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NATIONALLY APPROPRIATE  
MITIGATION ACTION ON

## A CIRCULAR ECONOMY SOLID WASTE MANAGEMENT APPROACH FOR URBAN AREAS IN KENYA

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# UNDP LOW EMISSION CAPACITY BUILDING (LECB) PROGRAMME

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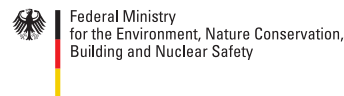
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## TABLE OF CONTENTS

List of Figures	5
List of Tables	5
List of Boxes	6
Abbreviations and Acronyms	7
Executive Summary	9
1 Introduction	12
1.1 Sustainable Solid Waste Management and Development	12
1.2 Nationally Appropriate Mitigation Actions (NAMAs)	14
1.2.1 History of NAMAs	14
1.2.2 A Circular Economy Approach to Solid Waste Management as an Opportunity for Kenya	14
1.2.3 NAMA Objectives and Its Transformational Change	16
1.2.3.1 Objectives of the NAMA	16
1.2.3.2 Transformational Change of the NAMA	16
2 Background on Kenya	18
2.1 Geography and Administration	18
2.2 Climate	19
2.3 Demography	20
2.4 The Socio-Economic Situation	22
2.5 Kenya's National Development Strategies	23
2.5.1 Progress on the Millennium Development Goals	23
2.5.2 Alignment with Sustainable Development Goals	24
2.5.3 Alignment with the INDC	25
3 Background to Solid Waste Management in Kenya	26
3.1 The Solid Waste Situation in Major Cities in Kenya	26
3.2 Analysis of the Solid Waste Situation in Nairobi	27
3.3 Recycling and Composting as a Potential Solution	30
3.4 Barriers to Recycling and Composting	31
4 The Policy Environment	32
4.1 Policy on Waste Management	32
4.2 Existing Economic Incentives for Solid Waste Management	36

4.3	Policy Recommendations	37
4.4	NAMA Alignment with National and Sectoral Strategies and Policies	38
4.5	Relevant Stakeholders	39
4.5.1	Ongoing Initiatives	40
5	NAMA Baseline and NAMA Targets	42
5.1	The NAMA Boundary	43
5.2	The NAMA Baseline	43
5.2.1	GHG Emission Reduction Baseline	43
5.2.2	Sustainable Development Baseline	43
5.3	NAMA Targets	47
6	The NAMA Circular Economy Approach	48
6.1	The Circular Economy Business Model	48
6.1.1.1	Recycling Points, Sorting Process and Layout	50
6.1.1.2	Composting Process and Layout	51
6.1.1.3	Composting Field Trials (Test Farms)	53
6.2	NAMA Institutional Support and Support for Technology Transfer and Development	53
6.2.1	NAMA Institutional support	53
6.3	Waste Fractions Included in the NAMA	54
6.4	Eligibility Criteria and Support Mechanisms for Private Sector Companies	56
6.4.1	Eligibility Criteria for Waste Collection Companies (under WEMAK)	56
6.4.1.1	Engagement Requirements	56
6.4.1.2	NAMA Measures to Support Waste Collectors	56
6.4.2	Eligibility Criteria for Recycling points	57
6.4.2.1	Engagement Requirements	57
6.4.2.2	NAMA Measures to Support Recyclers	57
6.4.3	Eligibility Criteria for Composting Companies	58
6.4.3.1	NAMA Measures to Support Composters	59
6.4.4	Eligibility Criteria for Recycling Industries	59
6.4.5	Eligibility Criteria for New Technologies	60
6.5	Technical Requirements for Participation in Recycling and Composting	60
6.5.1	Recycling of Waste	60
6.5.2	composting of Biodegradable Material	61
6.6	Approval Process for Grant Disbursement to Private Sector Participants	61

7	The NAMA Institutional Structure	64
	7.1 Institutionalizing the NAMA	64
	7.2 NAMA Institutions	65
8	NAMA Costs and Finance	70
	8.1 Determination of NAMA Costs	70
	8.1.1 International and National Grants and Loans	70
	8.1.2 Capacity Development Costs	73
	8.1.3 Potential Source(s) of Finance:	74
	8.1.4 National and International Finance	75
9	Measurement, Reporting and Verification	78
	9.1 The MRV System for GHG Emission Reductions	78
	9.1.1 Recycling of Plastics	79
	9.1.2 Monitoring and Verification	81
	9.1.3 Composting of biodegradable material	81
	9.1.4 Monitoring and Verification	83
	9.2 Measurement and Monitoring of Sustainable Development Benefits	83
	9.2.1 Baseline and Project SD Scenario	84
	9.2.2 Monitored SD Parameters	85
	9.3 Measurement and Monitoring of Financial Support	89
	9.4 MRV Management	90
	9.4.1 Responsibilities and Process Workflow	90
	9.5 Reporting	91
	9.5.1 Reporting Forms	91
	9.6 Verification	92
	9.6.1 Verification Procedures	92
	9.6.2 Quality Assurance Procedures	92
10	NAMA Implementation Plan	94
	10.1 Step 1. NAMA Operationalization	94
	10.1.1 Operationalizing the Institutional Structure for NAMA Implementation	94
	10.1.2 Launching the NAMA and Promoting the NAMA Achievements	95
	10.1.3 Hiring International Experts	95
	10.2 Implementation Phase 1: Infrastructure Development (Years 1–5)	96
	10.3 Full-scale Operations Phase 2 (Years 6–15)	96
	References	98
	Annexes	102
	NAMA Summary	102
	Outcomes, Outputs and Activities	103

## LIST OF FIGURES

Figure 1: Circular Economy Model	9
Figure 2: Overview of the NAMA Outcomes	15
Figure 3: Location of Kenya	18
Figure 4: Distribution of Mean Annual Rainfall	19
Figure 5: Kenya’s Demographic Trends, 1950-2050	20
Figure 6: Kenya’s Urban Population, 2000-2015	21
Figure 7: Kenya’s GDP Growth Rates, 2008-2013	22
Figure 8: Circular Economy Model	49
Figure 9: Recycling Point Layout for 20 Tons of Waste	50
Figure 10: Layout of the Composting Facility	52
Figure 11 The NAMA Intervention Approval Process	62
Figure 12: Institutional Structure of the NAMA	68
Figure 13: Schematic Representation of a Strategic CSA Model	75
Figure 14: Flow Chart of International and National Finance	77
Figure 15: The NAMA MRV Process	90

## LIST OF TABLES

Table 1: Urban Population and MSW Generation Trends in Kenya	13
Table 2: SDG Targets and SD Benefits resulting from the NAMA	24
Table 3: Relevance of the NAMA to stated Mitigation Priorities in Kenya’s INDC	25
Table 4: Data on Major SWDSs operating in Kenya, 2013	27
Table 5: Overview of the NAMA Policy Framework	32
Table 6: NAMA Alignment with National and Sectoral Strategies and Policies	38
Table 7: Sustainable Development Indicators, Parameters and Baseline Values	44
Table 8: NAMA Indicators, Impacts and Target Values	47
Table 9: Key Elements of the Intervention	60
Table 10: Mandatory Technical Requirements	60
Table 11: Description of NAMA Approval Process	61
Table 12: Breakdown of NAMA International and National Grants and Loans	71
Table 13: Local Investment Grants (Government Contribution to Private Sector)	71
Table 14: International Investment Loans (to Private Sector)	72

Table 15: Local Investment Loans (to Private Sector)	72
Table 16: Indicative Costs of NAMA Capacity Development	73
Table 17: International and National Funding Needs	76
Table 18: SD Indicators for the NAMA	83
Table 19: Overview of Baseline and Project SD Scenarios	84
Table 20: Monitored SD Parameters	85
Table 21: Overview of NAMA Stakeholders' Capacity Development	97

## LIST OF BOXES

Box 1: Health Situation caused by Dandora Dumpsite	28
Box 2: A Successful Pilot Circular Economy Model	41
Box 3: Enabling Private Sector Finance through Strategic Corporate Sustainability Actions (CSA) and Impact Investing	74



## ABBREVIATIONS AND ACRONYMS

<b>ASAL</b>	Arid and Semi-Arid Lands
<b>BAU</b>	Business-as-Usual
<b>BMUB</b>	German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety
<b>CCN</b>	County Council of Nairobi
<b>CDM</b>	Clean Development Mechanism
<b>COP</b>	Conference of Parties
<b>DFID</b>	UK Department for International Development
<b>EMCA</b>	Environmental Management and Coordination Act
<b>ER</b>	Emission Reductions
<b>ERC</b>	Energy Regulatory Commission
<b>EU</b>	European Commission
<b>GBV</b>	Gender-Based Violence
<b>GCF</b>	Green Climate Fund
<b>GDP</b>	Gross Domestic Product
<b>GHG</b>	Greenhouse Gas
<b>GWP</b>	Global Warming Potential
<b>HDPE</b>	High-density Polyethylene
<b>INDC</b>	Intended Nationally Determined Contribution
<b>ISWM</b>	Integrated Solid Waste Management
<b>ITCZ</b>	Inter Tropical Convergence Zone
<b>JICA</b>	Japan International Cooperation Agency
<b>KC</b>	Kiambu County
<b>KEBS</b>	Kenya Bureau of Standards
<b>KENSUP</b>	Kenya Slum Upgrading Programme
<b>KISIP</b>	Kenya Informal Settlement Improvement Project
<b>KJC</b>	Kajiado County
<b>LDC</b>	Least Developed Country
<b>LDPE</b>	Low-Density Polyethylene
<b>LECB</b>	Low Emission Capacity-Building
<b>LEDS</b>	Low Emission Development Strategies
<b>MC</b>	Machakos County

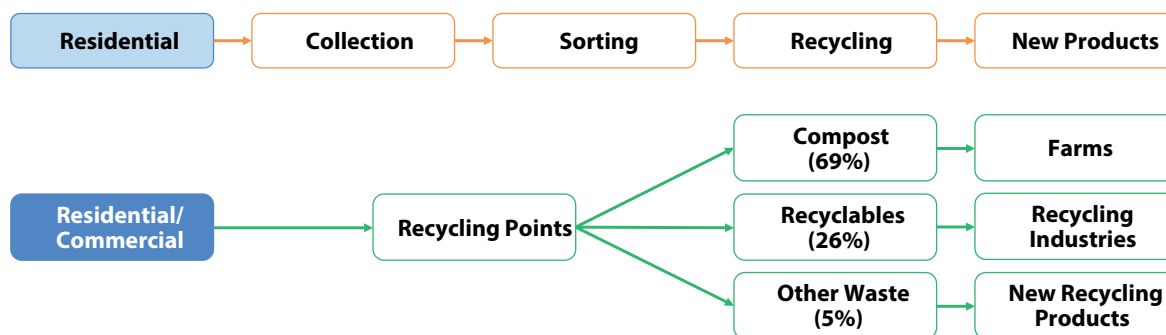
<b>MDG</b>	Millennium Development Goal
<b>MEG</b>	Monoethylene Glycol
<b>MENR</b>	Ministry of Environment and Natural Resources
<b>MRV</b>	Measurement, Reporting and Verification
<b>MSW</b>	Municipal Solid Waste
<b>NA</b>	NAMA Approver
<b>NAI</b>	Nationally Appropriate Improvements
<b>NAMA</b>	National Appropriate Mitigation Action
<b>NCA</b>	NAMA Coordinating Authority
<b>NCC</b>	Nairobi City County
<b>NCCAP</b>	National Climate Change Action Plan
<b>NCCSC</b>	National Climate Change Steering Committee
<b>NDA</b>	National Designated Authority
<b>NEE</b>	NAMA Executing Entity
<b>NEMA</b>	National Environment Management Authority
<b>NGO</b>	Non-Governmental Organization
<b>NIE</b>	NAMA Implementing Entity
<b>OSH</b>	Occupational Safety and Health
<b>PET</b>	Polyethylene Terephthalate
<b>PP</b>	Polypropylene
<b>PTA</b>	Purified Terephthalic Acid
<b>PVC</b>	Polyvinyl Chloride
<b>QA</b>	Quality Assurance
<b>QC</b>	Quality Control
<b>SD</b>	Sustainable Development
<b>SMTP</b>	Second Medium Term Plan
<b>SW</b>	Solid Waste
<b>SWDS</b>	Solid Waste Disposal Site
<b>SWM</b>	Solid Waste Management
<b>UNDP</b>	United Nations Development Programme
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>US\$</b>	United States Dollar
<b>WEMAK</b>	Waste Management Association of Kenya
<b>WIBA</b>	Work Injury Benefits Act

## EXECUTIVE SUMMARY

Waste management is a major challenge in Kenya, especially in Nairobi, the rapidly growing capital. Nairobi produces around 2,400 tons of waste every day, of which only 38 per cent is collected and less than 10 per cent recycled (JICA, 2010). The remaining 62 per cent is left on illegal dumpsites and next to houses or burned. This is particularly the case for residents living in low-income areas, 2.5 million people, who cannot afford waste collection services. These services are unaffordable because of the costly and inefficient disposal at overfilled dumpsites. Additionally, the private sector overlooks the income generating opportunities from waste, such as recycling and composting. Uncollected waste causes severe health and environmental problems, and represents a missed opportunity from a development and economic perspective.

