Leone at Urban Shift City Academy Kigali, May 2022.

3.4. Monitoring, Reporting & Evaluation

This first strategy concludes a two-and-a-half-year journey of FCC and stakeholders, working to identify actions needed to address climate change. These actions result from the CRA, a comprehensive city-wide GHG inventory, development of emission reduction pathways, and identifying a long list and then prioritising ready to implement actions to deliver on this first strategy. Implementation is already underway - at least for some actions. Others will yet need to be developed and detailed out further.

In order to effectively monitor and manage progress in fulfilling the visions of each of the programs, and to facilitate ongoing revisions and updates to the City's climate change response, there is a need to improve data availability and quality. Many assumptions have been made in deriving the evidence base used for setting the goals and targets in this plan, and there are multiple opportunities to improve the data across energy, waste, transportation and the many adaptation-related sectors. Improving the GHG Inventory and CRA data for these sectors will lead to better planning in these sectors, and to improvements in managing other areas, such as monitoring and mitigating air pollution in the city. Data improvements depend on filling the data gaps through resourcing of City departments, acquiring access to new data sources, surveys, financing of monitoring equipment and investing in analysis. Collaboration with national ministries, district authorities, universities, and local and international research centres is essential for improving data access and analytical capabilities. Attending the residual emissions and updates to mitigation plan is dependent on exploring higher degrees of ambition as Freetown continues to explore new avenues for implementation in the main sectors in combination with a robust strategy for enhancing the data required for planning and subsequent updates to this plan.

Monitoring and reporting on the actions set out in the CAP with FCC being the lead agency will be the responsibility of FCC, specifically the council's M&E unit, in collaboration with the CA&DRM Unit, as well as other corresponding sector departments and is supported by the MDU.

At the moment, there is no clear general process for monitoring and evaluation within the city, apart from the progress reports for the Transform Freetown Agenda. These contain updates on projects and activities being implemented in a given year in relation to the Transform Freetown priority clusters and sectors. At the end of the year, the sector leads within the MDU typically update an internal spreadsheet on the projects that are and were implemented throughout the year. On the basis of this spreadsheet and additional text inputs for each of the projects the update report is compiled by one of the MDU team members and presented for revision to the various internal stakeholders at FCC before final publication and dissemination. The annual progress reports, publicly accessible through the [FCC's website](#) and shared widely through a number of social media channels as well as television, radio and the press, will be the base to inform reporting on actions identified in this first strategy. However, once the election period in 2023 has passed the linkage between the reporting on Transform Freetown and this first climate action strategy needs to be revisited and if needed amended.

For the medium to long term, it is important to highlight that this strategy is dynamic and responsive - a 'living document' - which will undergo periodic review and assessment; in particular, the next iteration of this strategy, five years from publication, will benefit from an updated climate risk assessment to develop a more robust climate risk evidence basis and an updated greenhouse gas emissions inventory as well as a number of sector strategies. In the lead up to the target years of 2030 and 2050, the baselines, targets and trajectories will be updated to reflect the impacts of better data and to account for new technologies and approaches to reducing climate impacts and greenhouse gas emissions, to provide the greatest opportunity of achieving climate resilient and net zero emissions development in 2050. Thereby, the FCC will aim at continuing to report annually to the CDP (Carbon Disclosure Project) and updating the GHG inventory and CCRA as per C40 leadership standards. The leadership standards require a GHG update every two years, with data no older than three years, and an update of the CCRA every five years.

More specifically the following additional priorities can be identified:

- Through the process of implementing this first climate action plan, develop and strengthen a culture of monitoring, evaluation and reporting for the cross-cutting climate theme, ultimately aiming at the development of a formalised monitoring, reporting and evaluation process for the city's climate action work by:
 - Detailing out actions in further detail and establishing links between actions, targets and goals;
 - Reporting on action implementation:
 - For cooperation with external partners, ensure that suitable key performance indicators are identified prior to project implementation;
 - For projects led directly by the FCC, prior to action implementation identify suitable key performance indicators.
 - Monitoring, evaluating and reporting on key program targets and tailoring, where possible, reporting outcomes to specific target audiences;
 - Developing, integrating and subsequently monitoring, evaluating and reporting on, where possible, demographic specific indicators, i.e., for migrants, people with disabilities or informal workers, and indicators for co-benefits, such as air quality, job creation.
- Create, update, or work with relevant institutions to ensure high quality emissions inventories, models, and analysis are available to describe where and how GHG emissions and outdoor air pollution is formed in Freetown, both today and in the future;

- Update Freetown’s GHG inventory in 2023 (latest in 2024), in line with the Leadership Standards, while making use of the flexibility mechanism.
- Thereby, align, where possible with the national process of updating the inventory and targets for the NDC, which is due in 2023.
- And report on the results publicly, preferably using language that is conducive for a wide variety of audiences.
- Create, update, or work with relevant institutions to ensure high quality data on climate risks and hazards as well as their impacts across priority sectors and resident demographics, at least every five years.
- On the basis of revised inventory data and data on climate risks and hazards, update Freetown’s first strategy at least five years from publication:
 - Freetown remains committed to the goals of Deadline 2020 (net zero emissions), however achieving those goals is highly conditional on receiving the necessary support and cooperation of key stakeholders to overcome the barriers identified below. Together with its development partners and funders the City will seek to revise identified targets in line with the Deadline 2020 targets in the next iteration of this strategy.

3.5. Communication and Outreach

At this point in time, the publication of this first climate action strategy is not intended by the FCC. This **long version** builds the evidence-base, provides detailed information and is the reference document for future iterations of the city’s climate action planning pathway and available on the city’s webpage.

Additionally, a **condensed version** of the content is prepared and presented to the public and partners more widely, once it is formally approved at the general council sitting. This version, allows the council to deliver its most important messages on climate action to the public and present a focused approach for action and addressing climate change at the subnational level in Freetown. The Climate Action & DRM Unit Lead, supported by the Environment & Climate team at the MDU, and led by the Mayor envision the publication of the condensed version in form of a press release, the dissemination through social media channels and a targeted distribution via email to direct contacts at partner organisations. This includes partners of the GoSL at national level, national and international NGOs, civil society and donor organisations. The list of contacts is available as a separate document as part of the attachments.⁶¹ This is further complemented by a radio and/ or a television interview with the Mayor, the CA&DRM Unit Lead and councillors of the CA&DRM council committee reporting on the journey and content of Freetown’s first climate action strategy.

The condensed version is further complemented by a resident **poster** highlighting the vision for each of the sectors and the contributions that residents can make. This poster will be presented and shared through social media channels, as well as within the CA&DRM council committee WhatsApp group, for further dissemination at the Ward level.

⁶¹ Please refer to the document containing additional information and analysis for CAP and the tab labelled ‘CA-DRM Stakeholder List for CAP Distribution’.

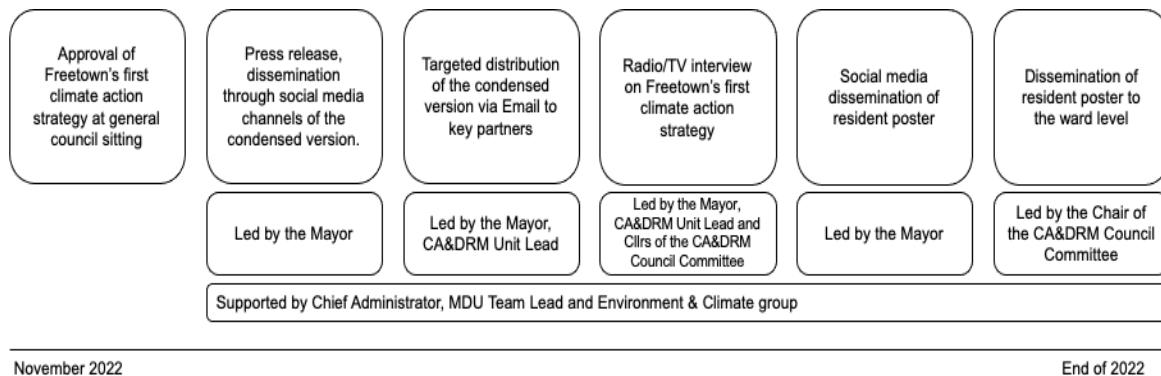
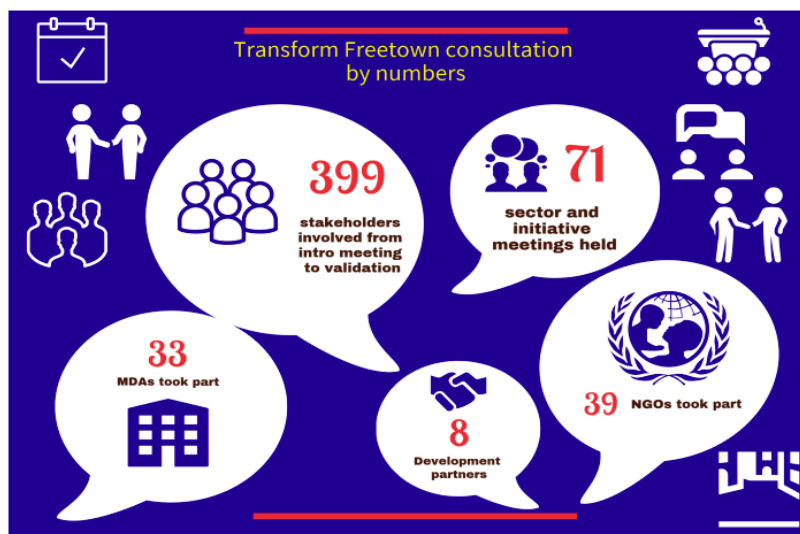


Figure 30 Overview of communication and distribution channels for Freetown's first climate action strategy

4. From Transform Freetown to Climate Actions

This chapter⁶² presents the core of Freetown's first climate action strategy: sectoral long-term visions and goals and ready to implement actions to achieving Freetown's ambitious mitigation and adaptation goals⁶³.

The approach adopted for selecting actions for this plan has been organic and iterative. In a first step, sectors were identified on the basis of the Transform Freetown Agenda which



includes four priority clusters, and eleven priority sectors are a reflection of the residents' needs. The priority sectors were derived in 2018, on the basis of wide-reaching consultations (see Figure 31), and presented the ideal baseline.

Figure 31. Transform Freetown consultation by numbers, retrieved from Transform Freetown - an overview (Source: [https://fcc.gov.sl/wp-](https://fcc.gov.sl/wp-content/uploads/2019/01/Transform-Freetown-an-overview.pdf)

[content/uploads/2019/01/Transform-Freetown-an-overview.pdf](https://fcc.gov.sl/wp-content/uploads/2019/01/Transform-Freetown-an-overview.pdf))

The eleven Transform Freetown priority sectors were assessed during the development of this strategy. This, coupled with a review of key national climate policy documents (Chapter 1.2), new evidence gathered from Freetown's Climate Risk and Hazard Assessment (Chapter 2.2), the GHG Modelling and Scenario Analysis and newly derived links to air quality (Chapter 2.1) resulted in seven themes/ sectors being prioritised in this strategy, including Urban Energy as well as Heat, which were added as additional key sectors to be taken into account within

⁶² The Appendix contains a work deck containing the long list of actions for the different sectors and the prioritisation process for the presented actions.

⁶³ As defined in Chapter 2.

Freetown’s first climate action strategy. Table 7 provides an overview of the identified themes/sectors as part of this first climate action strategy.

Transform Freetown Priority Cluster	Transform Freetown Priority Sector	Program visions under Freetown’s first climate action strategy
Resilience	Environmental Management - DRM & climate resilient infrastructure, Heat, Ecosystem & biodiversity	Developing climate resilient communities in Freetown by promoting the safety of communities in the face of climate change and extreme climate events.
		Freetown increases its climate resilience to heat impacts, becoming a more liveable, cool and sustainable city for its people
		Developing climate resilient communities in Freetown by enhancing nature in our urban environments and the natural ability of ecosystems to buffer climate change impacts
Healthy Cities	Water	Creating water security for all users and uses in Freetown
	Sanitation	Freeing Freetown from waste and developing a smart and sustainable waste management system that enables and fosters quality of life and livelihoods for communities
Urban Mobility		Building a cleaner, safer and more equally accessible transport system
Urban Energy		Transition to a clean, accessible and equitable city energy system

Table 8. Transform Freetown Priority Clusters and Sectors and corresponding programs under Freetown’s first Climate Action Strategy

Each of the seven sectors has been transformed into a sectoral program, which was designed using C40’s Goal Action Network⁶⁴ and complemented by further research on the underlying sectoral narratives. These sectoral narratives provide a completer and more coherent picture and allow to place ambitious mitigation and adaptation goals and targets within a wider context. As such, the sectors are equipped with a vision (presented in Table 8) and goals, presenting the general direction; targets, to identify whether progress is being made on achieving aforementioned goals; and a corresponding long-list of actions, breaking the goals down into actionable steps.

Additionally, each of the sectoral programs identify primary benefits within the climate action context - GHG reduction or climate adaptation - as well as co-benefits and contributions to the GoSL’s MTNDP and the SDGs (see Table 9 below). The co-benefits that are identified include the following: education, skills development, job creation and support for people with disabilities (human development cluster) as well as health, air quality and particularly vulnerable groups, such as women & girls. The co-benefits were identified again in relation to Transform Freetown priority sectors that were not yet covered directly when focussing on climate mitigation and adaptation (i.e. human development cluster and health), policy areas that have emerged on the basis of the evidence gathered (air quality), as well as women & girls, a Transform Freetown cross-cutting theme. At program level the identification of co-benefits is merely a qualitative assessment, given present data limitations. Ideally and whenever possible, co-benefits are identified, developed and taken into account in more detail at action/project level once actions are identified for implementation or as part of future iterations of this strategy. Additionally, urban planning is streamlined and integrated across the various sectors.