The NAMA targets this missed opportunity by promoting an alternative to the existing waste value chain. Instead of waste being collected for disposal only, the NAMA facilitates the diversion of at least 90 per cent of collected waste away from disposal sites and towards various recycling practices. The NAMA creates multiple links currently missing in the value chain: recycling points, where waste will be sorted for subsequent recycling; and composting facilities, for the organic waste treatment. The NAMA will also research and operationalize new recycling technologies as well as strengthen existing recycling industries. Successful pilot models have already been tested by small and medium sized companies in Nairobi.

**Figure 1: Circular Economy Model**



The NAMA is fully aligned with the policy goals of the Kenyan government (Kenya Vision 2030, National Climate Change Action Plan (NCCAP), Environmental Management and Coordination Act (EMCA)), which promote the provision of sanitation services and recycling.

Under the NAMA, up to 600 tons of waste will be recycled every day, (which accounts for 25 per cent of Nairobi’s total waste). This will save more than 800,000 tons in CO<sub>2</sub>e emissions (over the 15 years’ lifetime of the NAMA) and add 1,600 jobs to the economy. Waste collection services will become affordable to more than half a million low-income residents, because waste collection companies will divert their waste from dumpsites to recycling points, thereby reducing their operating costs.

The NAMA is divided into two distinct phases:

- **Infrastructure development phase (Phase 1 – years 1 to 5):** Phase 1 will develop the infrastructure required to collect and recycle 600 tons of waste per day. This phase establishes the recycling points, the composting facilities and the pilots for new recycling processes. Recycling points will be opened up to existing waste collection companies, enabling them to benefit from the NAMA framework. At the end of Phase 1, approximately 200 tons of waste will be collected and recycled per day.
- **Full-scale operations phase (Phase 2 – years 6 to 15):** This phase builds on the experience gained during Phase 1 and will scale the operations of the NAMA to 600 tons of waste per day. As private sector companies will operate each part of the NAMA, all activities will continue operating past the end of the NAMA timeline.

Capacity-building will be a key component in the implementation of the NAMA. Its focus will include the training of government and county institutions involved to facilitate the implementation of relevant policy frameworks and public awareness creation. It will also include the private sector through training and knowledge transfer across the waste value chain, from collection to recycling. A specific focus will be awareness creation amongst farmers for the usage of compost. The NAMA will also include the development of a product standard for recyclable materials in close collaboration with the Kenya Bureau of Standards.

The NAMA will test and operationalize new recycling technologies, which will be adapted to the local context. This will include conversion of organic waste to insect based protein, terra-preta production (enriching compost with waste-based charcoal), using residual waste for cement kilns, and a study on the treatment of hazardous waste fractions.

The total cost of the NAMA is estimated to be around US\$39 million. Approximately US\$25 million is to be funded by international finance (US\$13 million in grants and US\$12 million in loans), while the Kenyan government will fund US\$10 million in grants and the private sector will invest US\$4 million.

The international grant contribution will support the establishment of infrastructure for 15 recycling points (US\$ 4.1 million) and 16 composting plants (US\$ 2.6 million), compost market development (US\$ 1.6 million), implementing new technologies (US\$ 0.7 million), support to recycling industries (US\$ 0.6 million), a comprehensive capacity development package, including the development of the recyclables standards, and the project management (US\$ 3.3 million).

The NAMA Technical and Financial Implementing Entities will be determined through a stakeholders consultation process organized by NCA, within a 3 months period after start of NAMA implementation.

The NAMA will be carried out in two distinct phases over a period of 15 years. As pre-implementation steps, the institutional structure for NAMA implementation will be established while funding will be secured. Subsequently, Phase 1 of the NAMA will run for five years, followed by Phase 2 for up to 15 years.

The ultimate objective of the NAMA is to achieve lasting results, which will depend on its ability to facilitate the transformation of the waste sector in Kenya, particularly in the context of recycling and composting

in urban areas. The NAMA therefore aims to achieve 10 key success factors that the document identifies to create a pathway for the effective and sustainable implementation of a mitigation programme. The NAMA will promote:

- **Sector Transformation:** Spur development of an environment which facilitates transformation of the waste sector in urban areas of Kenya.
- **Alignment with national priorities:** Be fully embedded in Kenya’s national and sectoral development policies, strategies and targets.
- **Define Interventions:** Detail concrete technological actions that will lead to real, transparent and measurable emission reductions and help the country to achieve its national goals and targets while contributing to collective efforts on international climate actions.
- **Define Eligibility Criteria:** Clearly define the eligibility criteria for private sector participation and funding.
- **Value for Money:** Be cost effective and provide value for money.
- **Approval Structure:** Define a structure for approval of funding to beneficiaries of grant and concessional loans to ensure transparent disbursement of funds.
- **Management Entity:** Detail an institutional and management system for smooth implementation.
- **Capacity Development:** Define capacity development measures to drive the technical interventions and sector transformation
- **Finance:** Include a financial plan and management in sufficient detail.
- **Measurement Reporting and Verification (MRV):** Apply transparent and robust MRV for GHG Emission Reductions and Sustainable Development Impacts.

Additionally, this document refers to a Sustainable Development Evaluation Tool (also referred to as an SD Tool) provided by UNDP to elaborate on the specific indicators that will be tracked under the NAMA to measure the specific outcomes of the proposed activities.

# 1 INTRODUCTION

## 1.1 Sustainable Solid Waste Management and Development

The world's urban population increased to more than 50 per cent of the world's total population in 2015 and will rise further to approximately 70 per cent of the total by 2050. Most of this population growth will be concentrated in developing countries. The urban population in Africa is projected to treble from 470 million in 2015 (UNDEA, 2014) to 1.2 billion in 2050, making Africa the continent with the highest urban population growth (UNDEA, 2008).

Hand in hand with this development, cities produce an ever-growing amount of municipal solid waste (MSW). Globally, the World Bank estimates that the amount of MSW generated by urban areas is growing even faster than the rate of urbanization. By 2002, there were 2.9 billion urban residents who generated about 0.64 kg of MSW per person per day (0.68 billion tons per year) (World Bank, 2012). In 2012, there were about 3 billion urban residents each generating 1.2 kg per day (1.3 billion tons per year), and with the urban population projected to reach about 4.3 billion by 2025 and with each resident generating about 1.42 kg of MSW every day total MSW will reach 2.2 billion tons by then (World Bank, 2012).

In many low-income countries, MSW disposal is a neglected area, and a major environmental health hazard. The cost of disposal of large quantities of waste is often beyond the financial capacities of cities and municipalities. There is also poor institutional capacity and low political will to address the problem. Many low-income countries lack the facilities for safe disposal of MSW and the most common MSW disposal practice in these countries is uncontrolled dumping.

Badly managed waste also has negative consequences in terms of greenhouse gas emissions. The waste sector was the third largest contributor to global emissions of non-CO<sub>2</sub> greenhouse gases in 2005, accounting for 13 per cent of total emissions. In the waste sector, the two largest sources of emissions are landfilling of solid waste and wastewater, which together contributing 92-93 per cent of emissions throughout the 1990 to 2030 period. CH<sub>4</sub> from landfills accounted for an average of 58 per cent of waste

emissions during this period. Increases in waste generation and population drive the quantity of these global waste emissions continuously upwards (US EPA, 2012).

Nairobi, the capital of Kenya, exemplifies the problems of a dysfunctional waste management system. Nairobi produces around 2,400 tons of waste per day. While 93 per cent of Nairobi’s waste is potentially reusable, only 5 per cent is actually recycled and composted. Moreover, only 33 per cent of waste produced is collected for disposal at Nairobi’s single official dumpsite, Dandora (JICA, 2010). The rest is tipped on hundreds of illegal dumpsites, left next to houses or burned. The official dumpsite, and even more so the illegal ones, are operated in an unsystematic, unplanned and highly unsanitary way. As a result, poorly managed and not properly disposed of solid waste pollutes the air, water and soil, causing significant health and environmental problems. This is especially true in slums and other low-income areas, where high population density, paired with lack of infrastructure and service provision, only aggravates these problems. More than half of Nairobi’s 3.5 million inhabitants live in slums.

With the urban population growth continuing, these problems will only worsen. The table below shows the urban population growth across Kenya and the associated waste production amounts.

**Table 1: Urban Population and MSW Generation Trends in Kenya**

Year	National Population (million)	Urban Population		Estimated Total Urban MSW Generated
		Million	% of total population	(tons per day) <sup>a</sup>
2011	41.1	9.9	24.1	4,950
2012	42.5	10.2	24.0	5,100
2013	43.7	10.9	24.9	5,450
2014	44.9	11.2	24.9	5,600

*a* Calculation based on a conservative daily per capita generation rate of 0.5 kg of MSW. This is the reported rate as of 2012, which will have increased as a result of changing urban lifestyles.

Source: World Bank, 2016.

It is against this background that this Nationally Appropriate Mitigation Action (NAMA) on a Circular Economy Municipal Solid Waste Management Approach for Urban Areas has been proposed.

The NAMA will showcase a model for improved urban waste management in developing countries. It will transition Nairobi’s waste sector from a disposal-driven one to one of recycling and composting. This will have numerous positive benefits:

- Affordable waste collection services to all income areas
- Increase in the amount of waste collected and recycled
- Improved health at household levels
- Reduction in GHG emissions

- Direct and indirect job creation
- Increase in the application of compost to improve agricultural soil fertility

## 1.2 Nationally Appropriate Mitigation Actions (NAMAs)

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### 1.2.1 History of NAMAs

The success of the Paris Agreement signals a significant step towards the future of climate action. This UNFCCC-led process involving over 190 parties led to an agreement in December 2015 that saw countries agree to cut emissions with the aim of limiting temperature increase. The agreement lays down several “building blocks” that can help the world collectively undertake climate actions and NAMAs are expected to play an important role in driving this transformation.

Nationally Appropriate Mitigation Actions (NAMAs) are voluntary, non-binding policy instruments that provide a framework for pursuing a country’s socioeconomic and development goals, while contributing towards global greenhouse gas mitigation efforts. NAMAs were first introduced at the 13th Conference of Parties to the Kyoto Protocol (COP13) in Bali in 2007.

Many developing countries are taking steps to develop and implement NAMAs, which can help achieve their growth objectives and participate in the global climate change mitigation agenda. NAMAs help governments leverage national and international support to achieve appropriate, effective and transformational GHG mitigation and sustainable development targets for the country and within communities.

COP 19 in 2013 saw the introduction of Intended Nationally Determined Contributions (INDCs), which were to be submitted by all parties, developed and developing, to the UNFCCC. The INDCs formed the crucial basis for the discussions leading to the successful Paris Agreement (COP 21) and provide an indicative list of activities that a party is willing to undertake in the period following 2020.

Though not explicitly mentioned in the Paris Agreement, NAMAs are currently the only “framework for non-market approach to sustainable development” (as noted in the Paris Climate Agreement) and are expected to play an important role in helping developing countries plan and execute mitigation actions as elaborated in their INDCs. Moreover, the overall scope of a NAMA, i.e. mitigation action combined with sustainable development leading to sector transformation, makes it an ideal framework to balance national development priorities with global climate actions.

### 1.2.2 A Circular Economy Approach to Solid Waste Management as an Opportunity for Kenya

Kenya is a party to the UNFCCC process and is committed to tackling climate change, as indicated by its various policies and programmes. Kenya submitted its INDC to the UNFCCC in July 2015 and has set an emission reduction target of 30 per cent by 2030 compared with its BAU scenario. NAMAs form an essential element of Kenya’s commitment to the UNFCCC process.

This NAMA offers a unique opportunity for urban governments (cities and municipalities) in Kenya to transform MSW management practices and to accelerate the adoption of sustainable MSW management methods, with



significantly more recycling than currently practised. The NAMA aims significantly to improve MSW collection, recycling and composting through a robust framework and incentives for the private sector.

**Figure 2: Overview of the NAMA Outcomes**



For the NAMA objectives to be realized, a number of challenges affecting the MSW management supply chain have to be overcome. These challenges include the following.

- Lack of awareness on the part of both the residents who generate the waste and most actors in the MSW management supply chain. All the actors need to be made aware of the need for and benefits of enhanced recycling and composting.
- The MSW management supply chain service providers' lack of various capacities, such as financial resources, improved equipment for recycling, knowledge of efficient waste collection, waste recycling and composting, and the organizational and governance structures to manage the MSW supply chain.
- Lack of access to land for recycling points and composting facilities and lack of financial capacity to purchase land near where the waste is generated.
- Lack of access to improved technologies for composting to increase the quality of compost and lack of access to new markets to increase demand for composting.
- Lack of formal technical and management training among most of the MSW management supply chain service providers in handling solid waste.