GoSL’s MTNDP Clusters: SDGs

⁶⁴ Retrieved from [C40’s knowledge hub](https://www.c40.org/knowledge-hub).

Cluster 1: Human Capital Development	Goal 1: No Poverty Goal 2: Zero Hunger
Cluster 2: Diversifying Economy & Promoting Growth	Goal 3: Good Health and Well-being Goal 4: Quality Education
Cluster 3: Infrastructure & Economic Competitiveness	Goal 5: Gender Equality Goal 6: Clean Water and Sanitation
Cluster 4: Governance & Accountability for Results	Goal 7: Affordable and Clean Energy Goal 8: Decent Work and Economic Growth
Cluster 5: Empowering Women Children & Persons with Disabilities	Goal 9: Industry, Innovation and Infrastructure Goal 10: Reduced Inequality
Cluster 6: Youth Employment, Sports & Migration	Goal 11: Sustainable Cities and Communities Goal 12: Responsible Consumption and Production
Cluster 7: Addressing Vulnerability & Resilience	Goal 13: Climate Action Goal 14: Life Below Water
Cluster 8: Plan Implementation	Goal 15: Life on Land Goal 16: Peace and Justice Strong Institutions Goal 17: Partnerships to achieve the Goal

Table 9. Overview of the GoSL's MTNDP (2019-23) Clusters and the SDGs

Once the sectoral programs were developed in detail, including corresponding long-lists of action; the long-lists of actions were then ranked, on the basis of three factors. Each action was ranked, in comparison to other actions within the same sector, across the three aspects presented in Table 10. Ready-to-implement actions are the ones that scored relatively high on their integrated resilience and GHG reduction potential, associated co-benefits and the extent to which they are implementable at this point in time (Table 10). These high scoring ready-to-implement actions are highlighted in green in the subsequent chapters.

Factors applied for ranking the long-list of actions	Explanation	Scale
Integrated resilience & GHG reduction potential	Is the action critical to achieving the city's overall vision and goals within the corresponding sector?	no, not critical (1) - very critical (6)
Co-benefits	Does the action have co-benefits? For example, by favouring particularly women and girls or people with disabilities; improving air quality and health; creating jobs and/ or developing skills.	no, almost none (1) - yes, significant (6)
Implementability	Can the action be easily and readily implemented? <i>Level of city power and strategic alignment at subnational level</i> – Does the action align with FCC's policies, the Transform Freetown Agenda, and fall under existing mandates as defined by the 2004 Local Government act? <i>Alignment with existing national policies and plans</i> – Does the action align with the GoSL's MTNDP, other sectoral policies and plans as well as actions presented in the updated NDC/NAP? <i>Social and cultural acceptability</i> – Is the action taken up by the wider public and accepted culturally? <i>Political acceptability</i> – Does the action receive political support, at FCC and at national government? <i>Cost</i> – Can the associated costs and the level of investment required to implement the action be met by FCC and its partners?	very difficult to implement (1) - ready to implement (6)

Table 9. Factors applied to the long-list of actions for ranking and identification of ready-to-implement actions

Note that the long-list of actions, while aligned with NDC/NAP actions of the GoSL and sectoral policies, as well as the ready-to-implement actions, focus particularly on those for which implementation is to some extent under the city's control - at least from the perspective of mandates and the current status of the devolution process. For the ones not entirely under its control, the city is aligning with national government strategies and policies to take advantage of the synergies. For the ones which are outside of the city's control, the city aims at playing its part as a key stakeholder and contributing to implementation where possible and relevant.⁶⁵ Ready-to-implement action, as well as remaining ones from the long-list of actions were - where possible with available resources - further detailed containing information on the current status of implementation/roll out; timescale for delivery; financing arrangements and responsibilities.

This process has taken place at the FCC and included sectoral representatives from the corresponding FCC units, the CA&DRM Unit Lead and was supported by the MDU sector leads and volunteers who were part of the MDU Environment and Climate group. Additionally, ready-to-implement actions were subsequently run by the CA&DRM council committee as well national government stakeholders, where possible. The outcome is a long list of actions ranked as a result of the prioritisation exercise, presenting ready-to-implement actions at the top, followed by additional actions. Each action contains an id that links it back to the goal that it is contributing to.

Each of the programs is also complemented by a set of first ideas presenting how residents can contribute - providing relatable examples and initiatives showcasing that global matters require not only local action, but rather a contribution from each and everyone. These sectoral programs benefited from numerous technical contributions, revisions and numerous iterations from experts within the corresponding fields, in- and outside of Freetown.

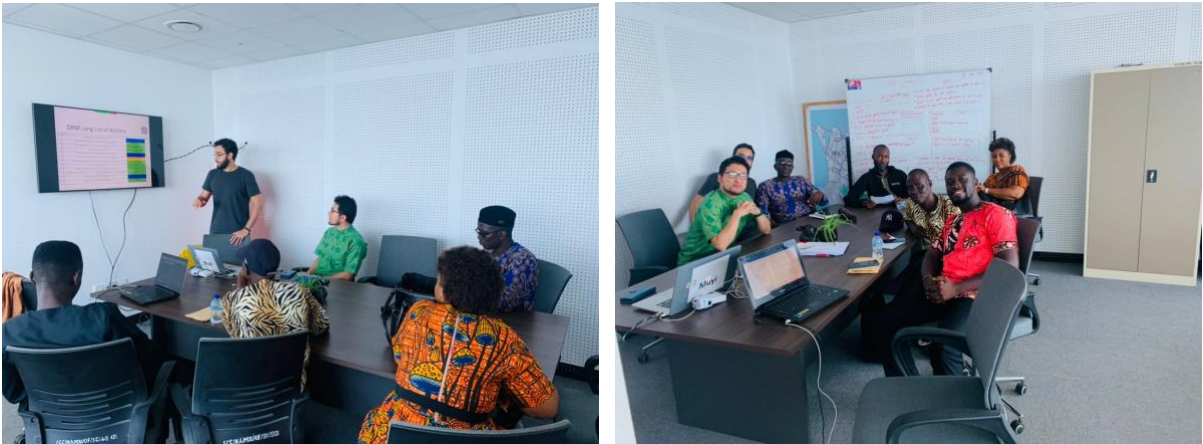


Image 7. Left and right: Engagement of Climate Action and Disaster Risk Management Council Committee members reviewing the prioritised list of actions, August 2022.

4.1. Vision 1: Developing climate resilient communities in Freetown by promoting the safety of communities in the face of climate change and extreme climate events

Freetown, due to its geography and landscape, is particularly prone to a number of natural disasters such as floods, coastal erosion, landslides, tropical storms and heat stress, which

⁶⁵ Refer to section 3.1 for a high-level sectoral powers overview.

are likely to be exacerbated in the next few years by a changing climate.⁶⁶ Further, the World Bank (2019) estimates for Freetown that “approximately 38% of the built-up expansion has taken place in either medium or high-risk areas”. This includes but is not limited to Freetown’s 74 fire and flood prone informal settlements that are to a certain extent isolated and can easily get cut off from government and emergency responders.⁶⁷ Easily clogged and inadequate drainage and storm water system place an additional toll. The drains are not equipped to handle the amount of stormwater generated from rainfall. This issue is intensified by the widespread disposal of waste into storm drains and the sediment run-off, as result of deforestation along the hillsides, which blocks the water pathways.⁶⁸ As a result and with an expanding population and increasing frequency of emergencies throughout the year, the demands on the city’s DRM system are more pronounced.⁶⁹

In the past and given the challenges described and with limited resources, DRM has rather been reactive than proactive and preventative in Freetown. For example, Early Warning Systems (EWS), a key component of the DRM cycle, is often inconsistent, delayed, and misunderstood. Poor EWS communication results in unnecessary deaths and a misuse of resources.⁷⁰ Generally, DRM capabilities and training for emergency responders has been a lower priority for the government and often been based on donor funding.⁷¹ Further, access to data is, as in many other sectors, limited and not consistently available at the lowest administrative level across the city to address and prevent risks and hazards more systematically.

However, this trend is changing, and it is becoming a higher priority in governmental planning. The Driving African Capacity-Building in Disaster Management (AFRICAB) Final Report shows that significant progress has been made in recent years aimed at improving the DRM system of Sierra Leone, including the passing of a new legislation in 2020, the establishment of a dedicated NDMA in November 2020 and the continuing development of a successful pillar-system for the coordination of disaster response. Significant progress has also been made in Freetown, including creating the Climate Action and Disaster Risk Management Unit which developed new standard operating procedures for disaster response at the subnational level. Also, the FCC implemented minimum training requirements for local councillors and disaster managers in 2020.⁷² A number of coordination structures have been set in place in order to facilitate communication between the different levels of government. These include, for example, the pillar coordination system for disaster response⁷³; half-yearly District Disaster Management Committee Meetings (coordinated by NDMA); quarterly meetings between FCC and NDMA.

While significant improvement has been seen, other areas for future improvement can be identified and were summarised and presented in the AFRICAB report:

Technical	Revision/Enforcement of standards and codes - fire safety, urban planning codes and by-laws
Coordination	Ministerial, National-District, NGO/Private Sector
Communication	Media Messages, Media Training, Communication Technologies
Capacity Building	Comprehensive DRR focus; EWS expansion and awareness
Procedural	Guides, Standard Operating Procedures, plans, risk matrices and registers,

⁶⁶ World Bank Group & GFDRR (2020)

⁶⁷ World Bank Group & GFDRR (2020)

⁶⁸ Freetown Water Supply and Sanitation Master Plan and Medium-Term Investments Project. (2022)

⁶⁹ Miles (2020)

⁷⁰ Miles, L., Bang, H., & Martin, J. (2021)

⁷¹ Miles, L., Bang, H., & Martin, J. (2021)

⁷² Miles, L., Bang, H., & Martin, J. (2021)

⁷³ Identifying incident categories within the pillar structure and fitting in pillar-leads and possibly co-leads that we will contact directly when the need arises. Pillars can be: WASH pillar, Food and Nutrition pillar Protection, Psychosocial pillar.

	with increased emphasis on DDR and recovery, implementation and compliance
Human Resources	Investment and Training in Human Resources: capacity, competency, expertise, training and exercising
Physical	Infrastructure investments in stores and logistics, road and electricity networks; investments in district EORs
Economic	Dedicated disaster management funding at national and district levels; funding transitions from response to recovery phases.

Table 11. Areas for future improvement as presented in the AFRICAB report (Source: Miles, L., Bang, H., & Martin, J. (2021))

Actions for DRM aim at addressing these short-comings and to ultimately develop climate resilient communities in Freetown by promoting the safety of communities in the face of climate change and extreme climate events.

DRM & Climate Resilient Infrastructure Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Resilience: Disaster Risk Management & Climate Resilient Infrastructure	Climate Adaptation	Education Skills Development	MTNDP: 7, 8 SDGs: 11, 13, 14, 15, 17
Goals:			
<ol style="list-style-type: none"> 1. Amplified prevention of disasters through communication between different levels of government, measures including knowledge, identification of and planning for climate induced risks and hazards at community level; 2. Effective and efficient response to and management of climate related disasters through strengthened capacity of the emergency responders and the DRM teams in Freetown - consistently across all Wards; 3. Development and maintenance of climate resilient infrastructure to prevent disasters, focussing on flood mitigation. 			
Targets to track progress on achieving our goals⁷⁴	2030	2050	
Population affected and/ or displaced by extreme climate events	no more than 50%	no more than 10%	
How can residents contribute?			
<ul style="list-style-type: none"> • Community disaster volunteers: help cascading weather reports in their communities effectively; support the implementation of flood mitigation activities by cleaning/clearing of waterways in their respective communities; support disaster response in their communities; • Keep waterways and drainages clear of waste; • Limit fire hazards – including open cooking and burning; • Use word of mouth to inform about weather forecasts; • Keep community access clear to allow responders access in case of emergencies; • In case of emergencies and/or disasters, follow instructions from public officials and evacuate where needed. 			