- Inadequate infrastructure for effective MSW management, such as a sufficient number of recycling points and composting facilities.
- A strong political will and commitment to enact, coordinate and support enforcement of appropriate laws.

By promoting this NAMA, the resultant activities will address multiple SD objectives—poverty alleviation, local job creation, alternative income generation, income equality opportunities, improved health conditions, and environmental conditions. More important, by creating an enabling environment for the private sector to participate, the NAMA will ensure the longevity and sustainability of the activities that it encompasses, even after its technical life span.

Furthermore, the NAMA interventions will result in emission reductions from recycling of plastics and from composting of biodegradable waste. It is envisaged that the NAMA interventions will be replicated in other urban areas of Kenya which will lead to emission reductions at scale.

### 1.2.3 NAMA Objectives and Its Transformational Change

#### 1.2.3.1 Objectives of the NAMA

Kenya's national stakeholders have decided to set as the NAMA objective the development of a circular economy approach for sustainable waste management to implement a holistic business model (see Chapter 7 for details on the technical interventions) by significantly increasing the share of collected, recycled and reused waste and encouraging existing industries to use the remaining waste in their industrial processes.

The overall purpose of this Circular Economy NAMA in Kenya is to improve MSW management in a sustainable manner while leading to transformational change.

The two distinct Objectives of this NAMA are:

- **Objective 1:** Establish infrastructure for recycling and reuse of waste to substantially reduce the amount of disposed waste.
- **Objective 2:** Establish a framework for the private sector to participate in the recycling and reuse of waste.

#### 1.2.3.2 Transformational Change of the NAMA

The circular economy approach described in this NAMA makes it possible to offer waste collection services at the equivalent of US\$1 /household/month. Existing pilots suggest that this collection service fee is financially feasible under a circular economy model. At this price, waste collection services become affordable to 90 per cent of the population as compared with the current 33 per cent.

Such a high recycling rate would not only make it possible to offer affordable waste management services, but would also provide new market opportunities for recycling industries. Recycling industries traditionally have not had access to (1) recyclable materials from low-income areas in the absence of waste collection services in these areas, and (2) the majority of recyclable materials from middle- to high-income residential areas as wastes are not separated. By collecting across all areas, irrespective of income, and separating 90

per cent of collected waste, the sustainability of the waste management value chain will be significantly increased and will lead to previously unavailable raw materials being made available to the recycling industries, thereby creating additional business and employment opportunities.

As at most 10 per cent of the waste will be disposed of at dumpsites, waste collection companies will be able to offer waste collection at significantly reduced monthly fee. This will increase the collection rate and make waste collection affordable to the poor and the poorest of the poor in the slum areas of Nairobi.



# 2 BACKGROUND ON KENYA

## 2.1 Geography and Administration

The Republic of Kenya, which is almost bisected by the Equator, is situated in the eastern part of the African continent where it extends between latitudes 5°N and 5°S and longitudes 34°E and 42°E. It is bordered by South Sudan and Ethiopia to the north, Uganda to the west, Somalia to the east, Tanzania to the south-west and Indian Ocean to the south-east (Figure 3). It spans a territorial area of 582,646 km<sup>2</sup> consisting of 11,230 km<sup>2</sup> of water surface and 571,416 km<sup>2</sup> land area (KNBS, 2016). Of the total land area, approximately 490,000 km<sup>2</sup> (85 per cent) are classified as arid and semi-arid land (ASALs) (UNDP in Kenya, 2016).

Kenya is a unitary state with a multiparty political system. In 2013, Kenya introduced a devolved two tier governmental system consisting of a national government and 47 autonomous county governments (Figure 4). Under the system of devolution county governments play a major role in service delivery, including having responsibility for waste management (Kenya Law Reports, 2010).

Kenya's landscape relief stretches from sea level to about 5,200m above sea level at the peak of Mount Kenya (Paron, Olago and Omuto, 2013). The country's topography is described as simple and diverse, with its relief separated into lowlands and uplands with varied landform types, consisting of plains, escarpments, hills

**Figure 3: Location of Kenya**



Source: Kenya National Bureau of Statistics

with low and high mountains, and breaks. Moving inland from the coastline in the south-east, one comes to a narrow low-lying plain. The altitude then gradually changes to low plateaus, mainly of a semi-arid nature, that spread into the eastern and northern parts of the country and are sparsely populated. From the low plateaus the terrain runs to an elevated plateau and mountain region in the south-west, which form the Kenyan highlands.

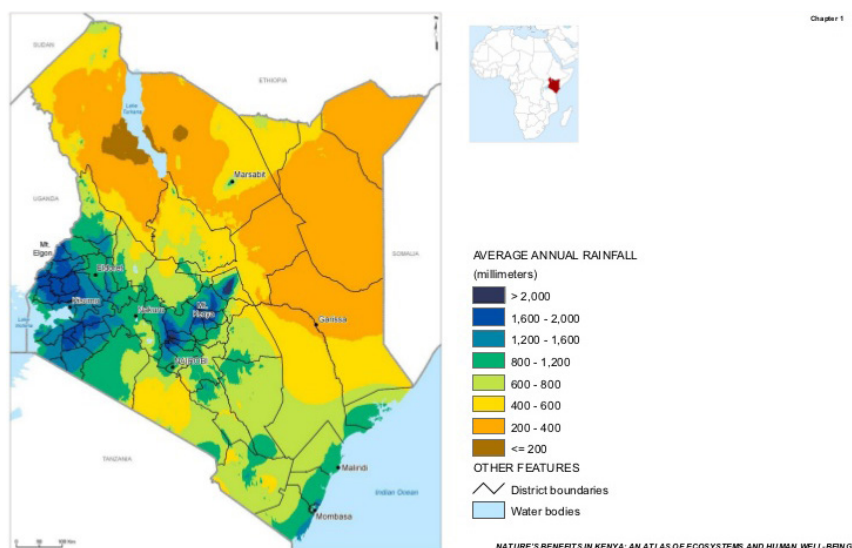
The highlands contain the bulk of the country's population and farmland. The highlands are cool and agriculturally rich. Both large-scale and small-holder farming are carried out here. Major cash crops are tea, coffee, flowers, vegetables, pyrethrum, wheat and maize. Livestock farming is also practised. Much of the highlands lie 1,500-3,000 m above sea level and are dotted by extinct volcanoes. The Great Rift Valley bisects the highlands into east and west, forming a steep sided trench 48-64 km wide and 600-900 m deep. Mount Kenya the highest mountain in the country is found on the eastern side, while Mount Elgon is to the western side on the border of Kenya and Uganda.

## 2.2 Climate

Kenya's climate varies considerably across the country. It is hot and humid at the coast, temperate inland, and very dry in the north and north-east of the country. The climate is heavily influenced by its variable topography and the north-south migration of the zonal arm of the Intertropical Convergence Zone (ITCZ). Its geographic location also makes the country prone to cyclical droughts and floods with climate change expected to make such types of climate driven events increase in intensity and frequency.

Temperatures vary dramatically, with the highlands experiencing considerably cooler temperatures than the coastal and lowland regions.

**Figure 4: Distribution of Mean Annual Rainfall**



Source: World Resource Institute



The average annual precipitation is typically 680 mm, ranging from less than 250 mm in the northern ASAL areas to about 2,000 mm in the western region. The high rainfall zone, which receives more than 1,000 mm of annual rainfall, is productive agricultural land. It occupies less than 20 per cent of the country's land area and supports approximately 80 per cent of the population. The ASALs, with annual rainfall of less than 750 mm, occupy more than 80 per cent of the land area, and support about 20 per cent of Kenya's population and 70 per cent of livestock production.

On an annual basis, precipitation in the country is governed primarily by the movement of the ITCZ which migrates south through Kenya in October-December and returns northwards in March-May, resulting in "long rains" from March to May and "short rains" from October to December. The rainfall distribution, therefore, shows very strong seasonality. The "long rains" are abundant over most parts of the country and contribute significantly to the annual rainfall totals. The "short rains" are more abundant and reliable in the south-eastern lowlands and parts of the eastern highlands. The two distinct rainfall seasons are separated by a hot dry period (December-March) and a cool dry period (June-September) (McSweeney, New and Lizcano, 2008).

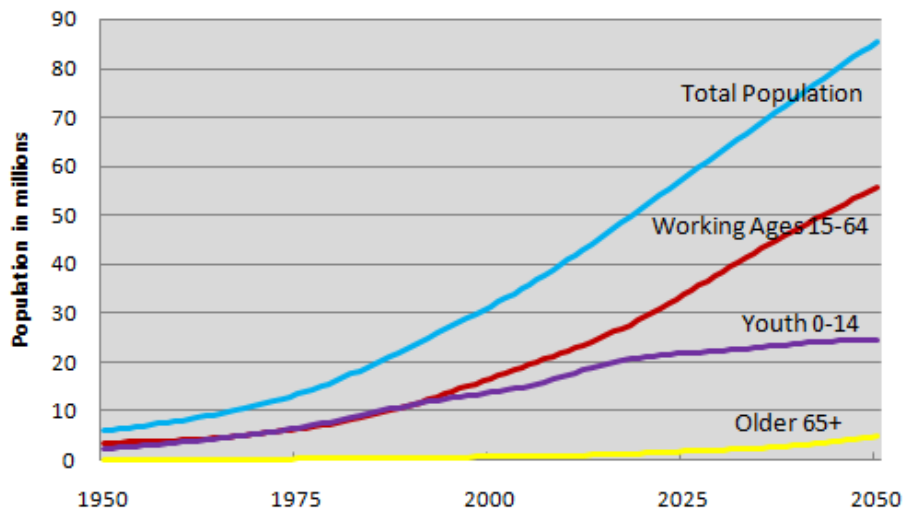
### 2.3 Demography

Kenya is characterized by a rapidly growing population, rapid urbanization (estimated at 4 per cent per annum) and increasing urban poverty, although 75 per cent of the population still lived in rural areas as of 2014. Climate change and rapid population growth combine to increase environmental degradation, food insecurity and poverty levels in the country (UNFPA/NCPD, 2013).

Kenya's population at the end of 2015 was estimated at 46 million with 49.9 per cent being male, 50.1 per cent female and an average population density of 80 people per km<sup>2</sup> (World Bank, 2013). The population is concentrated in the non-ASAL areas (about 20 per cent of the land area) (GoK, 2013). This puts pressure on natural resources, constraining the country's ability to develop in a sustainable manner.

Figure 6 shows population growth trends for Kenya (1950-2050). There are limited opportunities for technical and vocational skills training.

**Figure 5: Kenya's Demographic Trends, 1950-2050**



The rapidly growing urban population and limited affordable housing have resulted in informal settlements with limited housing, sanitation, water, energy and waste, including municipal waste, disposal systems. It is estimated that less than 50 per cent of the solid waste generated in Kenya's urban areas is collected and disposed of in a sanitary manner.

Today, about 25 per cent of Kenyans live in cities. By 2033, half of Kenya will be residing in the urban areas (World Bank, 2013). One result of this trend will be over-stretched resources, infrastructure and municipal services, including sanitation and MSW management services, in urban areas.

## 2.4 The Socio-Economic Situation

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Having the largest and most diverse economy in East Africa, Kenya is a lower middle-income country with an estimated national GDP of US\$60.9 billion in 2014 and an average annual growth rate of over 5 per cent for nearly a decade (World Bank, 2014). Figure 8 shows the trend of Kenya's GDP from 2000 to 2013, demonstrating that Kenya's economic performance has varied over the period.

Approximately 42 per cent of Kenya's national GDP is derived from its natural resource sectors (namely agriculture, forestry, fishing, water supply and energy). The services sector (which includes transport and communications, wholesale and retail trade, and financial and other services) accounts for about half of GDP. The industry sector (manufacturing, construction, mining and quarrying) contributes the remaining 10 per cent (World Bank, 2014).

The informal sub-sector (also known as Jua Kali) accounts for about 80 per cent of total recorded employment. The sector covers all unregulated small-scale activities largely ones undertaken by the self-employed, including those involved in informal sorting of MSW. An estimated 10 million people were engaged in the informal sector in 2012. The informal sub-sector is generally characterised by low productivity, vulnerability of employment, and low incomes (KIPPRA, 2013).

In addition to concerns about an expanding informal economy, the labour market is also beset by unemployment, with the rate of unemployment varying across the country. In 2013, Kenya's unemployment rate was estimated at 36 per cent, with that for young workers (15-35 years) at 61 per cent. More than 70 per cent of Kenya's population are below the age of 30, while 43 per cent are under age 14.