Long List of Actions for DRM

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the DRM & Climate Resilient Infrastructure Program. While all actions are of relevance and key to a net zero emissions and climate resilient trajectory for Freetown,

⁷⁴ Targets are informed by SDG 11, Target 11.5 and SDG 13, Target 13.1; achievements are conditional on availability of necessary resources and cooperation across levels of government.

ready-to-implement actions - those that have ranked highest within their sector across their integrated resilience & GHG reduction potential, associated co-benefits and ease of implementability - are marked in green and are given most attention for immediate implementation.

id ⁷⁵	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation Timeline
Goal 1: Amplified prevention of disasters through communication between different levels of government, measures including knowledge, identification of and planning for climate induced risks and hazards at community level;						
G1A1	Raise the awareness of disasters at ward level and reduce thereby identified risks within communities	Additional action	FCC CA & DRM Unit, Ward Councillors	NDMA, Met Agency, CDMCs and specific NGOs and Media, RedCross, Fire Force, Community Leaders	No	2025
G1A2	Develop risk and hazard maps at ward level and corresponding action plans	Ongoing action with potential for scaling up	FCC CA & DRM Unit together with BUDMC	EVALDIS Project, TBI Tech Team, Greenstand, Meraki Analytics, NDMA, Met Agency, CDMCs and specific NGOs and Media, RedCross, Fire Force, Community Leaders	Yes, External	2030
G1A3	Implement action plans for high-risk areas	Additional action	FCC CA&DRM Unit	NDMA, Met Agency, CDMCs and specific NGOs and Media, RedCross, Fire Force, Community Leaders	No	2050
G1A4	Update the FCC's facilitators guide for the development of a long term DRM policy	Existing action	FCC CA&DRM Unit together with BUDMC	NDMA, Met Agency, CDMCs and specific NGOs and Media, RedCross, Fire Force, Community Leaders	Yes, External	2025
G1A5	Mainstream DRM across sectors at FCC and strengthen collaboration among levels of government	Existing action	FCC CA&DRM Unit, NDMA through RUSLP (WB)	NDMA, Met Agency, CDMCs and specific NGOs, RedCross, Fire Force, Community Leaders UNICEF, UNDP, WFP and WB	Yes, External	2025
G1A6	Revise and subsequently enforce Sanitation by-laws at the city level to prevent disasters and Standard Operating Procedures (SOPs) for fire safety at existing sanitation facilities.	Existing action	FCC CA & DRM Unit	NDMA, Ministry of Local Government	No	2030
G1A7	Support and enforce where possible flood proof development of new neighbourhoods	Additional action	FCC CA & DRM Unit and DPO	SLRA, SLRSA, Community Leaders, NDMA, ONS, EPA, Ministry of Environment	No	2030

⁷⁵ Action identification code; G links up to the corresponding goal for this program.

Goal 2: Effective and efficient response to and management of climate related disasters through strengthened capacity of the emergency responders and the DRM teams in Freetown - consistently across all Wards;

G2A1	Continue and strengthen Freetown's Rapid Emergency Response	Existing action	FCC CA & DRM Unit	NDMA, Met Agency, CDMCs and specific NGOs and Media, RedCross, Fire Force, Community Leaders	No	2050
G2A2	Strengthen the FCC's emergency response and incident training and build capacity for the CA&DRM Team	Existing action	RE:ACT, FCC CA & DRM Unit	EVALDIS Project, TBI Tech Team, Meraki Analytics, NDMA, Met Agency, CDMCs and specific NGOs (Handicap) and Media, RedCross, Fire Force, Community Leaders, WFP, Concern Worldwide, World Vision, Fedurp,	No	2025
G2A3	Explore options to scale up the early warning systems at FCC	Existing action	FCC CA&DRM Unit	Atlantic Council, Met Agency, NDMA, Action Against Hunger, Red Cross,	No	2030
G2A4	Strengthen the collaboration between SL Met and FCC to improve local understanding of risks and supporting early warning systems	Existing action	FCC CA & DRM Unit and SL Met	SL Met Agency, potentially EWS Organisation	No	2030
G2A5	Develop a flood evacuation plan for high risk areas	Existing action	FCC CA & DRM Unit	NDMA, ONS, CDMCs and Community leaders, Ministry of Finance, Local Government Ministry	No	2030
G2A6	Support the understanding of emergency responses perform incident trainings and increase capacity building for the most vulnerable at ward level	Additional action	FCC CA & DRM Unit	Not defined yet	No	2030
G2A7	Develop a drought response plan and integrate aspects of water scarcity within the council's DRM functions ⁷⁶	Additional action	FCC CA & DRM Unit	NDMA, ONS, SL Met Agency	No	2050
G2A8	Strengthen collaboration across DRM stakeholders for the deployment of tech solutions	Existing action	FCC CA & DRM Unit	Tony Blair Institute, DSTI, NDMA, Action Against Hunger	Yes, External	2025
Goal 3: Development and maintenance of climate resilient infrastructure to prevent disasters, focussing on flood mitigation.						
G3A1	Cooperate with the GoSL on the construction of stormwater drainage and river training works	Existing action	FCC CA & DRM Unit	Guma Valley Water Company, Ministry of Lands, Ministry of Economic	No	2025

⁷⁶ Note that this action is also included as part of the Water Program.

				Development and Planning, donor partners, Ministry of Environment		
G3A2	Cooperate with EDSA on building affordable and safer distribution of electricity in vulnerable communities ⁷⁷	Additional action	FCC CA & DRM Unit	EDSA, Ministry of Energy, National Fire Force	No	2025

4.2. Vision 2: Increasing Freetown’s climate resilience to heat impacts and becoming a more liveable, cool and sustainable city for its people

The Climate Risk and Hazard Assessment has shown that Freetown is at particularly high risk for heat stress compared to other parts of Sierra Leone due to the urban heat island (UHI) impact. The effects of the UHI can be severe in a city like Freetown. Particularly in informal settlements, exposure to high temperatures is even more severe as most are living in houses built from zinc and can’t afford the use of appropriate building materials and cooling systems, such as ACs to protect them from the ravaging heat effects. Heat also exacerbates vector diseases, such as malaria, the disease which is responsible for the particularly high under 5 and infant mortality rate. Indirectly, extreme heat is also closely linked to plastic and air pollution; during the day, the demand for drinking water increases due to heat exhaustion, people tend to buy and consume lot of plastic branded water as a quicker and cheaper alternative to satisfy their thirst and when the temperature is extremely high, harmful gases such as methane are released into the thermosphere causing air pollution. Also, sunlight and high temperatures trigger chemical reactions between primary air pollutants such as nitrogen oxides (emitted by engines) and oxygen, causing a chemical reaction that forms ozone. The hotter the day and the more intense the sun, the more ozone is formed which results in air pollution worsening the already critical situation. Lastly, extreme heat reduces active transport; it's very difficult for residents to walk, jog or conduct cycling activities during the day which in turn increases health issues.⁷⁸

Further, while the UHI effect is a concern for urban areas, increasing land surface temperatures (LST) across the country can also indirectly affect life in the cities. 65% of Sierra Leone’s population depends on subsistence farming and extreme heat lowers crop productivity levels, pressuring food systems, not only upcountry, but also in urban areas, further. This combined with the effect of a ten year long civil war has and will continue to lead to an increase in rural urban migration and the rise of internally displaced persons in Freetown. The influx of rural migrants to Freetown causes population increase, the expansion of the city and further growth of informal settlements.

These developments have increased the need for strong communication and collaboration across levels of government. Therefore, together with its Chief Heat Officer, FCC aims at creating a Heat Health Task Force. In the meantime, other coordination structures across stakeholders include in particular the existing ones within the DRM system as well as close collaboration with the Sierra Leonean Meteorological Agency (SL Met).

It is critical that Freetown invests in measures to reduce the UHI effect and LST. For example, different factors, such as effective mitigation procedures and changes in city development policies, can impact surface temperature patterns. By planting trees, creating parks and open

⁷⁷ Note that this action supports goals and visions for this as well as the Urban Energy program; it has been included here due to the prevalence of disasters related to energy distribution and transmission.

⁷⁸ FCC (2022)

spaces, urban planning can also produce multi-functional components that provide essential cooling in mitigation of the urban heat island effect. In addition, as future infrastructure investment occurs construction materials and design should be climate sensitive and consider heat stress and flood risk.⁷⁹

Heat Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Resilience: Heat	Climate Adaptation	Health, Women & Girls, Elderly	MTNDP: 7, 8 SDGs: 3, 11, 13, 17
Goals:			
<ol style="list-style-type: none"> 1. Identify Freetown’s heat risk areas; 2. Increase the resilience to heat impacts in heat island areas using heat sensitive infrastructure; 3. Support the integration of heat risk measures within regulatory frameworks; 4. Communication - foster a culture of support for heat mitigation and adaptation actions. 			
Targets to track progress on achieving our goals⁸⁰	2030	2050	
Heat maps	Freetown has mapped the heat risk in the whole territory (100%)	Freetown has assessed the interdependencies and cascading effects of heat events	
Early alarm system	Freetown has set a threshold and developed heat early alarm system	80% of Freetown’s residents received early warning messages and respond to heat waves	
Decrease the heat impact	Freetown has increased the shading (green canopy and shading infrastructures) at 50% of the most vulnerable heat areas (hot spot areas)	Freetown has increased the shading (green canopy and shading infrastructure) at 100% of the most vulnerable heat areas (hot spot areas)	
How can residents contribute?			
<ul style="list-style-type: none"> • Community disaster volunteers to help cascading weather reports to their communities; • Use word of mouth to inform about weather forecasts; • Support implementation of community heat resilient projects; • Become a Heat Health Ambassador in your community by; protecting existing trees, planting new trees and preserving nature. 			

Long List of Actions for Heat

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the Heat Program. While all actions are of relevance and key to a net zero emissions and climate resilient trajectory for Freetown, ready-to-implement actions - those that have ranked highest within their sector across their integrated resilience & GHG

⁷⁹ Government of Sierra Leone (2021a)

⁸⁰ These targets are preliminary on the basis of the knowledge and data that has been gathered during the process of developing this plan. A heat mapping assessment and perception study is already underway and will support the identification of the effect of extreme heat on communities and fill knowledge gaps where possible. A revision of the above targets is hence envisioned, as well as the development of a detailed Heat Action Plan centring around the above identified goals.

reduction potential, associated co-benefits and ease of implementability - are marked in green and are given most attention for immediate implementation.

id ⁸¹	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation Timeline
Goal 1: Identify Freetown's heat risk areas;						
G1A1	Assess spatially the heat risk in the city (map the exposure and vulnerable areas) and determine the most vulnerable areas (hot spots) to heat in the city (including vulnerable population and critical infrastructure)	Ongoing action with potential for scaling up	Chief Heat Officer together with the Environment unit and CA & DRM unit	Innovation SL, Asht-Rock, NOAA, CAPA Strategies, Meraki Analytics	Yes, External	2025
G1A2	Evaluate the health and socio-economic impact of extreme heat across different segments of the population	Additional action		Arsht-Rock Atlantic Council, Harvard C, Met Agency, DHMT, Ministry of Health, NDMA	No	2025
G1A3	Develop a heat action plan, with a strong focus on the identified hot spots and the most vulnerable segments of the population ⁸²	Additional action		Arsht-Rock Atlantic Council, NDMA, EPA, WRM, Guma Valley, SLRSA, SLRA, Met Agency and community leaders	No	2025
Goal 2: Increase the resilience to heat impacts in heat island areas using heat sensitive infrastructure;						
G2A1	Create shade at markets and along walkways	Ongoing with potential for scaling up	Chief Heat Officer together with the Environment unit and CA & DRM unit	Innovation SL, Asht-Rock, Market Women	Yes, External	2025
G2A2	Develop further passive building cooling and heat sensitive architecture in the city's hottest areas	Additional action		Ministry of Lands, Ministry of Energy, REASL	No	2030
G2A3	Develop green corridors in vulnerable communities	Additional action		Community Leaders and Ministry of Land	No	2050
G2A4	Engagement with SL Engineers to raise awareness on heat proof building materials and design a standard passive cooling model for housing	Additional action	Chief Heat Officer together with the Environment unit and CA & DRM unit and SL Engineers		No	2025
Goal 3: Support the integration of heat risk measures within regulatory frameworks;						
G3A1	Once building control and permit functions are devolved to the subnational level, integrate building cooling techniques and requirements for heat sensitive	Pending	Chief Heat Officer together with the Environment unit and	MLHCP, MoTA, Ministry of Local Government and Community Leaders	No	2030

⁸¹ Action identification code; G links up to the corresponding goal for this program.

⁸² Note that this action is also recorded within the Ecosystem-based Adaptation through Urban Nature-based Solutions Program.

	building architecture into the building code.		CA & DRM unit			
Goal 4: Communication - foster a culture of support for heat mitigation and adaptation actions.						
G4A1	Establish a Heat Health Task Force to coordinate the development and implementation of the Heat Action Plan and related activities	Additional action	Chief Heat Officer together with the Environment unit and CA & DRM unit	Innovation SL, Asht-Rock, NDMA, SL Met Agency, CBOs and Community Leaders	No	2025
G4A2	Create Early Warning Systems and protocols to cover heat waves, with a strong focus on the identified hot spots and the most vulnerable segments of the population	Additional action		Met Agency, NDMA, ONS, CDMT, CBOs, Community leaders Early Warning	No	2025

4.3. Vision 3: Developing climate resilient communities in Freetown by enhancing nature in our urban environments and the natural ability of ecosystems to buffer climate change impacts

Freetown is not only among the world’s rainiest cities, but also one that has experienced rapid tree loss in recent years, estimated at some 555 hectares – more than 500,000 trees – annually, since 2011. The effects have and can be devastating. Heavy rains, coupled with extensive deforestation, have resulted in devastating landslides, including an event in 2017, which claimed nearly 1,000 lives.

The national government oversees the legal framework governing urban greening and land use, limiting Freetown’s options for curbing tree loss and requiring reforestation. Hence, in January 2020 as a component of the Resilience cluster of Transform Freetown Agenda, Mayor Yvonne Aki-Sawyerr and the Freetown City Council launched the #FreetownTheTreeTown campaign, to reforest the city and surrounding areas to reverse tree loss and reduce such disaster risks. Our overall goal is to increase canopy cover by 50% from 2018 levels by the end of 2022. A million new trees is a simple, eye-catching target, but delivering the green infrastructure required may take more than a million. #FreetownTheTreeTown uses a community growing model, where reforestation is co-designed and co-managed by the community and the city government. Freetown residents are involved in decision-making on where trees are planted and receive payments to plant, grow and digitally track trees on a mobile TreeTracker app. Freetown partnered with a global technology firm, Greenstand, to develop a customised system to track tree planting and growth. The digital system creates a unique geotagged record for each tree planted. Growers revisit each tree periodically to water and maintain it, and to verify and document its survival, receiving micro-payments via mobile money every two months over the first three to five years of the tree’s life (when trees need most maintenance). The growers’ financial compensation is tied to continued tracking. Seedlings have also been procured from local nurseries to maximise the benefits to the local economy. The model has enabled 80% of the total resources leveraged for the project to be injected into local communities.

The tree data entered by paid city residents is verified by #FreetownTheTreeTown staff, creating a reliable and transparent dataset to facilitate payments and to leverage private investment. In the first two years since its launch in January 2020, 560,000 trees have been planted, digitally tracked and ‘tokenized’, with **578 hectares of urban land in and around Freetown restored**. Overall, we are targeting the tree planting strategically in different areas for different purposes:

- To improve the equitable distribution of trees and green space, 35% of areas targeted for new trees or vegetation are informal settlements that currently have low coverage.
- Planting by roadsides, schools and in residential areas (totalling almost 165 hectares to date) aims to reduce heat stress and improve air quality.
- Planting in Freetown's water catchment and greenbelt (104 hectares) aims to improve water security.
- Planting in the upper water catchment and on high slopes around Freetown (280 hectares) aims to reduce the risk of flash flooding and landslides.
- Mangrove reforestation (32 hectares) aims to reduce coastal erosion and flooding.

Given the high risks of flooding and landslides, the continued high rates of deforestation and the multiple benefits #FreetownTheTreeTown has provided, the city aims at continuing and expanding its ecosystem-based adaptation through urban nature-based solutions program by integrating it firmly within its first climate action strategy.

Ecosystem-based Adaptation through Urban Nature-based Solutions Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Resilience: Environmental Management Program	Climate Adaptation	Women & Girls, Youth Job creation, Skills development, Education	MTNDP: 7, 8 SDGs: 11, 13, 14, 15, 17
Goals:			
<ol style="list-style-type: none"> 1. Increase biodiversity; 2. Build a circular green economy through structuring alternative livelihoods/ income streams - targeting youth and women that protect the environment; 3. Build and implement impact investment strategies to ensure sustainable long-term financing for tree growing and nature-based solutions; 4. Increase community climate resilience, adaptation capacity and risk reduction. 			
Targets to track progress on achieving our goals	2030	2050	
Ecosystem restoration	Freetown has mapped the existing trees in the whole territory (100%)	Freetown has assessed the interdependencies and cascading effects of land and ecosystem degradation	
Ecosystem services	Increased water retention for residents through reforestation in the Green Belt, the area around the main water reservoir supplying Freetown	Reduce the incidence and scale of disasters such as flooding and landslides, exacerbated by slope degradation and the absence of trees	
Biodiversity	Decrease the destruction rate of mangroves and increase plant species in watershed areas.	30-40% total built up city surface area to be green spaces.	

How can residents contribute?

- Support tree growers by visiting each seedling periodically, to water and maintain, verify and document the plant's survival;
- Cooperate with the Community-Based Organization that the FCC works with to ensure that the 80% tree-survival rate is achieved;
- Ensure that green spaces in their communities are kept healthy to improve the environment and lifestyles;
- Support data collection and analysis processes which will allow the FCC to measure ecosystem benefits that include heat stress reductions, improvements in air and water quality, and a reduction of flooding and landslide risks.

Long List of Actions for Ecosystem-based Adaptation through Urban Nature-based Solutions⁸³

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the ecosystem-based adaptation through urban nature-based solutions program.

id ⁸⁴	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation Timeline
Goal 1: Increase biodiversity						
G1A1	Restore 3000 hectares of urban land, some proportion of which across natural spaces including a) River /Stream / Watershed, b) Mangrove Area, c) Wetland, d) Urban Forest, and e) Natural Area with Steep Slopes	Ongoing action with potential for scaling up	Environmental Foundation for Africa	FCC, NPAA, GVWC	Yes, External	2030
G1A2	Restore 3000 hectares of urban land, some proportion of which across urban areas and communities including a) Populated Area(s)/Communities - requiring distinction within one or between two communities, b) Populated Area/Community + Different Land Use Zone - requiring visual spatial boundary and c) Populated Area/Community – requiring Community Tree(s) or Iconic Trees.	Ongoing action with potential for scaling up	Environmental Foundation for Africa	FCC, NPAA, GVWC	Yes, External	2030
Goal 2: Build a circular green economy through structuring alternative livelihoods/ income streams - targeting youth and women that protect the environment						
G2A1	Incentivize a pathway to protection of the natural environment and away from harmful practices, like sand mining, stone mining and charcoal burning through job creation, particularly for women and youth	Ongoing action with potential for scaling up	Environmental Foundation for Africa	FCC	Yes, External	2025
G2A2	Incentivize a pathway to protection of the natural environment and away from harmful practices, like sand mining, stone mining and charcoal burning by training women and youth as	Ongoing action with potential for scaling up	Environmental Foundation for Africa	FCC, Community-Based Organization, National Non-	Yes, External	2025

⁸³ Note that actions under this program were prioritised when included under the #FreetownTheTreeTown initiative.

⁸⁴ Action identification code; G links up to the corresponding goal for this program.

	Community Climate Action Ambassadors			Governmental Organization.		
Goal 3: Build and implement impact investment strategy to ensure sustainable long-term financing for tree growing and nature-based solutions						
G3A1	Develop administrative processes and tools to issue impact tokens to investors and finalise carbon credit registration and market entry strategy / roadmap.	Ongoing action with potential for scaling up	Environment and Sanitation Department, FCC	Innovation SL, UNDP	Yes, External	2025
Goal 4: Increase community climate resilience, adaptation capacity and risk reduction						
G4A1	Develop a heat action plan, with a strong focus on the identified hot spots and the most vulnerable segments of the population ⁸⁵	Additional action		Arsht-Rock Atlantic Council, NDMA, EPA, WRM, Guma Valley, SLRSA, SLRA, Met Agency and community leaders	No	2025
G4A2	Build a replicable blueprint for sustainable reforestation to be shared with other cities through publication, direct exchanges and networks.	Ongoing action with potential for scaling up	Environment and Sanitation Department, FCC	Bloomberg Philanthropies, UNDP Sierra Leone	No	2025
G4A3	FCC planning policies will give priority in developing Action Area Plans targeted at preventing unsuitable development in hazard prone areas ⁸⁶	Ongoing action with potential for scaling up	FCC	MLHCP	World Bank funded Resilient Urban Sierra Leone Project	2025

4.4. Vision 4: Creating water security for all users and uses in Freetown

Water quality and availability are highly vulnerable to climate impacts - even more so in areas that are challenged by water insecurity. In Freetown, water is mainly used within the domestic (drinking, cooking, hygiene) and industrial (beer, spirits, soft drinks, cooling and waste disposal) context. Additionally, population growth as well as rural-urban migration to Freetown in the past two decades pose pressure on existing urban water resources. Reliable access to clean water is essential for these multiple uses and for Freetown's residents with implications for social vulnerability and poverty.⁸⁷

Water is naturally harvested through the thirteen water catchment areas. However, most of the catchment areas are located in Western Rural. Guma Valley Water Company (GVWC), a government-owned entity, is the national agency responsible for the distribution of piped water to the city. The main dam located at mile 13 supplies over 90% of Freetown's water. The treatment plant was built in the 1960s. However, at current population density levels in Freetown, the Western Area Peninsula Water Supply System cannot deliver sufficient and safe water to the region's population. The Guma Valley reservoir, designed for 300,000 people initially and supplying 90 percent of the water for Freetown, provides less than sufficient water to the growing population in Freetown - a problem which is even more pronounced during the

⁸⁵ Note that this action is also recorded within the Heat Program.

⁸⁶ Note that this action is also recorded as part of the Urban Mobility and Planning Program.

⁸⁷ Government of Sierra Leone (2021)

dry season.⁸⁸ The average daily output of GVWC to the city of Freetown is approximately 80,000 m³ per day, which is below the estimated average daily demand of 107,000 m³ per day in the Western Area (Figure 30).⁸⁹ Without major interventions and adjustments to existing facilities, the Western Area will be able to produce only 110,000m³ of water a day by 2035 which meets only 35.2% of the daily demand of residents of the Western Area. With the estimated demand and production, the Western Area will have a short fall of 202,682m³ of water daily in 2035.

Demand for Drinking Water				
Area	2020 (in m3/d)	2025 (in m3/d)	2030 (in m3/d)	2035 (in m3/d)
Western Area Urban	84,678	144,893	206,532	222,342
Western Area Rural	21,409	40,293	71,578	90,340
Total Western Area	106,087	185,186	278,110	312,682
Water Production				
Water Facility	2020 (in m3/d)	2025 (in m3/d)	2030 (in m3/d)	2035 (in m3/d)
Guma Dam	80,000	80,000	90,000	90,000
Other Sources	10,000	20,000	20,000	20,000
Total Production	90,000	100,000	110,000	110,000

Figure 30. Demand for Drinking Water and Water Production (Source: COBA and SMEC (2022), Freetown Water Supply & Sanitation Masterplan And Medium-Term Investments Project, Economic And Financial Analysis Report prepared for GoSL and GUMA Valley Water Company and funded by African Water Facility and Netherlands Enterprise Agency)

The insufficient supply of water requires rationing to many areas in the city, and almost no customers receive guaranteed supply 24-hours per day.⁹⁰ Freetown's poorest and most densely populated urban and peri-urban areas often receive water just once a week or not at all.⁹¹ Overall, only 75% of Freetown's residents have access to an improved water source compared to more than 86% on average in Sub-Saharan urban areas.⁹² Further, data from the 2015 population and housing census shows that only 22% of residents have access to improved, private sanitation facilities and only 3% of urban households have access to piped indoor drinking water, with 39% of households instead relying on public taps.⁹³ The rest of the city's people obtain their water from wells, both protected and unprotected, from open water sources, such as rivers and streams, and/or from vendors.

Whilst Sierra Leone has plentiful supplies of water, the transmission and distribution of water in the city remains poor. 40% of treated water in Freetown is lost through leakages, whilst informal and unmetered connections lead to further losses. Further, ageing infrastructure, upstream and downstream to end users, provides additional challenges. Tariffs are a third of the level in similarly water-abundant countries. This has rendered cost recovery impossible - resulting in bad equilibrium of poor service, poor coverage and low willingness to pay.⁹⁴

The lack of access to safe water has also indirect socio-economic consequences as the opportunity costs and lost wages associated with searching for water are high. While this affects the entire economy, low-income communities suffer the most. Those, who often can

⁸⁸ Government of Sierra Leone (2021)

⁸⁹ African Water Facility, African Development Bank (2018)

⁹⁰ African Water Facility, African Development Bank (2018)

⁹¹ CRS and the Nature Conservancy (2021)

⁹² World Bank (2018)

⁹³ Statistics Sierra Leone (2015)

⁹⁴ World Bank (2018)

least afford this lost time and wages, spend hours multiple times per day waiting in long lines at community water kiosks or walking to distant rivers or other water sources to meet their basic water needs.⁹⁵

With growing demand for clean water, many individuals have resorted to using informal water supplies such as streams and shallow wells that are not controlled, treated or safe.⁹⁶ These shallow wells are especially unsuitable for further development and should not be used as legitimate sources as they share the aquifer with many latrines. This causes widespread contamination of clean water sources. A further issue lies in the contamination due to increased sedimentation from tree loss and increased pollution, as the population migrates upstream of river catchments that supply water.⁹⁷ The use of contaminated water resources, which is more severe during the raining season, has serious health implications.⁹⁸

Addressing water from a holistic perspective and incorporating demand and supply aspects on the basis of reliable data and with technical expertise allows to develop the base for a long term adaptive water strategy. Such a strategy will not only foster water security in the short term but also long term despite a changing climate and increasing urbanisation pressures resulting from rural-urban migration.

Water Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Healthy City: Water	Climate Adaptation	Health, Women & Girls	MTNDP: 3, 8 SDGs: 6, 11, 13, 14, 15, 17
Goals:			
<ol style="list-style-type: none"> 1. Providing access to safe, affordable and sustainable water supply to Freetonians; 2. Encourage efficiency of and a reduction in water use. 			
Targets to track progress on achieving our goals⁹⁹	2030	2050	
Residents in Freetown that have access to safe, affordable and sustainable water supply	75%	80%	
How can residents contribute:			
<ul style="list-style-type: none"> ● Collect rainwater at household level; ● Recycle water that is not safe for consumption but can be used for bath water, laundry or dishes; ● Reuse bathwater for flushing toilets or watering your garden; ● Keep waterways free from waste to avoid blocked drainages and flooding downstream; ● Only use water supply that is controlled, treated and/or safe to protect your health; ● Plant drought resistant trees; ● Prevent cutting down trees and settling around water catchment areas; ● Protect existing trees to reduce sedimentation and run-off; ● Become a tree steward and inform other residents about their benefits. 			