In terms of the Human Development Index, Kenya ranks highest in the East African region. Its entrepreneurship and human capital give it huge potential for further growth, job creation and poverty reduction. The recent discovery of oil and other mineral resources creates great potential for the Kenyan economy. However, despite a decline of the country's absolute poverty rate, wealth has not been distributed equally and Kenya remains a highly unequal society by income, by gender and by geographical location.

## 2.5 Kenya's National Development Strategies

Kenyan national development policies have undergone some significant developments in the wake of the new 2010 Constitution and the 2013 presidential elections. The new Constitution, for the first time devolves power to the 47 newly created county governments and through its Bill of Rights, guarantees Kenyans basic economic, social and environmental rights.

Under the devolution provisions, the newly established county governments would become important players in several of the decision-making, implementation, management and monitoring activities associated with this Waste NAMA. The Constitution's Bill of Rights includes guarantees to Kenyan citizens of the right to a clean and healthy environment.

The Government's policies deliver on its promises and help meet the public's expectations. The Government of Kenya's (GoK) Second Medium Term Plan (SMTP) for the period of 2013-2017 prioritizes, among other goals, the country's rapid economic transformation and growth through infrastructure development, a stable economic environment, diversification and a greater contribution from manufacturing, and full attention to securing the environment and building resilience to climate change (GoK, 2013a, Executive Summary, pp. x-xiii). At the forefront of the new Government's promises are the goals set out in Vision 2030 of raising the annual GDP rate of growth to 10 per cent per year by 2030. Vision 2030 and the SMTP explicitly recognize that sustainable economic development cannot occur without significant investment in the national infrastructure and manufacturing. Employment, especially "Green Jobs" and employment for women and youth, is a key priority.

Article 42 of the Bill of Rights (Chapter 4 of the 2010 Constitution) states that every person has the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative and other measures. The Constitution assigns responsibility for solid waste disposal to the health services of the county governments (Fourth Schedule, Part 2, Paragraph 2 (g)).

The Kenya Vision 2030 is the country's long-term development programme covering the period 2008-2030. It aims, among other things, to make Kenya a nation with a clean, secure and sustainable environment by 2030. One of the strategies identified for realization of the Vision is improving pollution and waste management through design and application of economic incentives and the commissioning of public-private partnerships (PPPs) for improved efficiency in water and sanitation delivery. Under Vision 2030, a national framework for solid waste management has been developed and county governments have taken one of the targets of the Vision's social pillar, the Environment, Water and Sanitation, as the basis for developing their environmental laws. So far three waste management and pollution control plans have been drawn up and are being implemented at county level.

The National Climate Change Action Plan, 2013-2017 (NCCAP) states that although the share of the waste sector on the country's total GHG emissions is low, GHG emissions from the waste sector are expected to increase from 0.8 million tCO<sub>2e</sub> per year in 2010 to 2 million tCO<sub>2e</sub> in 2030. It is noted in the NCCAP that methane capture can go hand in hand with proper management of solid waste, thereby improving groundwater quality, local air quality and safety, as well as hygienic conditions (GoK, 2013b).



### 2.5.1 Progress on the Millenium Development Goals

The Millennium Development Goals (MDGs) adopted in 2000 by the world leaders were the world’s time-bound and quantified targets for addressing extreme poverty in its many dimensions (income poverty, hunger, disease, lack of adequate shelter, and exclusion), while promoting gender equality, education and environmental sustainability. They also incorporate basic human rights: the rights of each person on the planet to health, education, shelter and security. The Government of Kenya embraced the eight Millennium Development Goals at the time of their inception in 2000.

While Kenya has made significant progress on the MDGs, there are still targets that have to be achieved. Overall, Goal 3 has been met but it appears to be difficult to achieve the targets associated with of Goals 1, 3, and 7 (Ministry of Devolution and Planning, 2014).

The most relevant links between the NAMA and the MDGs are through Goal 1 “Eradicate Extreme Poverty and Hunger” (Targets 1A and 1B), Goal 3 “Promote Gender Equality and Empower Woman” (Target 3.2) and Goal 7 “Ensure environmental sustainability” (Target 7D).

### 2.5.2 Alignment with Sustainable Development Goals

The period over which the MDGs were targeted concluded in 2015 and the MDGs were replaced by the Sustainable Development Goals (SDGs). The NAMA will contribute to the national targets for the revised SDG parameters and Vision 2030 in establishing Kenya as an industrializing, middle-income country, with the capacity to provide a high quality of life to all its citizens.

The table below provides an indicative list of SDG targets, in line with the SD Tool, that will be positively affected by the SD benefits resulting from the NAMA.

**Table 2: SDG Targets and SD Benefits Resulting from the NAMA**

SDG Goals/ Indicator	Brief Description of the SDG Indicator	Potential Impact through NAMA SD Benefits
13	Take urgent action to combat climate change and its impacts	NAMAs are mitigation actions and the technical interventions will lead to emission reduction, thus contribute to positive climate action.
11	Make cities inclusive, safe, resilient, and sustainable	The NAMA will increase recycling and composting thereby improving air quality, and municipal waste management.
12	Ensure sustainable consumption and production patterns	The NAMA will improve water quality by reducing the amount of illegally dumped waste.
3	Attain healthy lives and promote well-being for all at all ages	The NAMA will improve health conditions through incentives for waste pickers and the general public through significant reduction of uncontrolled, informal disposal of waste.

SDG Goals/ Indicator	Brief Description of the SDG Indicator	Potential Impact through NAMA SD Benefits
4	Achieve gender equality and empower all women and girls	The NAMA will create opportunities for new income-generating activities for women in the recycling industry.
9	Build resilient infrastructure, promote sustainable industrialization and foster innovation	The NAMA will increase access to recycling and composting technologies, thereby integrating new small-scale enterprises into value chains and markets.
17	Revitalize the global partnership for sustainable development	The NAMA will provide capacity-building for SMEs in recycling and composting and for the general public in waste reduction and waste segregation at its origin.
8	Promote inclusive and sustainable economic growth, employment and decent work for all	The NAMA will foster productivity, increase production efficiency, enable added value activities and encourage new income-generating activities, enhancing economic growth and providing the means to alleviate poverty.
16.6	Develop effective, accountable and transparent institutions at all levels	The NAMA will directly contribute to the National Energy Policy, objectives and targets by supporting the creation of a NCA and NIE with adequate training and capacity-building.
17.1	Strengthen resource mobilization including international support	The NAMA Finance elaborates not only the country contribution, but also recommendations for international donor contribution in the form of loans and grants.

### 2.5.3 Alignment with the INDC

On 23 July 2015, Kenya submitted its Intended Nationally Determined Contribution (INDC) to the UNFCCC Secretariat.

Kenya, like other developing economies of Sub-Saharan Africa, bears the brunt of climate change impacts and the associated socio-economic losses. As a signatory to the UNFCCC process, Kenya submitted the country's Intended Nationally Determined Contribution (INDC) before the COP 21 meeting in Paris. Kenya's INDC includes both mitigation and adaptation components based on national circumstances. In the case of mitigation, the INDC states:

*"Kenya seeks to undertake an ambitious mitigation contribution towards the 2015 Agreement. Kenya therefore seeks to abate its GHG emissions by 30% by 2030 relative to the BAU scenario of 143 million tCO<sub>2</sub>eq in line with its sustainable development agenda. This is also subject to international support in the form of finance, investment, technology development and transfer, and capacity-building." (GoK\_INDC, 2015) p.2.*

The proposed emission reduction under this NAMA proposal of approximately 800,000 tCO<sub>2</sub>e will therefore contribute towards the stated abatement target of 30 per cent. The NAMA also explicitly notes the required support in the form of finance, technology, and capacity development. Among the specific activities and programmes listed under mitigation, the Circular Economy NAMA directly contributes to the priorities, as outlined in Table 3.

**Table 3: Relevance of the NAMA to Stated Mitigation Priorities in Kenya’s INDC**

Stated priority in INDC	Circular Economy NAMA
Sustainable waste management systems.	The NAMA directly contributes to the promotion of sustainable waste management by increasing the amount of recycled and composted MSW.

In addition, the INDC notes that Kenya does not rule out the use of international market-based mechanisms in line with agreed accounting rules. The MRV system proposed under this NAMA therefore will be transparent and available for international inspection as appropriate.



# 3 BACKGROUND TO SOLID WASTE MANAGEMENT IN KENYA

Kenya is a developing lower middle income country, with a rising urban population, an improving economic situation and changing lifestyles. Hence, it faces the same MSW challenge as other lower middle income countries.

The increase in Kenya's urban population has reduced the capability of the county governments to manage the solid waste generated, with less than 40 per cent being collected and disposed of at designated open dumpsites. The challenges that this waste poses to county governments and communities are varied. Much of the waste is poorly managed: waste is not collected, disposal sites are inadequate, or waste is contaminated with hazardous materials. This has major impacts on human health, especially for those living near disposal sites. Such impacts range from clogged drainage and sewers, waterborne diseases like typhoid, cholera and diarrhea, increased upper respiratory diseases from open burning of the garbage, to malaria (Entrepreneur's Toolkit, 2011). The inefficient use of scarce resources reflected in materials discarded and abandoned as waste represents a huge economic and environmental cost borne by society as a whole.

Despite efforts to encourage reuse and recycling, the amount of solid waste dumped remains high and is increasing (Ministry of Environment and Natural Resources, 2013).

## 3.1 The Solid Waste Situation in Major Cities in Kenya

Available data show that daily solid waste generation is directly proportional to the population and that the average per capita waste generation in the main Kenyan municipalities with solid waste disposal sites (SWDSs) is approximately 0.46 kg/day. Nairobi appears to be generating more, at a per capita rate of 0.75 kg/day. Table 4 shows the amount of waste generated in the different cities of Kenya.

**Table 4: Data on Major SWDSs Operating in Kenya, 2013**

Location of SWDS	Type of SWDS	Waste Received (t/yr)	Population (million)	Fraction of Waste Generated In Locality (%)	Total Waste Generated (t/yr)	Total Waste Generated (t/day)	Total Household Waste Generated <sup>a</sup> (t/day)	Per Capita Generation (kg/day)
Nairobi, Dandora <sup>(1)</sup>	Unmanaged Deep SWDS (>5m)	292,000	3.05	26	1,106,061	3,030	2,273	0.75
Mombasa, Mwakirunge <sup>(2)</sup>	Unmanaged Deep SWDS (>5m)	123,000	1.2	56	219,643	602	451	0.38
Kisumu <sup>(3)</sup>	Unmanaged shallow SWDS (<5m)	28,800	0.952	20	144,000	395	296	0.31
Nakuru <sup>(4)</sup>	Unmanaged shallow SWDS (<5m)	18,250	0.473	20	91,250	250	188	0.40
Average <sup>b</sup>		-	-	-	-	-	-	0.46

<sup>a</sup> Assumes household waste generated is 75 per cent of total urban waste generated.

<sup>b</sup> "-" indicates not applicable.

Sources: <sup>(1)</sup> Report of Taskforce on Identification of Technological Options for Solid Waste Management in Nairobi County, January 2014.

<sup>(2)</sup> Detailed Design and Environmental Impact Assessment for Solid Waste Management Project in Mombasa Town. INGEROP Africa.

<sup>(3)</sup> Environmental Impact Assessment of the Proposed Landfill for Solid Waste Disposal in Kisumu. Geoplan Consultants.

<sup>(4)</sup> Mwanzia P., Kimani, S.N., Stevens, L. (2013). Integrated Solid Waste Management: Decentralized service delivery case study of Nakuru Municipality, Kenya. 36th WEDC International Conference, Nakuru, Kenya.

### 3.2 Analysis of the Solid waste Situation in Nairobi

Nairobi produces around 2,400 tons of waste per day. While 95 per cent of Nairobi's waste is potentially reusable, only 5 per cent is actually recycled and composted. Moreover, only 33 per cent of waste produced is collected for disposal at Nairobi's only official dumpsite, Dandora (JICA, 2010). The rest is tipped on hundreds of illegal dumpsites, left next to houses or burned. The official dumpsite and even more so the illegal ones are operated in an unsystematic, unplanned and highly unsanitary way. As a result, poorly managed and not properly disposed of solid waste pollutes the air, water and soil, causing significant health and environmental problems. This is especially concerning in slums and other lower income areas, where high population density, paired with lack of infrastructure and service provision, only aggravates these problems. More than half of Nairobi's 3.5 million inhabitants live in low-income areas or slums.



### A city council garbage truck delivering garbage at Dandora dumpsite



Source: <http://www.nairobi-swm-project.or.ke/#>.

Around one third of Nairobi's waste is transported to the only dumpsite, Dandora. It is estimated that about 200 trucks offload garbage at Dandora dumpsite daily (WEMAK, 2015). The Dandora dumpsite is an open, unmanaged landfill. It is surrounded by a number of housing estates and slums. The Dandora dumpsite presents many challenges. It affects the health of the people living around it. The Nairobi River, running right across the dumpsite, carries polluted water downstream where it is used for irrigation of food products and for drinking water. Box 1 below summarizes the health conditions around the dumpsite.

#### Box 1: Health Situation Caused by Dandora Dumpsite

Dandora is a health and environmental disaster. At 43 hectares, equivalent to 60 football pitches, it has grown much too vast to be managed and the waste has been contaminating the groundwater for years. This affects half a million residents living around the dumpsite. A 2007 study by UNEP that examined 328 children living close to the dumpsite uncovered that half had blood lead levels equal to or exceeding the poisoning threshold of 10 micrograms per deciliter of blood. Exposure to such high levels of lead is linked with damage to the nervous system and the brain.

Source: *Grand Health Challenges Blog*

The following points summarize the key challenges of solid waste management in Nairobi.

- The **public sector** struggles to run an effective and efficient waste management system. The resources available to Nairobi City County (NCC) are insufficient. Commonly cities in developing countries spent 20-50 per cent of their budgets on waste management. NCC spends only US\$5 million of its US\$300 million budget on waste management, representing not even 2 per cent of the total (Institute for Social Accountability, 2014). For a city of 3.5 million inhabitants, NCC only has around 20 functioning waste collection trucks at any time. This, combined with contract private companies, only allows for collection of waste in the city centre and public markets.

- Current **private sector waste management models** do not offer a solution to this problem either. This is because (1) waste collection companies only collect waste for the purposes of disposal; and (2) their services are too expensive for the majority of Nairobi's population.
- Private sector waste collection companies collect waste from households and businesses for disposal at Nairobi's only official dumpsite, Dandora or at various illegal dumpsites. As a consequence, very little of the collected waste gets recycled.
- The collection-for-disposal approach of waste collection companies makes their services too expensive for most Nairobians.

First, not recycling collected waste has immense opportunity costs: Revenues from selling recyclable materials would help in lowering collection fees.

Second, disposal at Dandora dumpsite (or at the illegal dumpsite) is extremely inefficient and time consuming, involving long queuing, getting stuck due to lack of roads and inefficient manual off-loading. Thus, Nairobi's waste companies can only do one collection trip per truck per day. This level of inefficiency then results in high collection charges.

As a result, existing private sector companies in Nairobi collect waste only in middle to higher income areas, while not engaging in any recycling of organic waste. This leaves two thirds of residents without any proper waste management services.

### Waste pickers at Dandora dumpsite



### 3.3 Recycling and Composting as a Potential Solution

Waste is a resource and has considerable economic value. Organic waste, which constitutes 69 per cent of Nairobi's waste, can be converted into compost. Recyclable waste such as paper, plastic, glass and metal (16 per cent of waste) is used by industries for manufacturing new products (JICA, 2010). For these waste-to-value products, there exist large underserved markets in Kenya.

The market for compost has enormous potential in Kenya. In contrast to Europe, tropical soils have less soil fertility, texture and organic matter content. Soil conditioners such as compost are, therefore, essential to improve soils (AGRA, 2016). By improving the soil's organic matter content, compost helps increase its capacity to retain nutrients and water; supplies nutrients and helps suppress soil-borne diseases; and stabilizes soil pH-levels. It is estimated that the current demand for compost is in excess of 100,000 tons/year and growing (Lachlan Kenya Ltd., December 2011). Production of compost in Kenya currently stands at less than 10,000 tons/year. Meanwhile, Kenya imports around 1,500,000 tons/year of chemical fertilizer.

The market for recyclable materials is growing, as many raw materials become more expensive. Kenya has one of the biggest manufacturing sectors in sub-Saharan Africa outside South Africa. There are recycling industries for plastic, paper and metal waste. This leads to a strong demand for recyclable materials, as using them lowers production costs. However, this demand is largely underserved, as industries face the challenge of sourcing clean inputs. Recovery of recyclable waste is done by "junk shops" and waste pickers from mixed waste. This leads to high contamination. Recycling industries thus incur high cleaning costs, making the recycling of most materials economically unattractive. Consequently, only 10 per cent of potentially recyclable materials are currently recovered for recycling.

Composting and recycling are not only beneficial in themselves. First, the more waste is composted and recycled, the less waste needs to be disposed of. This can reduce costs for waste collection significantly by reduced disposal fees, reduced time losses at dumpsites and reduced distances to often far-away dumpsites. Second, selling recyclable materials to recycling industries generates additional revenues in the waste management value chain. This in turn can help reduce the costs of waste collection. Hence, promoting composting and recycling can help make waste collection more affordable. This in turn makes it possible to increase the waste collection coverage to low-income areas.

The introduction of the circular economy approach will:

- make waste management affordable to almost all income earners, as the overwhelming majority (at least 90 per cent) of the collected waste will be recycled;
- significantly reduce disposal costs (less than 10 per cent of waste will be residual waste);
- generate additional revenues from the sale of recyclable materials;
- generate additional revenues from the sale of compost; and
- generate additional revenues from the payment of tipping fees (for NEEs owning and managing recycling points).



### 3.4 Barriers to Recycling and Composting

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Promoting composting and recycling in Nairobi, and other similar urban areas, currently faces a multitude of barriers.

- **Lack of waste sorting.** The sorting of waste that happens tends to take place in an unsystematic and unreliable fashion.
  - Lack of proper sorting centres:
    - Staff on waste collection trucks try to sort some materials on the way to the dumpsite. This leads to a low quality of sorting.
    - The few materials that they do sort, are sold to small-scale “scrap yards”. Scrap yards lack the space and systems to sort large quantities of waste in a reliable manner. Moreover, as they receive largely mixed waste, most of the waste is too contaminated to sell to recycling companies.
    - Waste pickers scavenge for recyclable materials on dumpsites. As the waste getting to the dumpsite is mixed and heavily contaminated, waste pickers can only sort out a small fraction of the recyclable materials. Waste pickers on dumpsites also suffer from terrible health and sanitary conditions.
- **Lack of a market for organic waste.** There is only one company currently composting organic waste in Nairobi. As organic waste represents around two thirds of Nairobi’s waste, this poses a major barrier to reducing waste disposal in Nairobi. This can be attributed to two main factors.
  - The lack of clean organic waste. The collection of mixed waste makes it difficult to obtain clean organic waste on any scale.
  - Unlike in Europe and the USA, a composting business in Nairobi does not receive income from tipping (offloading) fees. This means that its needs to generate all its revenues from sales of compost. This is challenging due to the underdeveloped market for compost. Most farmers are not aware of the benefits and applications of compost. Compost is often confused with chemical fertilizer.
  - Other technologies for recycling organic waste, such as terra-preta (charcoal fortification of compost) and insect based protein production still require further testing to be fully commercialized.
- **The lack of a market for certain inorganic waste fractions.** While there are numerous recycling industries in Nairobi for many inorganic waste fractions, there are certain specific fractions that currently have no matching recycling industries (e.g. Styrofoam, low-grade plastics).

The NAMA as proposed is designed to overcome the existing barriers by offering a circular economy business model with a broad capacity development programme. The NAMA will support sorting centers, composting facilities, compost market development, and testing of other organic waste technologies, as well promoting recycling industries.

# 4 THE POLICY ENVIRONMENT

The policy environment provides the framework in which the NAMA will be embedded in order to ensure full alignment with the country’s political goals and objectives. The most relevant policies for this NAMA are summarized in Table 5.

**Table 5: Overview of the NAMA Policy Framework**

Policy	Objectives
Kenya Vision 2030	The country’s development programme for 2008-2030.
National Climate Change Action Plan (NCCAP)	Aims, inter alia, to reduce waste-related emissions and improve waste management.
Environmental Management and Coordination Act (EMCA)	Provides the appropriate legal and institutional framework for the management of the environment.

The above policies are described in more detail in the following sections.

## 4.1 Policy on Waste Management

**Kenya Vision 2030.** Kenya’s Vision 2030 is the national long-term development blueprint for Kenya that is implemented through a series of five-year development plans—the current being the Second Medium Term Plan (SMTP) 2013-2017. Vision 2030 aims to transform Kenya into a newly industrializing “middle-income country providing a high quality of life to all its citizens by 2030”. Vision 2030 is a living document that was first published in 2007 and is currently updated periodically in a web-hosted version. (GoK\_Vision 2030, 2007) (p1).

Kenya's Vision 2030 is inspired by the principle of Sustainable Development and by the need for equity in access to the benefits of a clean environment. To realize this, the focus will be on four strategic initiatives:

- Conservation: the country will intensify conservation of strategic natural resources in a sustainable manner without compromising economic growth. Kenya intends to have achieved 10 per cent forest cover by 2030. In addition, research activities into viable usage of natural resources will be undertaken.
- Pollution and waste management: Despite the high rates of growth envisaged in Vision 2030, Kenya will progressively apply measures to guard against the adverse effects of increased pollution and waste.
- ASALs and high-risk disaster zones: enhancing disaster preparedness in all disaster-prone areas and improving the capacity for adaptation to global climatic change.
- Environmental planning and governance: building the institutional capacity in environmental planning, and improving the impact of environmental governance in order to improve the overall management of the environment.

In order to achieve the outputs under these initiatives, the key flagship projects to be undertaken are;

- Water catchment management;
- Secure wildlife migratory routes;
- Develop a national waste management system;
- Land cover and land use mapping.

**National Climate Change Action Plan (NCCAP) 2013-2017** is Kenya's first Action Plan on climate change. It has been developed with the aim of implementing the National Climate Change Response Strategy (NCCRS) that was launched in 2010. It is an extensive 268-page blueprint addressing Kenya's priorities and responses to climate change mitigation and adaptation. One of the major contributions the NCCAP makes is defining Kenya's national GHG mitigation goals: Kenya hopes to reduce GHG emissions to 15 per cent below 2010 levels by the year 2015 and to 70 per cent by 2030; a quite ambitious target (GoK\_NCCAP, 2012) (pg 27).

The NCCAP states that although the share of the waste sector on the country's total GHG emissions is low, GHG emissions from the waste sector are expected to increase from 0.8 million tCO<sub>2e</sub> per year in 2010 to 2 million tCO<sub>2e</sub> in 2030. It is noted in the NCCAP that methane capture can go hand in hand with proper management of solid waste, thereby improving groundwater quality, local air quality and safety as well as hygienic conditions.

The NCCAP highlights improved waste management to increase employment through actions such as:

- Improved rates of waste collection and disposal;
- Creation of a regulatory framework that allows for the rights to landfill gas to be licensed for developers for capture and use; and

- Creation of financial incentives for private sector players to install composting and methane capture facilities for energy generation.

Priority programmes under the NCCAP include capacity development in the areas of national GHG inventories; measurement, reporting, and verification (MRV) of GHG emissions; and transformational change in climate change finance options by introducing new financial instruments and opportunities. In climate finance, the NCCAP identifies development of (international and private) partner funding for key priorities, improving the regulatory and policy framework for low carbon investments, and establishing a platform for engagement between the Kenyan government and investors as priority action programmes (GoK\_NCCAP, 2012) (p 93).

**Environmental Management and Coordination Act (EMCA), 1999.** EMCA, 1999 is an Act of Parliament that provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for related matters. The act provides for the following institutional framework.

The National Environment Management Authority (NEMA) is responsible for exercising general supervision and co-ordination over all matters relating to the environment and is the principal instrument of Government in the implementation of all policies relating to the environment. This includes solid waste management. As the regulator, NEMA licenses all the solid waste service providers in the country. Provincial and District Environment Committees are the decentralized face of environmental management and enable the participation of local communities in Kenya.

In addition, NEMA prepared the Environmental Management and Co-ordination (Waste Management) Regulations 2006 which outline the requirements for handling, storing, transporting, and treatment/disposal of all waste categories. Disposal of waste is done by NEMA-licensed entities. The waste management regulations place emphasis on waste minimization (reducing, re-using, recycling and recovering), cleaner production, and segregation of waste at source. The regulations also provide an opportunity for investment in various aspects of waste management by the private sector.

The EMCA includes the following detailed regulation.

a. Solid Waste Segregation and Reduction at Production and Consumption Levels

Every person whose activities generate wastes shall employ measures essential to minimize wastes through practices such as waste treatment, reclamation and recycling.

b. Primary Storage, Collection, Transportation and Transfer Stations

No person shall transport any waste other than in accordance with a valid licence to transport waste issued by the Authority; and to a waste disposal site established in accordance with a licence issued by the Authority.

c. Treatment and Landfills

Every person whose activities generate wastes shall employ measures essential to minimize wastes through treatment, reclamation and recycling.

d. Incineration and Recycling of Solid Waste

Highlights the issues that may have negative impacts on air quality, such as the process of incineration.

e. Resource Recovery and Construction and Demolition Waste

The general provision in the waste management regulations states that a waste generator shall minimize the waste generated by enabling the recovery and reuse of the product where possible and reclamation and recycling.

a. *Hazardous Wastes*

The act defines which wastes are considered hazardous and contains extensive provisions on the treatment and disposal of such wastes.