⁹⁵ CRS and the Nature Conservancy (2021)

⁹⁶ Guma Valley Water Company (2008)

⁹⁷ Millennium Challenge Corporation (2019)

⁹⁸ Guma Valley Water Company (2008) and CRS and the Nature Conservancy (2021)

⁹⁹ The targets are based on the Transform Freetown Target for 2022 which sets the ambitious target of 75% of Freetownians having access to a safe, affordable and sustainable water supply. Assuming the multi-faceted approaches needed addressing not only availability of water, but also its sustainability, the target is only slightly raised by 2030, while ultimately aiming at 100% in 2050.

Long List of Actions for Water

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the Water Program. While all actions are of relevance and key to a net zero emissions and climate resilient trajectory for Freetown, ready-to-implement actions - those that have ranked highest within their sector across their integrated resilience & GHG reduction potential, associated co-benefits and ease of implementability - are marked in green and are given most attention for immediate implementation.

id ¹⁰⁰	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation Timeline
Goal 1: Providing access to safe, affordable, and sustainable water supply to Freetonians;						
G1A1	Gain insights through research about the nexus of water management and climate change at the city level, in cooperation with the GoSL	Additional action	Ministry of Water Resources	NWRMA, FCC, WARDC	No	2025
G1A2	Engage and cooperate with the GoSL in hydrological monitoring of water use to create a national database and strategic planning of water resources in face of climate change	Additional action		Ministry of Water Resources, Guma, CRS	No	
G1A3	Involve and empower the most vulnerable communities in Freetown in the water space	Ongoing action with potential for scaling up	FCC City Engineering Department	UNCDF, FEDURP, ILNG	Yes, External	2025
G1A4	Provide water and storage systems to facilities for community use, including in informal settlements, at markets and in PHUs	Existing action	FCC City Engineering Department	EU and CRS	Yes, External	2025
G1A5	Provide portable water and storage systems to water deprived and hard to reach communities through the installation of water kiosks	Existing action	FCC City Engineering Department	UNCDF	Yes, External	2025
G1A6	Cooperate with the national government on the developments of the Guma dam reservoir and transmission expansion and improvement	Additional action		National Water Resources, Guma	No	
G1A7	Enhance demarcation activities of encroached areas in communities of catchment areas	Existing action	FCC City Engineering Department	NWRMA, CRS, WARDC	Yes, External	2025
G1A8	To stem the rapid rate of deforestation on the periphery of the city, areas will be identified in the Local Area Plans as Protected forested areas. The approach will aim to protect areas within existing water supply catchment and areas at risk of flooding. ¹⁰¹	Ongoing action with potential for scaling up	FCC	MLHCP	World Bank funded Resilient Urban Sierra Leone Project	2025

¹⁰⁰ Action identification code; G links up to the corresponding goal for this program.

¹⁰¹ Note that this action is also included within the Urban Mobility and Urban Planning Program.

G1A9	Establish and operationalize a water quality lab	Additional action		NWRMA, CRS, WARDC	No	
G1A10	Rehabilitate and expand existing water sources (springs, weirs)	Additional action		NWRMA, CRS, WARDC	No	
Goal 2: Encourage efficiency of and a reduction in water use.						
G2A1	Cooperate with newly established Water Loss Reduction Unit at GVWC	Additional action	FCC City Engineering Department	GVWC	No	2025
G2A2	Cooperate with the national government on the development of policies and procedures to address unauthorised consumption, water loss and pipe replacement programs in Freetown.	Additional action		GOSL, National Water Resources, Guma	No	
G2A3	Strengthen local water management by developing and delivering training on water management and maintenance	Existing action	FCC City Engineering Department	NWRMA, CRS, GOSL, WARDC	Yes, External	2025
G2A4	Develop of a drought response plan and integrate aspects of water scarcity within the council's DRM functions ¹⁰²	Additional action		NDMA, REACT, SL Met Agency	No	

4.5. Vision 5: Freeing Freetown from waste and developing a smart and sustainable waste management system that enables and fosters quality of life and livelihoods for communities

Inadequate management of solid and liquid waste is the third largest source of GHG emissions, accounting to almost one third (29%) of Freetown's total emissions in 2018, while at the same time resulting in a series of health, occupational and environmental impacts. This is due to a complex set of socioeconomic, spatial and logistic challenges, which, coupled with lack of financial resources and institutional capacity, complicates public service delivery for both solid and liquid waste.

Disposal of solid waste in Freetown occurs primarily at the city's two main dumpsites: Kissy (Granville Brook) in the East, and Kingtom in the West (Figure 33). A significant amount of waste is also deposited in smaller, illegal dumpsites.

¹⁰² Note that this action is also included as part of the DRM & Climate Resilient Infrastructure Program.



Figure 32. Location of the Kingtom and Kissy (Granville Brook) dumpsites within the Western Area Urban; Source: map produced by Freetown City Council on the basis of IMC Worldwide (2018).

Both main dumpsites have exceeded their capacity and are highly precarious: leachate, uncontrolled build-up of gaseous emissions, and risk of fire constitute serious hazards both to the surrounding environment and to the health and safety of adjacent communities, particularly of informal waste pickers. In the case of Kissy, waste has piled up to the point where slopes risk collapsing into the creek running through the site, which is already a safety concern in that its contaminated water is used for bathing and washing, and regularly floods the community nearby. The Freetown Structure Plan from 2014 recommended the sites be closed, which has not been acted upon due to lack of alternatives and sound planning as well as institutional support in providing equipment, manpower, budgets, policy guidelines, and oversight.¹⁰³ Indeed, of the around 550 tons of waste produced in Freetown every day, 127 are still landfilled.¹⁰⁴

Solid waste composition in Freetown is heavily dominated by organic waste with 67,6%, while 9.4% is paper, 8.5% is plastic, 3.7% is glass, 3.1% is metal, and the remaining 7.6% is composed of other materials.¹⁰⁵ Currently, there is no formal system of sorting these different types of waste in Freetown, neither in terms of household-level separation nor at transfer stations or dumpsites. Informal waste pickers collect and recycle small quantities of plastics and metals at the dumpsites, with serious occupational health hazards. Otherwise, there is no formal form of recycling apart from marginal amounts of plastics (mainly water sachets) that are collected and recycled in Guinea. In addition to the low material flows resulting from a lack of sorting and waste separation, recycling at a meaningful scale is also complicated by a number of other challenges, such as lack of an attractive market and sufficiently stable electricity supply.

Another problematic consequence resulting from a lack of waste separation and sorting is undifferentiated collection of organic waste, which reduces the value of recyclables and the lifetime of disposal facilities, increasing operational expenses accordingly. While there is yet no culture of separating at the household level, some organic waste is collected from hotels

¹⁰³ The Freetown Structure Plan is currently under revision.

¹⁰⁴ iMC Worldwide (2018)

¹⁰⁵ iMC Worldwide (2018)

and restaurants, and there are promising ways to make use of it. For instance, a company called Waste Transformers is working on installing biodigesters that convert organic waste into electricity and high-quality fertiliser: a pilot installation in Aberdeen is already supplying a local hospital with electricity, and more such projects are being planned.

Solid waste collection in Freetown is done mainly through trucks and tricycles (motorised three-wheelers with a carriage), some of which are registered, some of which are not. Their capacity is limited: as of early 2021, it was estimated that around 80 tricycles – organised predominantly in micro enterprises – collect waste from just 31,200 out of the city's 200,000 households, and the FCC only owns seven trucks that transport waste from the city's markets to the dumpsites. In 2018, the IMC report estimated that Freetown had a solid waste collection rate of just over 20%, which is very low compared to other African cities (83% in Accra, 65% in Nairobi, 60% in Kampala).¹⁰⁶ As of January 2021, data from the FCC has shown that 180 tons daily of the 550 tons of solid waste generated every day in Freetown are being collected, leading to an increase of twelve percentage points. In 2022, the rate is expected to improve further with the operationalisation of the transfer stations. However, improvements will always be hampered as a result of the city's topography, due to which many areas are hard to reach – a critical challenge in improving waste collection in Freetown.

Given these issues, residents often resort to other methods of waste disposal, including open-air burning and illegal dumping. There are currently 69 illegal dumpsites, which the FCC is working to clear – 32 major sites have already been cleared and 3 transformed into green spaces. Often, waste is deposited near waterways, so that it can be washed away during rainy periods – leading to congested ditches, blocked drainage channels and increased flooding. Apart from low environmental education and awareness of how to manage waste, such behaviour is mainly due to the inadequate number of collection points, as well as to logistical difficulties: when collection points are located far away, it takes a lot of time and resources to go and deposit waste - women and children often being the ones in charge of it. While relevant by-laws are in place (dumping is punished with SLE 500,000 or 6-month imprisonment), these are not ubiquitously known, and their enforcement is challenging. Indeed, to address the latter, FCC has recently undertaken efforts to strengthen the Metropolitan Police capacity to enforce sanitation by-laws, including establishment of dedicated units.

In Freetown, 70% of liquid waste is discharged to pit latrines, 26% to septic tanks, and 4% is directly disposed of.^{107 108} Septic tanks, owned mostly by businesses and high-income households, are emptied monthly by private operators; in most cases with trucks, but in hard-to-reach areas with manual pumps. 80% of liquid waste collected from septic tanks is disposed of in Freetown's first, recently inaugurated faecal sludge management plant, where it is separated and converted into safely disposable water. It is intended that the sludge will be converted into biological fertiliser and briquettes, which is then sold. The remaining 20% of waste collected from septic tanks is illegally discharged, at illegal sites in the city. FCC is partnering with relevant stakeholders, to develop a system which combines trucks and mechanised pit-emptiers to dispose of liquid waste in faecal sludge management plants.

While challenges are tremendous, at the same time, however, the current lack of adequate and sufficient waste and wastewater management systems also means that there is an immense opportunity to plan for smart and sustainable waste management systems that not only reduce emissions but come with a series of crucial socioeconomic benefits. Apart from improved health and climate resilience, such systems can help create economic opportunities through stimulation of a market for local materials recovery as well as job creation along the entire value chain, particularly also for disadvantaged and marginalised residents. A coherent and holistic approach to waste management can also attract the necessary finance and investment that Freetown needs to advance its goals in this sector.

¹⁰⁶ iMC Worldwide (2018)

¹⁰⁷ Liquid waste in Freetown is primarily composed of waste water, since there are no significant quantities of industrial effluent.

¹⁰⁸ WSUP Advisory (2017)

Sanitation Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Healthy City: Sanitation	GHG reduction	Air Quality and Health, Biodiversity and Tourism, Women and Girls, Job Creation	MTNDP: 8 SDGs: 6, 8, 9, 11, 12, 13, 14, 15, 17
Goals: <ol style="list-style-type: none"> 1. Develop the infrastructure and transportation modes to support the functioning of the waste system, including the sanitary disposal of human and solid waste, also in hard-to-reach areas and under inclusion of the informal workforce within the sector; 2. Develop and implement systems for recovery and beneficiation of valuable materials in the waste stream (including organics); 3. Encourage and promote behavioural change to ensure increase in waste collection, recovery and recycling of liquid and solid waste, including separation at source and preventing illegal dumping. 			
Targets to track progress on achieving our goals ¹⁰⁹	Base Year 2018	2030	2050
<p>In order to reduce GHG emissions from the waste sector, and with a view to developing a smart and sustainable waste management system, the following targets were modelled under an ambitious scenario. The ultimate objective is to reduce citywide GHG emissions and targeting net zero emissions by 2050, and this can be achieved through a combination of universal collection with flexible mechanisms, significantly increased recycling rates and organics treatment while developing engineered sanitary landfills coupled with the elimination of illegal and remediation of the existing two major dumpsites and wastewater treatment.</p>			
% of paper waste recycled	20%	50%	80%
% of plastic waste recycled	25%	60%	100%
% of food waste composted	0%	40%	70%
% of landfill gas captured	1%	25%	50%
% of wastewater treated with an advanced treatment technology (Activated sludge treatment and/or anaerobic digestion with biogas capture)	0%	35%	40%
How can residents contribute: <p>Residents have an important role to play in Freetown reaching its goals on improved waste management, in that a significant part of it depends on behaviour at the household level. To the extent that the City provides the necessary resources and processes (e.g. increased and differentiated solid waste collection capacity, bio-digesters, access to improved sanitation systems), residents can contribute significantly by adopting new behaviours:</p> <ul style="list-style-type: none"> • Follow the council's sanitation by-laws; • Separate plastics and organics at the household level and have them collected separately and/or follow the council's proposed waste management solution within your area of living; • Use approved registered waste service providers for collection and disposal of solid waste and emptying of liquid waste; • Use the sanitation 8244 hotline to report illegal sanitation practices; 			

¹⁰⁹ The targets relate to the scenario of ambitious action and were developed on the basis of existing knowledge, sectoral policies, available quantitative data points as well as qualitative studies within the waste sector. This information has been limited and needs to be complemented over the course of the following years. Further information might require a revision and corresponding adjustment of identified targets and corresponding actions.

- Refrain from littering and dumping waste anywhere that is not an official dumpsite or transfer station;
- Learn about the danger of not managing waste properly.