**The Solid Waste Management Initiative.** This calls for the relocation of the Dandora dump site, and development of solid waste management systems in five leading municipalities and the economic zones planned under Vision 2030.

**The Plastic Bags Initiative.** This requires tightening of regulations in order to limit the production and use of environmentally-detrimental plastic bags.

**The National Solid Waste Management Strategy.** This is intended to guide sustainable solid waste management in Kenya to ensure a healthy, safe and secure environment for all.

The strategy seeks to establish a common platform for action between stakeholders to systematically improve waste management in Kenya. The measures set out in the strategy cannot be undertaken without a collective approach to waste challenges, and the involvement of a broad range of stakeholders in their implementation.

**The Integrated Solid Waste Management (ISWM) Plan for Nairobi.** Launched in March 2009, this plan is designed to help Nairobi to overcome its solid waste management challenges, with a focus on solving the public health issues related to the lack of consistent, efficient and effective waste collection and disposal, and to reduce waste streams by at least 50 per cent through recycling. To achieve these objectives, the ISWM plan foresees the development of public-private partnerships for all activities (collection, separation, recycling and disposal) related to waste management (Scheinberg and others, 2011).

**The Nairobi City County Solid Waste Management Bill, 2015.** This is a Bill of the Nairobi City County Assembly to provide for the preparation of guidelines and the undertaking of activities to facilitate and promote recovery of waste materials through the reduction, reuse, recycling and composting of waste by various actors in solid waste management but has not been implemented yet.

Clause 20 provides that litter bins, liner bags and other solid waste bags being coded in order to facilitate waste segregation as follows:

- green for organic waste
- blue for plastics and paper waste
- brown for any other waste.

The bill also requires, in Clause 25, that solid waste generators separate the waste into various categories, including organic, plastic, paper and metals. The segregated waste should be placed separately in the

approved containers for each category before collection and every generator must ensure appropriate collection and transportation of the separated waste.

The bill recognizes the County Government as the sole body with solid waste disposal responsibility. Any other agency intending to dispose of waste either through incineration, recycling or composting must be granted a permit. The permit will be given at a fee.

The bill goes on to state that disposal will be through tipping, sanitary landfilling, recycling, composting, incineration and any other method that may be in place depending on the type of waste, and that there will be no entry into disposal sites without permission.

#### **The Factories Act of 1950 and amendments (Chapter 514 of the Laws of Kenya)**

The Factories Act is one of the existing laws that deals with sectors that generate solid waste. The Act makes it mandatory for every factory owner to ensure that the factory environment is kept clean.

#### **The Local Government Act of 1998 and amendments (Chapter 265 of the Laws of Kenya)**

The Local Government Act governs local authorities. The Act spells out wide ranging powers and functions of Local Authorities, including the provision of public services such as garbage collection.

#### **The Scrap Metal Act (2015)**

The Act prohibits anybody from exporting any scrap metal unless the public officer in charge of the police station has been given written notice of the intention to export the scrap metal, specifying in such notice the premises and time at which the scrap metal may be inspected.

## **4.2 Existing Economic Incentives for Solid Waste Management**

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Economic incentives, such as subsidies, tax rebates, and exercise waivers, are provided for in some of the policy instruments.

Several sections of the EMCA include provisions for economic incentives. This is relevant as it provides room to develop economic tools that could be used to encourage or discourage good solid waste management practices.

Section 57 (1) authorizes the Minister of Finance, on the recommendation of the National Environment Council, to propose fiscal incentives to encourage proper management of the environment or to prevent its degradation. Section 57(2) states that such proposals may include:

- a) Customs and excise waivers in respect of imported capital goods which prevent or substantially reduce environmental degradation caused by an undertaking;
- b) Tax rebates to industries or other establishments that invest in plants, equipment and machinery for pollution control, recycling of wastes, water harvesting and conservation, prevention of floods and for using other energy resources as substitutes for hydrocarbons;
- c) Tax disincentives to deter bad environmental behavior that leads to depletion of environmental resources or that cause pollution;
- d) User fees to ensure that those who use environmental resources pay proper value for the utilization of such resources.

The City Council of Nairobi's Solid Waste Management By-Laws mandate the Council to issue directions on waste collection charges. Such directions are to specify the amount of the charge or charges to be imposed for different categories of services or for services in different localities or zones within the area of jurisdiction of the Council. They also include the mode of payment and receipt of the charges; and provisions as to the penalty or penalties for failure to pay the charges.

So far, very few of the economic tools envisaged in the policy documents have been developed to encourage good practice in the solid waste management sector such as recycling, reuse and recovery of the materials. The few that have been developed have not been implemented successfully. The non-implementation of these economic tools is due to lack of awareness among the stakeholders and to the fact that most of the stakeholders in the solid waste management sector are not involved in the process of devising such economic tools. Most of the economic instruments reviewed were in the form of disincentives, such as fines, penalties, levy and surcharges.

### 4.3 Policy Recommendations

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Kenya has an overall policy framework for the NAMA exists but in order to further improve it, the following key recommendations are made as priority areas to increase the efficiency of MSW management while realizing the sustainable development goals under the NAMA framework.

- Regulatory bodies shall ensure that every waste recycler is licensed and fiscal incentives developed to encourage such registered recyclers.
- The City Council needs to help people involved in the recovery of material from solid waste by helping them acquire land to carry out their activities.
- Privatize the solid waste management sector as the current arrangement where the Council plays the roles of a regulator and service provider compromises the enforcement process.
- Raise public awareness on best practices in solid waste management such as recycling, segregation, reuse and recovery, as well as inculcating the culture of waste reduction and proper storage among producers and consumers.
- Exercise the powers provided for in the EMCA so as to prevent rampant illegal disposal of solid waste.
- Establish sorting stations as platforms for resource recovery while minimizing the amount of solid waste that find its way into the final disposal site.
- Incentivize subsidization of solid waste management in slum areas so as to make it attractive to private firms.
- Improve enforcement by fully staffing the institutions charged with the responsibility for regulating standards.
- Establish an efficient solid waste management system in the city in which CCN and private firms are jointly involved.

#### 4.4 NAMA Alignment with National and Sectoral Strategies and Policies

The NAMA is fully aligned with national and sectoral strategies and policies, in particular the Vision 2030 and the EMCA and will contribute to the overall goal of achieving a clean and healthy environment, where wastes are well-managed and utilized for economic benefits. It is especially important in the case of Kenya, where despite increasing migration to urban areas and increasing waste generation, there are limited solid waste disposal options and facilities.

This NAMA will support the goals of Vision 2030 and the EMCA by removing the barriers hindering the effective management of waste in Nairobi and other similar urban areas in Kenya and having a substantial positive impact on Kenya's transformation to climate resilient waste management.

This section describes the relationship between the NAMA's objectives and the national strategies and policies as set out in Sections 5.2 and 5.3.

**Table 6: NAMA Alignment with National and Sectoral Strategies and Policies**

NAMA objectives	National strategies and policies
<p>Establish infrastructure for recycling and reuse of waste to substantially reduce the amount of disposed waste.</p>	<p><b>Kenya Vision 2030 identifies the</b> increased unsustainable disposal of waste as an emerging issue and challenge and proposes solid waste management projects.</p> <p><b>The National Climate Change Action Plan (NCCAP):</b> highlights the role of improved waste management in increasing employment through actions such as:</p> <ul style="list-style-type: none"> <li>improved rates of waste collection and disposal;</li> <li>creation of a regulatory framework that allows for the rights to capture and use landfill gas to be licensed to developers;</li> <li>creation of financial incentives for private sector players to install composting and methane capture facilities for energy generation.</li> </ul> <p><b>Environmental Management and Coordination Act (EMCA), 1999</b> lays emphasis on:</p> <ul style="list-style-type: none"> <li>waste segregation and reduction; and</li> <li>resource recovery and the construction and demolition of waste; and</li> <li>waste management regulation that emphasizes waste minimization through reuse, recycling and recovery.</li> </ul> <p><b>The Sustainable Development Goals'</b> target of reducing the adverse per capita environmental impact of cities, including by paying attention to air quality, municipal and other waste management, and substantially reducing waste generation through prevention, reduction, recycling and reuse. (Goal 11 and Goal 12)</p>



NAMA objectives	National strategies and policies
<p>Establish a framework for the private sector to participate in the recycling and reuse of waste.</p>	<p><b>The Integrated Solid Waste Management (ISWM) Plan for Nairobi, launched in March 2009</b>, contains measures to overcome Nairobi’s solid waste management challenges, with a focus on solving the public health issues related to the lack of consistent, efficient and effective waste collection and disposal, and to reduce waste streams by at least 50 per cent through recycling by encouraging public-private partnerships in all activities (collection, separation, recycling and disposal) related to waste management.</p> <p><b>The Nairobi City County Solid Waste Management Bill, 2014</b>, encourages activities that facilitate and promote the recovery of waste materials through reduction, reuse, recycling and composting of waste by various actors involved in solid waste management through the rigorous separation of waste into different categories.</p> <p><b>The National Climate Change Action Plan (NCCAP)</b> highlights improved waste management to increase employment through the creation of financial incentives for private sector players to install composting facilities.</p>

## 4.5 Relevant Stakeholders

Given the importance and scale of Kenya’s waste sector, there are multiple governmental organizations, academic institutions and private sector players that have important roles in the development of the sector. This section details the main administrative, private sector and capacity-building bodies that play a significant role in the development of climate change mitigation or sustainable development policies in the waste sector.

**County Government(s)** are the agencies with the sole responsibility of ensuring all waste generated within their jurisdiction is collected and dumped at designated dumping sites or recycled. They license private entities to collect waste from residents and businesses within their jurisdiction and to subsequently transport it to designated dumpsites or recycle it. T

**Nairobi City County (NCC)** is legally responsible for providing waste management services to all residents. The NCC has engaged the private sector to collect and dispose of waste.

**Kiambu County (KC)** is legally responsible for providing waste management services to all residents in the county. KC has engaged the private sector to collect and dispose of waste.

**Machakos County (MC)** is legally responsible for providing waste management services to all residents in the county. MC has engaged the private sector to collect and dispose of waste.

**Kajiado County (KJC)** is legally responsible for providing waste management services to all residents in the county. KJC has engaged the private sector to collect and dispose of waste.

**The National Environment Management Authority (NEMA)** is the national agency charged with the responsibility for ensuring a clean and healthy environment for all citizens. It is the enforcer of all environmental laws.

**Contracted waste transporters:** These are private entities subcontracted by the County Government(s) to collect waste on their behalf from legal/illegal dumpsites and to transport it to designated waste disposal sites. They are paid per ton of waste delivered to the dumpsite.

**Private waste collectors:** These are private entities licensed by the County Government(s) to collect waste from their clients (households/commercial entities) and deliver it to the designated dumpsites. They levy charges on their clients for services rendered.

**Waste recyclers:** These are entities which buy waste and convert it into useful products which are then sold for economic benefit.

**Waste pickers:** These are mainly individuals who pick useful/recyclable waste from dumpsites and sell it to recyclers.

**Informal youth groups** are another category of garbage collectors who collect from households and deliver to the nearest dumpsites. They are mainly youth groups or community based groups which step in to fill the void left by council operations and are mostly found in slum areas. In Nairobi, they do not deliver the waste they collect to the Dandora dumpsite; instead it is collected from the smaller dumpsites by the contractors who have been contracted by the County Government to collect solid waste from these sites and deliver to the main Dandora dumpsite. This category of collectors charge as little as Ksh 50.00 per household, since they use handcarts rather than trucks.

**The Kenya Bureau of Standards (KEBS)** is the agency responsible for ensuring that all products are fit for consumption in Kenya. Therefore products generated as a result of recycling have to meet the required standards before they can be rolled out into the market.

**The Energy Regulatory Commission (ERC)** is the agency, under the Ministry of Energy, responsible for regulating all energy related activities in the country. Any investor/initiative intending(ed) to generate electricity, including through gasification, using methane produced from landfills, will have to obtain the relevant licences from the ERC.

**Private investors in the waste sector** i.e private entities interested in investing in the solid waste sector.

**Non-Governmental Organizations (NGOs)** can offer implementation and advisory support for improving the waste management value chain.

#### 4.5.1 Ongoing Initiatives

The NAMA will supplement existing initiatives, seek synergies wherever possible and leverage existing efforts to multiply the NAMA's impacts.

The three most important ongoing Government initiatives to improve the efficiency of Kenya's waste management are listed below.