Long List of Actions for Sanitation

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the Sanitation Program. While all actions are of relevance and key to a net zero emissions and climate resilient trajectory for Freetown, ready-to-implement actions - those that have ranked highest within their sector across their integrated resilience & GHG reduction potential, associated co-benefits and ease of implementability - are marked in green and are given most attention for immediate implementation.

id ¹¹⁰	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation timeline
Goal 1: Develop the infrastructure and transportation modes to support the functioning of the waste system, including the sanitary disposal of human and solid waste, also in hard-to-reach areas and under inclusion of the informal workforce within the sector;						
G1A1	Implement intermediate transfer stations, under inclusion of the informal workforce, to avoid duplicated collection routes and minimise the distance travelled by collection vehicles	Ongoing action with potential for scaling up	FCC Sanitation Department		Yes, External	2025: 40% 2030: 60% 2050: 100%
G1A2	Develop and implement revenue-sharing mechanisms for collection entities, particularly, informal workers	Ongoing action with potential for scaling up	FCC Sanitation Department	Mayors Migration Council	Yes, External	2025
G1A3	Cooperate with collection entities to ensure understanding/ compliance with service users and to thereby encourage the development and expansion of new skills and provide employment opportunities, particularly for the informal workforce within the sector.	Ongoing action with potential for scaling up	Department, Waste Management Association		Yes, External	
G1A4	Develop a fleet and data management system for tricycles	Additional action	FCC Sanitation Department		No	2025: 40% 2030: 70% 2050: 100%
G1A5	Procure additional tricycle carts to expand the waste management system and provide additional employment opportunities, particularly for the informal workforce.	Existing action	FCC Sanitation Department		Yes, External	2025: 60% 2030: 80% 2050: 100%
G1A6	Expand household registrations	Ongoing action with potential for scaling up	FCC Sanitation Department		No	2025: 50% 2030: 70% 2050: 90%
G1A7	Develop and further expand existing community-based waste management plan and support waste collection in hard-to-reach areas	Ongoing action with potential for scaling up	FCC Sanitation Department	C40, Concern	No	2030
G1A8	Close Kissy dumpsite safely	Existing action	FCC Sanitation Department in cooperation with NGO consortium		No	
G1A9	Install a weighbridge	Existing action	SL Red Cross, FCC		Yes, External	2025
G1A10	Improve Kingtom dumpsite and	Ongoing	FCC		No;	

¹¹⁰ Action identification code; G links up to the corresponding goal for this program.

	transform it to an engineered landfill	action with potential for scaling up	Sanitation Department		Funding: (Pending application processes for AfDB UMDf and/ or RUSLP)	
G1A11	Support the development of the new sanitation landfill/waste management park and its integration within the city's waste management system	Ongoing action with potential for scaling up	MoF, FCC Sanitation Department	World Bank RUSLP, WARDC	Yes, External	2030
G1A12	Remove illegal dumpsites and thereby strengthen compliance with sanitation bylaws	Ongoing action with potential for scaling up	FCC Sanitation Department		No	2025: 40% 2030: 60% 2050: 100%
G1A13	Continue running of the FSM Treatment Plant and expanding coverage and services	Ongoing action with potential for scaling up	UKAID, FCC Sanitation Department		Yes, External	
G1A14	Procure Vacuum Trucks to further expand the FSM and integrate the informal workforce	Additional action	FCC Sanitation Department		No	
G1A15	Develop public toilets across the city	Ongoing action with potential for scaling up	FCC City Engineering Department	UNCDF	Yes, External	2025
G1A16	Develop a pilot for citywide segregated food waste / organics collection	Additional action	FCC Sanitation Department		No	
G1A17	Implement citywide segregated food waste / organics collection	Additional action	FCC Sanitation Department		No	2050
G1A18	Integrate picking and sorting of plastics within the waste management system, also through cooperation and partnerships with the private sector and the informal workforce in the sector.	Additional action	FCC Sanitation Department		No	
Goal 2: Develop and implement systems for recovery and beneficiation of valuable materials in the waste stream (including organics);						
G2A1	Develop a strategy for plastics	Existing action	FCC Sanitation Department		No	
G2A2	Strengthen/ enhance the development of a plastic recycling market and value chain	Additional action	FCC Sanitation Department, Private Sector		No	2025: 30% 2030: 50% 2050: 80%
G2A3	Support initiatives that generate energy from organic waste at low scale ¹¹¹	Ongoing action with potential for scaling up	Waste Transformers, FCC Sanitation Department		Yes, External	2025: 10% 2030: 40% 2050: 80%
G2A4	Encourage and support the development of briquettes production and compost from liquid waste	Additional action	FCC Sanitation Department	GOAL	Yes, External	2025: 30% 2030: 60% 2050: 100%
Goal 3: Encourage and promote behavioural change to ensure increase in waste collection, recovery and recycling of liquid and solid waste, including separation at source and preventing illegal dumping.						
G3A1	Strengthen the capacity of METPOL & improving METPOL stations to enhance enforcement of bylaws	Ongoing action with potential for scaling up	London MPS, FCC Sanitation Department and Metpol		Yes, External	2030/2050
G3A2	Revise, develop and enforce sanitation by-laws to encourage behavioural change	Existing Action	FCC Sanitation Department		No	2025: 50% 2030: 80% 2050: 100%

¹¹¹ Note that this action is also integrated within the actions list under the urban energy program.

G3A3	Improve the complaints system to support behavioural change and encourage compliance with sanitation by-laws	Existing action	GOAL, Cater Foundation, FCC Sanitation Department		Yes, External	2025
G3A4	Strengthen outreach and community engagement at ward level encouraging behavioural change and compliance with sanitation bylaws.	Ongoing action with potential for scaling up	FCC Sanitation Department		No	2025
G3A5	Run the Cleanest Zone Competition to enhance behavioural change	Existing action	FCC Sanitation Department		No	2025
G3A6	Run the Cleanest School Competition to sensitise children at early ages on waste management	Existing action	FCC, Rotary Club of Freetown Sunset		Yes, External	2025

4.6. Vision 6: Building a cleaner, safer and more equally accessible transport system

With Freetown’s rapid growth, increasing pressure has been put on the existing transport systems. Limited, poorly-maintained roads and the uncontrolled expansion of private and semi-informal public transport resulted in high levels of congestion, emissions and air pollution in the city – not to mention challenges in accessibility, connectivity and competitiveness regarding the use of road space.¹¹² On-road transport is the second largest source of greenhouse gas emissions in Freetown in 2018, accounting for 31% of the total, slightly more than emissions generated within the waste (29%), but less than within the energy sector (40%).

With overall emissions being rather low in Freetown, it is noteworthy to mention the suppressed demand effect, which contributes to a transport system in Freetown that is characterised by a relatively low share of private vehicles, while the majority of residents depend on public transport – leading to a mode share of approximately 20% private and 80% public transport.¹¹³ The latter is dominated by often informal or semi-formal low-occupancy public transport in the form of *poda podas* (minibuses), shared taxis, *kekehs* (three-wheelers), and *okadas* (motorbikes). Conventional mass public transport accounts for only a small share of potential options for travel: in 2018, only 66 public buses were operating in the city.¹¹⁴ This share has decreased in recent years, while the number of *kekehs* and *okadas* has grown exponentially due to the low upfront costs associated with them, as well as to their ability to navigate congested roads - at peak hours, average traffic speeds in some central areas of the city reaches just 3 km per hour, lower than a walking pace¹¹⁵ - manage unpaved roads - which in 2008 amounted in Freetown to 76% as compared to Accra, Ghana, 50%¹¹⁶ – and navigate also hard to reach areas at least to a certain extent (Figure 32). Further, research suggests that 77% of the population can access an *okada* or *kekeh* hub within 1,000 m of their home; nearly 50% of the population can do so within 500 m.¹¹⁷ As a result, the use of *kekehs* and *okadas* save significant amounts of time and expand coverage of the transport system as compared to their formal public transit counterparts. Prevalence of low-occupancy transport resulting from these factors has contributed to continuous, severe congestion, emissions, air pollution, and frequent traffic accidents.

¹¹² World Bank Group (2018c)

¹¹³ At the time of writing, no detailed study has been undertaken at the city level providing an exact share of the private public transport ratio. This is an estimation on the basis of available studies and the knowledge of the sector experts at the FCC.

¹¹⁴ World Bank Group (2019)

¹¹⁵ Adam Smith International (2013)

¹¹⁶ Kumar and Barrett (2008)

¹¹⁷ SLURC and UCL (2021)



Figure 33. Highly inaccessible areas (marked by red dotted lines) by fixed-route modes - SLRTC, poda poda and shared taxis; Source: map produced by Freetown City Council based on SLURC and UCL (2021)

Further, the former, rather low share of private vehicles, provides Freetown with a unique opportunity compared to other developing cities: leapfrogging car-oriented development and potentially restricting **growth of private car ownership** before it becomes a problem unbearable for the city - a problem which might even be more severe in Freetown than in other African cities. In Freetown, particularly in the eastern half, road network expansion is extremely limited – estimates suggest that less than 5 percent of total land in Freetown is allocated to roads, compared with about 10 percent across other large African cities.¹¹⁸ Although car ownership remains a symbol of status and aspiration of many residents, due to the relatively low-income levels it remains out of reach for a large proportion of the city's residents. This presents an opportunity to support the expansion of high quality and reliable public transport systems to encourage a modal shift from private car ownership to the planned proposals for a regulated bus service and a cable car as more efficient and cleaner public transport systems. The current state of the city's infrastructure has limited scope for expansion for increased car journeys and a regulated public transport system presents the most sustainable solution.

Apart from its environmental impact, transport is also associated with a number of socioeconomic and economic challenges. The transport system can – through low levels of access and limited connectivity – contribute to an additional layer of inequality between residents and areas of the city, hampering economic growth and ultimately slowing poverty reduction. More specifically, a combination of geographic and socioeconomic factors leads to inequality of access to transport services and as a result public services more generally across residents and areas in Freetown. Although, kekehs and okadas are the only motorised option of transport for a number of areas in Freetown - in particular the hill-side areas and unpaved streets - many low-income households either cannot connect access and/or afford them and instead either walk long distances or refrain from travelling outside of their neighbourhoods, a

¹¹⁸ World Bank Group (2018c)

situation which is exacerbated during the months of the rainy season.¹¹⁹ In terms of affordability, research shows that low-occupancy transport – which is generally more accessible - is more expensive than higher-occupancy options: the ratio of the average cost per okada trip to income for a minimum wage household is 18%, while for modes with fixed routes (poda poda or shared taxis) it is 12%.¹²⁰ Further, and apart from considerations of geographic location or affordability, walking is generally the most accessible and used mode of transport, while at the same time it is of little consideration in transport and land use planning more widely.¹²¹ Sidewalks, when available, are often used by street traders and for car parking, with less provision being made for pedestrians. The density of road space usage often leads to traffic accidents, which poses a significant toll on residents' safety while simultaneously indirectly incentivising the proliferation of private car ownership. Data from 2016 obtained from the Sierra Leone Police Traffic Management and Road Safety Directorate indicate that 4.7% (145) of road traffic fatalities, 19.0% (582) injuries and 76.3% (2,354) slight injuries resulting from road collisions were recorded. As indicated in the report from SLURC and UCL (2021) these can be attributed to the following factors: failure to observe traffic signs and signals; failure to adhere to traffic laws and regulations – speed limit; poorly designed road network to enhance safety, operations and allow the efficient movement of people and goods; lack of a proper system for training, testing and certification of drivers.¹²²

Further, while playing a significant role in the city's GHG emission composition, the transport sector is also responsible for most emissions of several key atmospheric pollutants, mainly SO₂, NO_x and VOCs¹²³, which adversely affect air quality and pose a significant health risk for residents. These include but are not limited to an increased risk of incidence of respiratory tract and cardiovascular diseases infections among sensitive populations and particularly those predominantly exposed to congestions, like pedestrians and street traders. As a result, undertakings to reduce greenhouse gas emissions from the transport sector present an important opportunity to address larger health and socioeconomic issues, by improving air quality and promoting greater equality of access to mobility, and hence public services more generally and encouraging novel thinking around road space allocation to favour walkability, safety, health.

From an economic perspective, it is important to stress that the transport sector, especially its informal part, which accounts for about 85%, is a key source of income for residents, and part of the largest component contributing to economic activities (40%)¹²⁴ in Freetown.¹²⁵ Transport providers are organised in associations or unions, representing the interests of specific semi-formal modes. Any intervention aimed at reducing greenhouse gas emissions from the transport sector needs to account for its importance for local livelihoods, and ensure just transition through an inclusive approach, holistic planning, and supporting measures as needed.

The transport sector is not only a source of income to residents, but also a main resource to connect firms and workers as well as goods and services across Freetown, within Freetown Peninsula and to the rest of the country. In order to understand this connection and the trade-off that is being faced by policy makers, it is important to mention that the port of Freetown,

¹¹⁹ The academic paper from Oviedo et al. (2021) provides detailed insights on the results of a pilot study that examined the walking environment and everyday walking practices in an informal settlement in Freetown, using web-based mapping and a qualitative questionnaire.

¹²⁰ SLURC and UCL (2021)

¹²¹ SLURC and UCL (2021)

¹²² SLURC and UCL, 2021

¹²³ As estimated in the 2018 analysis of Freetown's air quality using C40's Pathways-AQ tool.