1. In 2011, the Nairobi City County (NCC) and the Ministry of Devolution and Planning with support from JICA, initiated a project, (whose slogan was "Clean, Healthy, Wealthy Nairobi") that was designed to provide a waste collection and transportation framework that allowed for the efficient collection of waste from designated points. This was to be achieved by granting a tender to one successful franchisee

and raising public awareness on proper solid waste management. It started with information sharing through public forums, and further sensitization was to be conducted in the residential areas. The JICA project ended in March 2016.

2. The NCC has actively started to outsource the collection of waste from communal collection points, and its transportation to and disposal at the Dandora dumping site. By 2014, more than 13 contractors had been engaged and assigned to various divisions/waste collections zones by the NCC with the Divisional Officers being responsible for guiding these contractors on the routes to follow during waste collection and transportation to the dumping sites (Njoroge, Kimani and Ndunge, 2014).
3. The NCC is licensing private companies to improve the waste management value chain. Currently, there are over 120 private companies licensed by the NCC that are thought to be participating in waste management (Njoroge, Kimani and Ndunge, 2014). These companies are mostly concerned with collection, both from households and commercial entities, transportation and dumping at the Dandora dumpsite. A few, however, are involved in recycling.

### Box 2: A Successful Pilot Circular Economy Model

TakaTaka Solutions, a waste management enterprise based in Nairobi and founded in 2011 operates a successful a circular economy model. It collects source-separated waste from its clients (organic and recyclable waste). After collection, its trucks take the waste to its sorting points, called “TakaTaka Points”. There the waste is manually sorted into different recyclable materials. Recyclable materials (30 per cent of the waste) are sold to recycling industries. Organic waste (60 per cent of the waste) is taken to TakaTaka Solutions’ own composting plant for further processing into compost. The residual waste (less than 10 percent) is disposed. As only 10 per cent of the waste is disposed and additional income is generated from recyclable and compost sales, TakaTaka Solutions is able to offer waste collection services at less than the equivalent of US\$1 /household/month in low-income areas.

According to management, TakaTaka Solutions is currently serving 12,000 households, 80 per cent of which are low-income clients. They collect 20 tons of waste per day, with an average recycling rate of 93 per cent. More than 40 fractions of recyclable materials are sold to numerous recycling industries. TakaTaka Solutions is also operating various trial farms to market its compost, which it has started selling to farmers around Nairobi. TakaTaka Solutions has 100 employees, 70 per cent of whom are female. It operates one composting facility and two TakaTaka Points. TakaTaka Solutions’ recycling rate of more than 90 per cent is one of the highest recycling rates in the world (compared to, for example, an average of 35 per cent in the US). Its waste collection fees are amongst the most affordable in Africa. TakaTaka Solutions has won awards and recognition for its work in waste management.

The proposed NAMA will complement, strengthen and expand the abovementioned existing initiatives by focusing on recycling and composting.

# 5 NAMA BASELINE AND NAMA TARGETS

## 5.1 The NAMA Boundary

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The geographical boundary of the NAMA covers the whole of Kenya but focuses in its initial phase on Greater Nairobi, and is targeted at the entire population of Nairobi with its various economic needs. The groups defined by these needs have different consumption levels based on differences of ability to pay for goods and services. The proposed interventions under this NAMA will make sure that the right services are made available to the different user groups on the basis of an appropriate pricing model.

Greater Nairobi, for the purposes of the NAMA project, includes the following towns:

- Nairobi City County
- Ongata Rongai and Ngong (Kajiado County)
- Uthiru, Kikuyu, Ruaka, Kiambu and Ruiru (Kiambu County)
- Mlolongo and Athi River (Machakos County)

## 5.2 The NAMA Baseline

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The **baseline scenario for the NAMA** is the hypothetical scenario describing what will happen in the absence of the proposed NAMA interventions.

Therefore the baseline scenario for this NAMA assumes very limited coordinated and managed recycling and reuse, and the continued dumping of waste in formal and informal ways. In particular, it assumes a recycling rate of below 5 per cent and a waste collection coverage rate of 33 per cent.

The baseline scenario consists of two components, a **GHG emissions reduction baseline** and a **Sustainable Development (SD) baseline**. Setting the baseline scenario in this way allows the effects of the Nationally Appropriate Improvements (NAI) to be properly assessed and quantified through the monitoring activities described in the Measurement, Reporting and Verification (MRV) system.

### 5.2.1 GHG Emission Reduction Baseline

The specific baseline of GHG emissions reductions will depend on the type of technical intervention (e.g. composting has a different baseline than recycling of plastics) and will be discussed in detail in Section 10 on the MRV.

### 5.2.2 Sustainable Development Baseline

The Sustainable Development (SD) indicators were selected based on the Sustainable Development Evaluation Tool (SD Tool) provided by UNDP (UNDP MDG Carbon, 2014). The SD Tool defines five different SD domains:

- Environment
- Social
- Growth and Development
- Economic
- Institutional.

The tool requires for it to be decided for each intervention whether an indicator (such as air pollution, job creation, health, etc.) is selected, identify the impact, add an explanation on the chosen indicator, define the effect (positive, negative or both) and indicate whether monitoring is to be done.

The monitored NAMA interventions—composting and recycling of plastics—will contribute to improvement of a number of sustainable development indicators, as shown in Table 7.

While the NAMA is supporting the overall objectives of Kenya's NCCAP of improving waste management, increasing private sector involvement and building capacity in the field of sustainable waste management, the NAMA target values need to be set in such a way that they can be used to quantify impacts on SD indicators.

**Table 7: Sustainable Development Indicators, Parameters and Baseline Values**

Domain	Indicator	Parameter	Explanation of Parameter	Baseline
<b>Environment</b>	Air Pollution	Better Air Quality	The NAMA will reduce odors on formal and informal disposal sites.	<ul style="list-style-type: none"> <li>■ Illegal dumpsites cause significant odour in communities close by.</li> <li>■ The SWDS is unmanaged, no methane capture is happening in the baseline and odors is strong.</li> </ul>
	Climate Change Adaptation and Mitigation	Reduced GHG Emissions	The NAMA will reduce GHG emissions through controlled and coordinated recycling and composting.	<ul style="list-style-type: none"> <li>■ In the baseline, methane emissions are emitted into the air from the SWDS and the many illegal dumpsites throughout the city. Currently Dandora produces 70,000 tons of CO<sub>2e</sub> emissions per year.</li> <li>■ Energy consumption is high in the production of virgin materials.</li> </ul>
	Water Pollution	Better Water Quality	The NAMA will improve the water quality by reducing the amount of illegally dumped waste.	<ul style="list-style-type: none"> <li>■ Illegally dumping of waste causes water pollution throughout the city.</li> <li>■ Waste illegally dumped into the rivers and lakes increases the harm to fish and humans, who depend on fish from nearby lakes and rivers.</li> </ul>
<b>Social</b>	Health	Better Health and Improved Safety for People	The NAMA will improve health conditions for waste pickers and the general public through significant reduction of uncontrolled, informal disposal of waste.	<ul style="list-style-type: none"> <li>■ Informal waste pickers are working under dangerous conditions without any legal protection, health insurance or safety equipment.</li> </ul>

Domain	Indicator	Parameter	Explanation of Parameter	Baseline
<b>Social</b>	Livelihood of Poor, Poverty Alleviation, Peace	Poverty Reduction	The NAMA will provide financial incentives for the private sector to engage in a circular economy waste management system and will create significant new jobs.	<ul style="list-style-type: none"> <li>■ Waste collection does not occur in the poorer areas of Nairobi in the absence of a coordinated approach to sustainable waste management. Only 33 per cent of Nairobi's population can afford these services.</li> <li>■ Jobs in the sector are often significantly underpaid and do not provide health insurance or safety equipment.</li> <li>■ Training opportunities and learning tools and workshops are not coordinated and organized, so that little innovation and improvement is possible.</li> </ul>
<b>Growth and Development</b>	Empowerment of Women	New income-generating activities for women	The NAMA will create opportunities for new income-generating activities for women.	<ul style="list-style-type: none"> <li>■ Employees in the different sector compartments are not well protected and do not receive incentives to learn and develop.</li> </ul>
	Capacity Development	Build extensive capacity at both the national and regional levels for sustainable waste management	The NAMA will provide capacity development for SMEs in recycling and composting, and for the general public on waste reduction and waste segregation at origin.	<ul style="list-style-type: none"> <li>■ No training for start-ups or for new or improved technical equipment is provided and little innovation is happening in SMEs.</li> </ul>
	Access to Sustainable Technology	Increased access to improved or state of the art recycling and composting technologies, leading to increased process efficiency	The NAMA will increase access to recycling and composting technologies, thereby improving the process efficiency and quality of recycled products or compost.	<ul style="list-style-type: none"> <li>■ SMEs have currently little or no access to modern technology which would allow them to improve the process cycles and outputs of the recycling processes and improve the quality of compost.</li> </ul>

Domain	Indicator	Parameter	Explanation of Parameter	Baseline
<b>Economic</b>	Job Creation (Number of Men and Women employed)	Creation of skilled and semi-skilled employment	The NAMA will foster productivity, increase production efficiency and decrease production time, enable added value activities and encourage new income-generating activities, enhance economic growth and provide the means to alleviate poverty.	<ul style="list-style-type: none"> <li>■ Participating SMEs are working with less efficient equipment and have few opportunities to expand their businesses and hire new recruits under socially improved conditions.</li> <li>■ Employees have few opportunities to participate in trainings that foster innovation and productivity.</li> </ul>
<b>Institutional</b>	Policy and Planning	Enabling Policy environment	Proper organizational structure for NCA set up.	<ul style="list-style-type: none"> <li>■ Institutions engaged in this sector are not coordinating well and are not well set up to overcome the barriers facing the sector.</li> </ul>
		Management, Coordination & Approvals by NCA	NIE Operation management system and procedures implemented.	<ul style="list-style-type: none"> <li>■ Sub-units and technical teams within the Ministry have no efficient management system in place to respond to the urgent needs of the sector and encourage sustainability in the sector.</li> </ul>
	Laws and Regulations	Management, Coordination & Approvals by NIE	Operational management system and procedures implemented for the NIE structure.	<ul style="list-style-type: none"> <li>■ The technical entity proposed for the implementation of the NAMA is not coordinating with lead Ministries to improve waste collection and disposal operations.</li> </ul>
		Management, Coordination by NEE	Operational management system and procedures implemented for the NEE structure	<ul style="list-style-type: none"> <li>■ SMEs throughout the waste sector value chain are not encouraged to coordinate and implement their activities in a sustainable and expanding manner so that the collection rate and recycling volumes increase to the extent needed.</li> </ul>



### 5.3 NAMA Targets

While the NAMA is supporting the overall objective of the NCCAP to improve waste management and increase employment through improved waste collection and private sector incentives to encourage reuse and recycling, the NAMA target values need to be set in such a way that they can be used to quantify impacts of SD indicators:

The NAMA targets are therefore defined as shown in Table 8.

**Table 8: NAMA Indicators, Impacts and Target Values**

Indicator	Impact	NAMA Target Value
Climate change adaptation and mitigation	Tons CO <sub>2</sub> -equivalent	832,032 tCO <sub>2</sub> e
Quantifiable SD impacts	Hectares compost applied	14,235 ha
	Number of people engaged in new or improved businesses	1,600 persons
	Number of women employed	1,000 persons
	Number of items of new equipment	200 pieces
	Number of SMEs trained	105 companies
	New jobs created	1,600 jobs
	NCA established	1 entity
	Technical and financial NIEs established and operational	2 entities
	Participating NEEs	40 companies

By having these impacts this NAMA meets the requirements for NAMAs set out in the UNFCCC Bali Action Plan (UNFCCC, 2008).

- **Developing country party.** NAMAs are developing country parties' instruments.
- **Voluntary.** Developing countries are not obligated to engage in NAMAs. (This NAMA was proposed by national stakeholders of Kenya)
- **Nationally appropriate.** NAMAs should be appropriate for the national circumstances and development needs of the developing country. Sustainable waste management has been identified as a priority area in the NDC.
- **Sustainable development.** NAMAs should be an integral part of a country's broader sustainable development strategy. (This NAMA fulfills a number of Kenya's sustainable development goals as defined in the national strategies such as the Vision 2030).
- **Support.** NAMAs can access developed country support (technology, finance and capacity development).
- **Measurable, reportable, and verifiable (MRV).** NAMAs (as well as the support from developed countries) are subject to international or internationally defined MRV (UNFCCC, 2008). (A detailed MRV framework is part of this document).