¹²⁴ Composition of economic activities in Freetown: other services (transport, finance and hospitality): 40%; agriculture (fishing and cropping): 6%; industry (construction and manufacturing): 16% and wholesale and retail trade: 38%; World Bank Group (2018a)

¹²⁵ SLURC and UCL (2021)

which is the main point of entry and exit to the international goods market, not only for Freetown but also Sierra Leone, is located within the eastern and most dense part of the city. Simultaneously, the increasingly densely populated city and a limited housing market forces people to move to the fringe areas, particularly towards the east, along the road connecting to Western Area Rural, while income earning opportunities continue to remain within the CBD. Even with freight being restricted to move from 6 am to 6 pm, commutes towards the CBD are lengthy and place a toll on residents as well as business.¹²⁶

Lastly, while contributing to Freetown’s economic activities, the reliance on a mainly fossil-fuel powered transport system can have destabilising effects on the local economy through fluctuating international oil prices as well as national petroleum prices potentially of inherent risk to the residents as has been witnessed during the tragic fire disaster resulting from a fuel tanker explosion in Wellington on Nov. 5.^{127 128}

Actions within the transport sector that encourage public transport, disincentive the use of private cars, address land-use planning challenges favouring transit-oriented development and foster behavioural change can not only leverage a path to net zero emissions but also provide a meaningful contribution to the city’s socioeconomic development and reduction in air pollution with devastating impacts on Freetonians’ health, in the short and long-term.

Urban Mobility and Urban Planning Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Urban Mobility	GHG reduction	Air Quality and Health, Women and Girls, Job Creation	MTNDP: 2, 3, 5, 8 SDGs: 11, 15, 17
Goals:			
<ol style="list-style-type: none"> 1. Encouraging public transport and maintaining the share of private to public transport at low levels; 2. Proactively address historical land-use planning challenges in support of efficient and low-carbon transportation and transit oriented development; 3. Promoting behavioural change and enabling and encouraging the use of public transport, cycling and walking. 			
Targets to track progress on achieving our goals ¹²⁹	Base Year 2018	2030	2050
In order to reduce GHG emissions from the transportation sector, and with a view to building a cleaner, safer and more equal transport system, the following targets were modelled under an ambitious scenario. The ultimate objective is to reduce citywide GHG emissions and targeting net zero emissions by 2050, and this can be achieved through a combination of increased mode share for walking, cycling and public transport, and a shift towards powering all vehicles by electric or other alternative clean fuels.			
% of passenger trips ¹³⁰ taken by Cable Car	0%	20%	31%

¹²⁶ World Bank Group (2018b)

¹²⁷ For an overview of recent petroleum price fluctuations refer to SLURC and UCL, 2021, p.31.

¹²⁸ For further information on the [Wellington PMB fire disaster](#), retrieved 07.03.22.

¹²⁹ The targets relate to the scenario of ambitious action and were developed on the basis of existing knowledge, sectoral policies, available quantitative data points as well as qualitative studies within the transport sector. This information has been limited and needs to be complemented over the course of the following years. Further information might require a revision and adjustment of identified targets and corresponding actions.

¹³⁰ Passenger trips were derived on the basis of numbers of vehicles, daily mileage and occupancy.

'% of passenger trips taken by Regulated Bus Service	8%	12%	14%
% of passenger trips taken by cycling	0%	4%	6%
% of passenger trips taken by moto-taxi or mini-bus	79%	56%	43%
% of passenger trips taken by private vehicle	4%	3%	3%
% of taxis electrifying	0%	18%	55%
% of light-duty trucks electrifying	0%	8%	30%
% of motor cycles and moto-taxis electrifying	0%	30%	70%
% of private vehicle electrifying	0%	18%	55%
% of buses using alternative fuels (biodiesel and electricity)	0%	30%	70%
% of mini-buses using alternative fuels (biodiesel and electricity)	0%	35%	60%

How can residents contribute?

Residents play an important role in achieving the CAP goals on urban mobility, which, apart from their climate impact, entail numerous health and socioeconomic benefits. The following changes in behaviour will be encouraged:

- Avoid unnecessary trips, especially with private vehicles;
- Refrain from owning a vehicle if not strictly necessary;
- Walk whenever possible;
- Once in place, use formal mass public transport options;
- Sensitise others about the health and environmental impacts of motorised transport.

Long List of Actions for Urban Mobility and Urban Planning¹³¹

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the Urban Mobility and Urban Planning Program. While all actions are of relevance and key to a net zero emissions and climate resilient trajectory for Freetown, ready-to-implement actions - those that have ranked highest within their sector across their integrated resilience & GHG reduction potential, associated co-benefits and ease of implementability - are marked in green and are given most attention for immediate implementation.

id ¹³²	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation Timeline
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¹³¹ Note that actions under this program were prioritised on the basis of the action either being a priority / ready to implement action or not; this assessment was made on the basis of the above identified factors for prioritisation (integrated resilience and GHG reduction potential, co-benefits and implementability).

¹³² Action identification code; G links up to the corresponding goal for this program.

Goal 1: Encouraging public transport and maintaining the share of private to public transport at low levels;						
G1A1	Partner with the Ministry of Transport and Aviation to introduce a regulated high-occupancy bus service along the Freetown East-West Corridor	Existing action	MoTA	Sierra Leone Road Transport Regulatory Authority FCC	Funded by a World Bank IDB Grant as part of the Integrated Urban Mobility Project	2025
G1A2	Partner with the Ministry of Transport and Aviation to increase the proportion of high-occupancy electric buses	Additional action			Funded by a World Bank IDB Grant as part of the Integrated Urban Mobility Project	2030/ 2050
G1A3	Conduct a Feasibility Study for and procurement of the Freetown Cable Car East Line (Pilot Route)	Existing action	FCC	MoTA MoF	C40 Finance Facility	2025
G1A4	Implement the cable car pilot and other routes as part of the integrated transportation system	Additional action	FCC	MoTA MoF	C40 Finance Facility	2030/ 2050
G1A5	Introduce On-Street Parking Controls	Ongoing action with potential for scaling up	FCC	SLRSA	Funded as part of a City-to-City Partnership with Zurich	2025
G1A6	Implement a Low Emission Zone and Congestion Charging Schemes	Additional action			n/a	2030/ 2050
G1A7	Support a ban on import of high polluting vehicles	Additional action	SLRSA	MoTA	Self financing scheme to be implemented and cost recovered from vehicle tax system	2025
G1A8	Cooperate with national stakeholders to implement a national vehicle emission testing roadworthiness regime	Additional action	SLRSA	MoTA	Self financing scheme to be implemented and cost recovered from vehicle tax system	2025
G1A9	Support the development of a system for and the performance of on-the-spot vehicle emission testing	Additional action	SLRSA	FCC	Self financing scheme to be implemented and cost recovered from vehicle tax system	2025
Goal 2: Proactively address historical land-use planning challenges in support of efficient and low-carbon transportation and transit oriented development;						
G2A1	Promote Transit Oriented Development to minimise car travel by introducing high density development at locations with good public transport links	Ongoing action with potential for scaling up	FCC	MLHCP	World Bank funded Resilient Urban Sierra Leone Project	2025
G2A2	Partner with the Ministry of Transport and Aviation in	Existing action	FCC	MoTA	World Bank funded	2025

	developing a Sustainable Transport Management Strategy for the Western Area				Integrated Resilient Urban Mobility Project	
G2A3	Devolution of Planning Controls to Local Councils	Pending	FCC	MLHCP	n/a	2025
G2A4	Devolution of the Maintenance of Local Roads to FCC	Pending	FCC	SLRA	World Bank funded Resilient Urban Sierra Leone Project	2025
G2A5	Through the development of the Western Area Structure Plan, policy interventions will seek to restrict development in hard to reach areas that are difficult to service due to limited levels of accessibility.	Ongoing action with potential for scaling up	FCC	MLHCP	World Bank funded Resilient Urban Sierra Leone Project	2025
G2A6	FCC planning policies will give priority in developing Action Area Plans targeted at preventing unsuitable development in hazard prone areas. ¹³³	Ongoing action with potential for scaling up	FCC	MLHCP	World Bank funded Resilient Urban Sierra Leone Project	2025
G2A7	To stem the rapid rate of deforestation on the periphery of the city, areas will be identified in the Local Area Plans as Protected forested areas. The approach will aim to protect areas within existing water supply catchment and areas at risk of funding. ¹³⁴	Ongoing action with potential for scaling up	FCC	MLHCP	World Bank funded Resilient Urban Sierra Leone Project	2025
Goal 3: Promoting behavioural change and enabling and encouraging the use of public transport, cycling and walking.						
G3A1	Improve Pedestrian Walkways	Ongoing action with potential for scaling up	FCC	SLRA	Highway works funded as part of a City to City Partnership with City of Zurich	2025
G3A2	Create Pedestrianised Streets	Ongoing action with potential for scaling up	FCC	SLRA	Highway works funded as part of a City to City Partnership with City of Zurich	2025
G3A3	Improve Street Lighting in the CBD area ¹³⁵	Ongoing action with potential for scaling up	FCC	SLRA	Highway works funded as part of a City to City Partnership with City of Zurich	2025
G3A4	Introduce Car Free Days	Additional action			n/a	2030/ 2050

¹³³ Note that this action is also included within the Ecosystem-based Adaptation through Urban Nature-based Solutions Program.

¹³⁴ Note that this action is also included within the Water Program.

¹³⁵ Note that this action is also included within the Urban Energy Program.

G3A5	Introduce Bicycle Sharing Rental Scheme	Additional action			n/a	2030/ 2050
G3A6	Introduce Cycle Lanes	Additional action			n/a	2030/ 2050

4.7. Vision 7: Transitioning to a clean, accessible and equitable city energy system

Freetown’s 2018 GHG Inventory shows that energy use in the city contributes to nearly 40% of the city’s total emissions. 83% of those energy-related emissions come from the residential sector, 11% from the commercial sector and the remaining 6% from energy used in manufacturing industries and agriculture, forestry and fisheries. While at the same time the energy supply does not currently meet the needs of households - not yet to mention the future needs taking into account rising temperatures¹³⁶ - nor does it provide for much needed inputs to commercial and economic growth in the city. As acknowledged in Sierra Leone’s NDC, the global energy transition currently underway offers an important opportunity for the country (and the city) to transition directly to cleaner, cheaper and more reliable sources of energy, while improving livelihoods and health, creating economic development through localised supply of energy, and conserving ecosystems.

Further, first internal estimations of air quality measures for Freetown show that the energy sector is the largest contributor to local air pollution after transport.¹³⁷ The current cooking industry is the cause of 50% of the black carbon causing severe health impacts.¹³⁸ Cleaner cooking in particular, is critical to improving energy access in Freetown because it will have a profound impact on reducing city emissions while improving the lives of vulnerable groups, particularly women, reducing poverty and addressing a health crisis.

Sierra Leone is blessed with a large renewable energy potential. It was estimated that there is a capacity of 2500 MW of hydro power based on the river flows and the solar potential is 1600KWh/m2/year.¹³⁹ Despite this, only 4% of the Hydropower potential has been utilised (average of 60 MW) and a negligible percentage of solar is used (5 MW).¹⁴⁰ 63 MW of Freetown’s energy supply comes from a heavy fuel oil powered ship, the Karpowership. There is one main high voltage transmission line at 161 kV that runs from Bumbuna (outside the city’s boundaries) to Freetown and covers 85% of Freetown’s electricity supply.¹⁴¹ Freetown is supplied by two main sources of electrical power both generated outside the city’s boundaries. The main source is Bumbuna Hydropower, owned by the GoSL, which ranges in capacity from 50-200MW, and powers 43% of Freetown’s electricity needs.¹⁴² This fluctuating capacity is due to Freetown’s very different dry and wet seasons. As temperatures rise, the capacity most likely lowers and water levels decrease - highlighting the need for further investment to diversify clean energy sources.

The city has limited financial resources and capacity to complement the current energy infrastructure, which is governed by the GoSL. It is likely that demand for electricity is suppressed by the poor grid coverage and overall supply capacity. While there has been much institutional change occurring in the direction of increased private sector energy investment

¹³⁶ Measures to address rising temperatures, heat and reducing/managing related needs for cooling can be found within programs for Heat and #FreetownTheTreeTown.

¹³⁷ Air Quality Implications of Climate Action: Preliminary Analysis for Freetown (2021)

¹³⁸ The Women Leadership Network (2021)

¹³⁹ Konneh et al. (2018)

¹⁴⁰ Konneh et al. (2018)

¹⁴¹ ICLEI (2021)

¹⁴² ICLEI (2021)

and clean energy development, there still remain policy gaps to clearly underline the regulations around new development.

For the sector in Freetown, one of the largest challenges is the lack of infrastructure expansion keeping up with urban growth and the maintenance of existing one. The transmission lines in place can't reach all households in Freetown, particularly the most vulnerable ones, which are often situated in informal settlements. All these challenges mean that change within the sector will require capacity and resources to maintain and improve infrastructure and minimise illegal connections.

Freetown aims at moving towards a future where most of its overall energy needs are being met with renewables and with minimal associated emissions. This is especially important as the demand for electricity, which is currently not being met, will likely further increase beyond the current supply capacity. More specifically, in line with the National Renewable Energy Action plan of the Government of Sierra Leone, the FCC aims to support the ambition of transitioning to a national target of 84% renewable sources by 2030.¹⁴³ The Ministry of Energy has indicated that this transition to cleaner sources of energy will be implemented through planned expansions in hydropower projects, decentralised mini-grids and standalone photovoltaic systems on rooftops and in solar parks. This is reiterated within the updated NDC “the transition to Renewable Energy Technologies is seen as a major means of reducing current emission levels. The goal is to improve energy efficiency and increase access to grid connections by 42% in 2025 and off-grid mini-grid and solar stand-alone systems by 27% and 10% respectively in 2030.” This expansion coupled with new developments in transmission lines is expected to increase energy supply. The expansion is also expected to lead to a decreased reliance on the diesel-powered Karpowership which currently supplies 42% of Freetown's electricity.

The low reliability of electricity supply leads to many people relying on multiple energy sources and depending on a system of “energy stacking”. For example, many use dry cell batteries and some use generators in Freetown. Diesel generators, used due to the unreliability of the current energy supply, contribute to GHG emissions as well as burgeoning air pollution. Many people experience brownouts (drops in voltage) which cause disruptions to business and education.

Currently, it is estimated that most buildings in Freetown do not have insulation or windows that would increase the efficiency of the building. The GoSL, in the National Energy Efficiency Action plan, establishes minimum standards for the energy performance and efficiency of existing buildings. In addition to this initiative, the FCC needs to work with the national government to implement and enforce building energy efficiency standards for new and existing buildings. This could be done, for example, with municipal buildings and projects focussing on the development and construction of affordable housing. Developing a program for retrofitting existing residential and commercial buildings to improve energy efficiency is necessary to support the energy transition in the long-term. All new buildings need to be highly efficient in their design. Building design can incorporate higher performance building materials, green roofs, better insulation, natural lighting, and solar hot water heating to dramatically reduce the amount of energy required and help make buildings more resilient to climate change impacts. Further, regulations and energy performance ratings and energy certificates have a role to play in increasing awareness of buildings energy performance and opportunities for increased efficiency and on-site renewables.

Further, over 35% of Freetown residents live in informal settlements which cannot be overlooked from a policy and planning perspective when it comes to sanitation, waste

¹⁴³ As well as other plans presented in the updated NDC as Sierra Leone's unconditional contribution: Sierra Leone proposes to implement the revised National Energy Policy and Strategic Plan (2020), the Integrated Resource Plan (2019), and National Electrification Roadmap (2020), focusing on the role off grid energy sources could play in achieving universal access and energy efficiency. Focused plans such as policies for clean cooking and the off grid solar energy strategy (2020) will be useful in improving quality control measures, creating opportunities for private investment, addressing ambiguities around ownership of environmental attributes for solar investments, and fostering resident buy-in.

management and energy.¹⁴⁴ To improve the conditions of these informal settlements and provide opportunities for improvements in living standards, it is imperative to prioritise energy access in city planning. As one study for countries in SSA has shown, there is often a high rate of connectivity to the grid in informal settlements but many of these households can't afford the prices charged so there is a large proportion of informal and illegal connections.¹⁴⁵ These connections do not only pose a safety risk, but they ultimately impact energy access for all because of the lost revenue to the utilities and corresponding lack of infrastructure reinvestment, increased likelihood of power cuts, and threats of fires. As an example, in Susan's Bay, one of Freetown's largest informal settlements, around 78% of connections may be informal.¹⁴⁶ Residents of Susan's Bay noted long application processes, cost and an inability to meet the set standards of utility companies as reasons for not owning a formal connection. This informal supply is not safe and has caused fires in the settlements.¹⁴⁷

For cooking, Freetonians mostly do not use electricity but rather charcoal, a limited amount of firewood and then smaller percentages relying on kerosene and LPG. The challenges related to cooking fuels in Freetown and Sierra Leone generally are not dissimilar to the global situation, particularly in developing countries where the Clean Cooking Alliance estimates that "nearly 3 billion people are forced to cook with charcoal, firewood, or kerosene".¹⁴⁸ It has been estimated that around 7,984 tons/day of firewood and 457 tons/day of charcoal are consumed in Sierra Leone and it is assumed that Freetown has a similar demand for cooking fuels.¹⁴⁹ This primarily relies on the burning of biomass (charcoal and wood fuel) using often inefficient and polluting cookstoves which contribute heavily to the emissions of the city. The move towards cleaner and more sustainable fuels for cooking is therefore a major focus for future energy work. Also, the quality of the charcoal maker can also have an enormous impact on the efficiency yield, the pollution level, and the impact the process has on the forest. If the producer is not efficient, much of the wood is wasted and more deforestation is necessary for production. Much of the appeal surrounding the use of wood energy is its affordability and ability to buy on a day-to-day basis. Charcoal is sold in small 0.5-1 kg units with the average household using 2 kg a day.¹⁵⁰ Most of the process of how wood fuel is used is inefficient which leads to high pollution rates. Most of the meals that require longer cooking times are cooked using a 3-stone fire. This is the most inefficient cooking method using wood fuel, and also has associated air quality and health impacts. Inefficient cooking methods and production methods lead to an increasingly unsustainable dependence on the resource with harvesting of wood exceeding regrowth rate.

Residents in Freetown typically spend 20% of their incomes on cooking fuel.¹⁵¹ The comparative costs for fuel wood are 4-11 USD/KWH vs 72 USD/kWH for fossil fuels.¹⁵² Fuel costs dominate the total cost of cooking and therefore, the biggest impact in reducing the high costs of cooking will be in fuel alternatives. While monthly costs of LPG remain lower than wood fuel, the necessity of a one-time large purchase of the cylinder and the fuel to fill it is a limiting factor for many in Freetown.¹⁵³ Charcoal is instead sold in small, daily use chunks that make it more manageable for the household to purchase. Nevertheless, "most communities

¹⁴⁴ FCC (2022)

¹⁴⁵ Finnigan (2013)

¹⁴⁶ Finnigan (2013)

¹⁴⁷ Finnigan (2013)

¹⁴⁸ Clean Cooking Alliance (2020)

¹⁴⁹ MoE (2021)

¹⁵⁰ Temmerman (2019)

¹⁵¹ Clean Cooking Alliance (N.D)

¹⁵² Temmerman (2019)

¹⁵³ Finnigan (2013)

could make significant savings by moving from traditional fuels to LPG for cooking".¹⁵⁴ While charcoal stoves don't last very long, LPG cylinders can last for 20 years.¹⁵⁵ However, significant upfront investment capital is required to purchase a cylinder. Additionally, the entire LPG distribution infrastructure would need to be developed further.

Traditional stoves are cheap and only last a few years. Those without liners are less efficient due to much of the heat dissipating through the stove walls. The savings from more efficient stoves would be several times the new cost of a stove demonstrating the necessary and



profound impact of energy efficiency technologies.¹⁵⁶ The barrier to widespread adoption of high efficiency stoves at the household level is the lack of access to capital to purchase the more efficient stove. Consequently, despite the long-term savings, most do not have the capacity to buy the stove initially.

Figure 34. Total Costs of Cooking for Stoves of Varying Efficiency (Source: Interim Report on Clean Cooking Strategies for Sierra Leone (2021))

Overall, while increasing the supply of renewable sources of power is necessary to bolster the availability of electricity for household, industrial and commercial uses, there is also a need for a long-term transition away from charcoal-based cooking fuels to cleaner and more sustainable sources of cooking fuel in the case of Freetown this can be achieved by primarily increasing the efficiency of cookstoves while increasing the prevalence of LPG as a transition fuel in the medium-term. In the long-term an appropriate mix of sustainable biomass, efficient cookstoves and electrical stoves would be the ideal strategy for improving human health and reducing deforestation through the harvesting of fuel wood and charcoal production. This transition will improve the air quality of Freetown and put the city on the path to being net zero emissions by 2050.

Urban Energy Program

Transform Freetown Priority Cluster and Sector:	Primary Benefits:	Co-benefits:	Contribution to:
Urban Energy	GHG reduction	Women and girls, Air Quality and Health	MTNDP: 2, 3, 8 SDGs: 7, 8, 9, 11, 13, 17
Goals:			
<ol style="list-style-type: none"> 1. Increase the supply of off-grid renewable sources of power to bolster the availability of electricity for household, industrial and commercial uses; 2. Transition in the short-term to more efficient and cleaner-burning cookstoves, and in the medium to move away from using charcoal to cleaner fuels, and towards 100% renewable energy-powered electric cooking by 2050; 3. Manage current and future demand for energy through promotion of efficient design of new buildings, retrofitting of existing buildings and through cooperation with GoSL develop and implement standards and regulations for energy efficiency, technologies and appliances. 			

¹⁵⁴ Finnigan (2013)
¹⁵⁵ Finnigan (2013)
¹⁵⁶ Gress (2021)

Targets to track progress on achieving our goals¹⁵⁷	Base Year 2018	2030	2050
To reduce GHG emissions from the energy sector, and with a view to developing a clean, accessible and equitable energy system, the following targets were modelled under an ambitious scenario. The ultimate objective is to reduce citywide GHG emissions and targeting net zero emissions by 2050.			
% share of grid electricity from renewable sources (hydro and solar PV)	58%	100%	100%
% of informal households switching from charcoal to cleaner fuels (electricity) for cooking with LPG as a transition fuel	0%	30%	100%
% of formal households switching from charcoal to cleaner fuels (electricity) for cooking	0%	35%	100%
% of new buildings using electricity for cooking instead of charcoal	0%	35%	100%
% of commercial buildings floor area using efficient lighting technologies (LED and compact fluorescent)	0%	50%	100%
How can residents contribute?			
Residents have an important role to play in Freetown reaching its goals on transitioning towards a clean, accessible and equitable city energy system in that a part of it depends on behaviour at the household level. To the extent that the City provides the necessary resources and processes (e.g. accessibility to alternative sources of energy for cooking, such as LPG), residents can contribute significantly by adopting new behaviours:			
<ul style="list-style-type: none"> ● Switch to cleaner and more efficient cooking methods; ● Save energy whenever possible - switch off appliances when not in use, close windows when using AC's; ● Limit water heating to a minimum; ● Learn about potential options for waste to energy production at household/community level. 			

Long List of Actions for Urban Energy

The below table presents the long list of actions that presents a pathway towards achieving the goals identified for the Energy Program. While all actions are of relevance and key to a net zero emissions and climate resilient trajectory for Freetown, ready-to-implement actions - those that have ranked highest within their sector across their integrated resilience & GHG reduction potential, associated co-benefits and ease of implementability - are marked in green and are given most attention for immediate implementation.

id¹⁵⁸	Action	Action Status	Lead Implementing Agency & Partner	External Stakeholders Involved	Available Funding Sources	Implementation timeline
Goal 1: Increase the supply of off-grid renewable sources of power to bolster the availability of electricity for household, industrial and commercial uses						

¹⁵⁷ The knowledge and understanding, similarly to mandates of the energy sector at city level, is at this point in time very limited. The sector has also not been included as a priority sector within the Transform Freetown Agenda and has hence received less interest, as compared to other sectors like Urban Mobility and/or Sanitation. A more detailed current and future energy demand and supply assessment at city level is crucial to identify robust targets and derive evidence-based actions and policies in the future.

¹⁵⁸ Action identification code; G links up to the corresponding goal for this program.

G1A1	Develop CBD Solar Powered Street Lighting ¹⁵⁹	Ongoing action with potential for scaling up	FCC Engineering Department, Zurich City		Yes, External	2025
G1A2	Develop a program that includes the provision of solar panels for electricity generation in PHUs in Freetown	Additional action			No	
Goal 2: Transition in the short-term to more efficient and cleaner-burning cookstoves, and in the medium to move away from using charcoal to cleaner fuels, and towards 100% renewable energy-powered electric cooking by 2050;						
G2A1	Conduct a feasibility assessment of clean cooking solutions for Susan's Bay	Existing action	FCC Engineering Department	ICLEI, Private Sector	Yes, External	2025
G2A2	Implement programs delivering clean cooking solutions at household level in informal communities	Ongoing action with potential for scaling up	FCC Engineering Department	ICLEI, Private Sector	Yes, External	2030
Goal 3: Manage current and future demand for energy through promotion of efficient design of new buildings, retrofitting of existing buildings and through cooperation with GoSL develop and implement standards and regulations for energy efficiency, technologies and appliances.						
G3A1	Develop and implement cooking energy awareness and engagement programs, particularly in informal communities	Ongoing action with potential for scaling up	FCC Engineering Department	ICLEI, CODOHSAPA	Yes, External	2025
G3A2	Support the GoSL to develop and promote a minimum energy efficient performance standard for existing buildings and regulations for minimum energy efficiency requirements for new buildings	Additional action			No	
G3A3	Cooperate with the GoSL to support the transition to improved efficiency of cooling appliances and climate friendly refrigerants in Freetown	Additional action			No	
G3A4	Cooperate with the GoSL, on its energy policy and strategy to develop an implementation plan aimed at improving access to energy, improving energy efficiency and transitioning to cleaner fuels and renewable energy. This planning will be supported by a programme for gathering and analysis of data at the city level as well as the development of a tailored implementation plan for aforementioned policy and strategy at the city level.	Additional action			No	
G3A5	Support the development of a tax reduction scheme that encourages clean cooking plans	Additional action			No	
G3A6	Expand PPP portfolio to mobilise more finance and unlock funding opportunities for off-grid connection, especially in hard-to-reach areas	Ongoing action with potential for scaling up	n/a	n/a	n/a	n/a

¹⁵⁹ Note that this action is also included under the urban mobility program.

Additional supporting internal documents

Signed Letter Deadline 2020 Commitment
Overview of Stakeholder Engagements
Assumptions E&P Scenario
Detailed Climate Risk Assessment
ToRs Climate Action & DRM Unit and Council Committee
Detailed Overview of Funding Vehicles for Climate Action Finance
Work deck including long-list of actions and prioritisation process
Additional information and Analysis for CAP

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