# 6 THE NAMA CIRCULAR ECONOMY APPROACH

## 6.1 The Circular Economy Business Model

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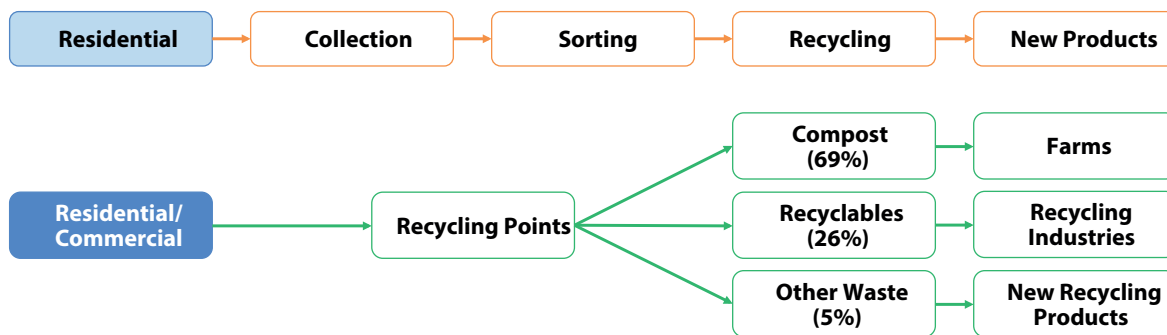
The circular economy model described in the NAMA proposes a separation of 90 per cent of all collected waste for recycling and would give Kenya one of the highest recycling rates globally. (For comparison, Italy has a recycling rate of 36 per cent and the USA one of 34.5 per cent—US EPA, 2012).

Waste collection companies will collect waste from households and businesses. They will then take it to decentralized recycling points instead of disposing it at Dandora dumpsite. At the recycling points, the waste will be sorted into various fractions. Recyclable materials (30 per cent of the total waste collected) will be sold to recycling industries. Organic waste (60 per cent of the total waste collected) will be taken to a composting plant, where it will be turned into compost. The remainder of the waste will be disposed or, within a small research pilot activity, be taken to a cement-kiln for energy production.

The figure below shows the operational flow of the circular economy approach of the NAMA. Revenues come from three sources:

- Waste collection fees (earned by collectors)
- Sales of recyclable materials and tipping fees (earned by recycling points)
- Sales of compost (by composting businesses)
- Sales of new products (by recycling industries).

Figure 8: Circular Economy Model



The key “building block” of the NAMA, namely the four outcomes described below, will ultimately lead to scaled up emission reduction, sector transformation by establishing recycling points and composting facilities, and improved recycling processes and a financially viable compost business model directly aligned to the objectives of the NAMA.

The NAMA has two key objectives that will result in four distinct outcomes:

**Objective 1:** Establish Infrastructure for recycling and reuse of waste to substantially reduce the amount of disposed waste:

**Outcome A:** 15 Recycling points: The NAMA will support the set-up of recycling points by providing loans to acquire the relevant land for them. In a later stage of the project, from year 3 onwards, the county government will provide land for this purpose. The NAMA will also fund the infrastructure of the recycling points (buildings, equipment). As the recycling points enable all subsequent recycling activities, they form a core part of the NAMA. This is why the NAMA will fund the infrastructure through grants.

**Outcome B:** 16 Composting facilities: The NAMA will support the set-up of composting facilities by providing loans to acquire the relevant land for them. In a later stage of the project, from year 3 onwards, the county government will provide land for this purpose. The NAMA will also fund the infrastructure of the composting facilities. The NAMA will provide grants to support a more climate-friendly composting technology, composting sheets by the company Gore. Other equipment components will be funded through loans.

**Objective 2:** Establish a framework for the private sector to participate in the recycling and reuse of waste:

**Outcome C:** New or improved technologies to increase recyclable fractions and improve recycling processes: The NAMA will support existing recycling industries by subsidising technology upgrades or new technologies. These technologies will either improve existing processes or enable the recycling of previously non-recycled materials.

**Outcome D:** Compost market is developed and sale of compost becomes a viable business model.

The NAMA will support market development for compost, as this will be essential for the viability of the composting plants. This will include trial farms, transport costs and technical experts. This support will be in the form of grants.

The technical interventions of the NAMA will result in real and measurable outcomes that will lead to scaled up emission reduction.

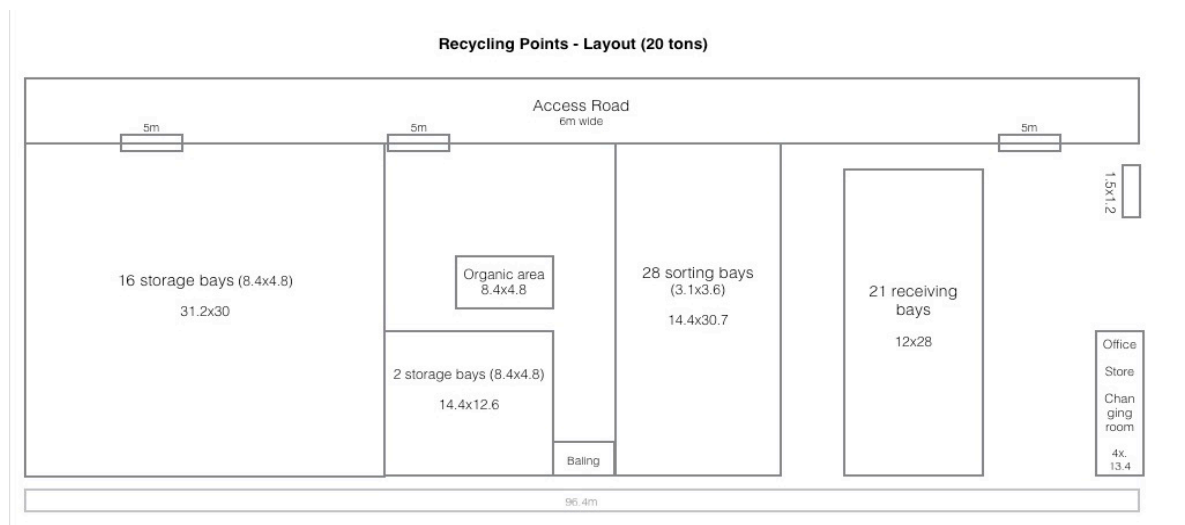
### 6.1.1 Recycling Points, Sorting Process and Layout

At a recycling point mixed waste is manually sorted into around 40 waste fractions. These waste fractions are then purchased and collected by various recycling industries for recycling.

Collection trucks enter the facility and the waste is offloaded in a designated receiving area. From there the waste is weighed and distributed to the sorters, who sort the waste on an individual sorting table. After sorting, the waste fractions are weighed again before they are put into the storage chambers. The organic waste is stored in skips. The facility has separate entrances for incoming waste and the collection of sorted waste.

Each area of the facility is roofed. The receiving, organic waste and residual waste storage areas also have leachate collection systems. The facilities are fully compliant with Kenyan environmental (NEMA) standards.

**Figure 9: Recycling Point Layout for a Daily Capacity of 20 Tons of Waste (Size in Meters)**



### Waste sorting at a recycling point



#### 6.1.2 Composting Process and Layout

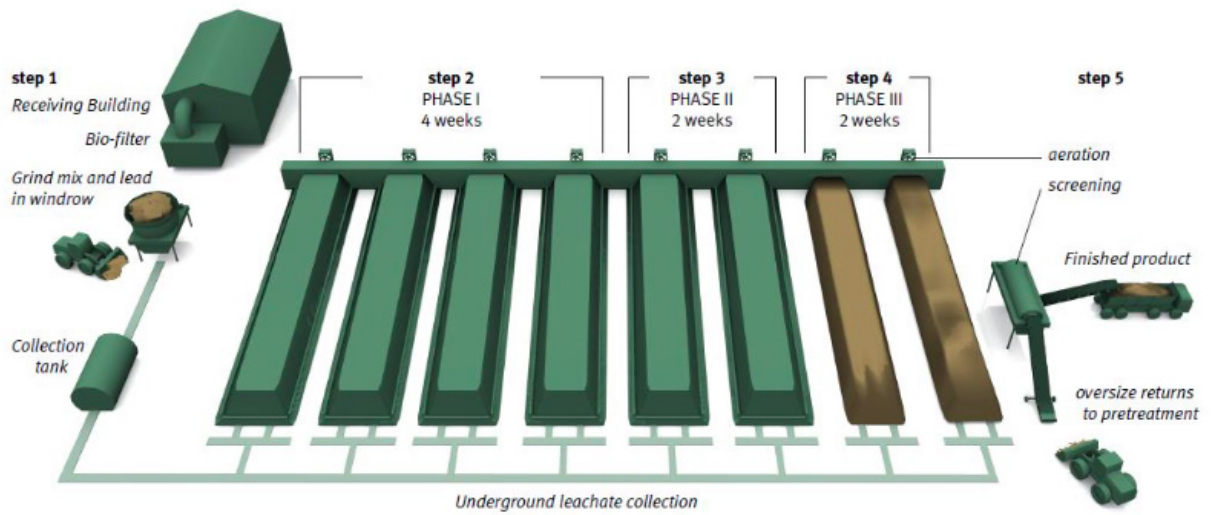
Organic waste, which makes up 60 per cent of collected waste, will be processed to high-quality compost. The compost will then be sold to smallholder farmers through agro-dealer networks and direct sales.

At the composting facility organic waste is converted into compost (organic fertilizer). The produced compost is sold to farms as a soil amendment product.

Sorted organic waste is brought from the recycling points to the facility in skip trucks. The offloaded organic waste is mixed with shredded wooden material and then built up into big piles called windrows. The windrows, covered by semi-permeable Gore-tex sheets, are regularly aerated. This provides an ideal decomposition environment. Over a period of three months the organic waste turns into compost, whereupon it is sieved and bagged.

The windrows have in-built leachate collection systems, which make it possible to recycle the leachate back into the compost. The facilities are fully compliant with Kenyan environmental (NEMA) standards.



**Figure 10: Layout of the Composting Facility**

### Gore-tex composting technology



The Gore-tex technology, GORE® Cover, is a composting solution for the treatment of organic waste. It provides optimized process control for producing consistent high quality compost and has significantly lower CH<sub>4</sub> and N<sub>2</sub>O emissions in comparison to other technologies.

A variety of input materials can be processed and have already been successfully applied in more than 150 composting plants in more than 20 countries. GORE® Cover meets the strictest of regulatory requirements worldwide.

### 6.1.3 Composting Field Trials (Test Farms)

The field trials test how compost performs under various circumstances: different crops, in combination with other agricultural inputs and different soil types. Successful trials help convince farmers that compost is an economically viable input in their production process. This is important, as the market for compost is largely undeveloped in Kenya.

The field trials can take place at a dedicated trial site or on the existing land of farmers. A specific trial set-up will usually involve various crops (e.g. maize, potatoes, French beans, etc.), various input combinations (e.g. compost, chemical fertilizer, manure, etc.) and different compost application rates (high and low). To ensure that the results are not random, each combination of crop/inputs/application rates will be replicated three times.

#### Compost test farm in Kiambu County



## 6.2 NAMA Institutional support and Support for Technology Transfer and Development

The NAMA will provide support to various stakeholders across various topics as described in detail in the following sections.

### 6.2.1 NAMA Institutional Support

**Waste standards:** in conjunction with the Kenya Bureau of Standards, the NAMA will work on two projects. First, a standard on recyclable materials as an input to recycling industries will be developed. Second, the existing standard on compost will be further improved with a specific focus on developing the laboratory testing capacity in Kenya.

**Waste management Association of Kenya (WEMAK):** WEMAK is the industry umbrella group for waste collection companies in Nairobi. The NAMA will support WEMAK through capacity building workshops, operational support in the form of funding core staff as well as providing GPS trackers to its members.

**County governments:** The four involved county governments will benefit from workshops on policy changes and best practice, foreign travel to visit best-practice examples, funding of travel as well as supporting awareness creation initiatives with residents and other stakeholders.

NAMA support for technology transfer and development:

**New technologies:** The NAMA will also support the testing and implementation of new recycling technology that will propel Nairobi towards a 100 per cent recycling rate. This will entail:

- Setting up partnership with cement factories to convert the remaining residual waste to energy through their cement kilns.
- Testing the production of insect based protein from organic waste through a study and a processing plant. This technology is currently gaining momentum in the USA, Europe and South Africa.
- Enriching compost with charcoal produced from organic waste, which allows for higher quality compost (terra preta). Terra preta charcoal adds additional carbon to the soil, which increases soil fertility.

**Pilot technology studies:** The previously mentioned technologies to be operationalized by the private sector (residual waste to cement kiln, insect based protein, enriching compost with charcoal) will be preceded by technical studies. Additionally, a study on how to treat hazardous waste fractions will also be undertaken.

### 6.3 Waste Fractions Included in the NAMA

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The following waste segments will be covered under the circular economy approach.

- Recycling of plastics
  - PET bottles
  - Hard HDPE plastics
  - Low-grade plastics
  - HDPE plastic bags
  - Bio PP bags
  - PP bags
  - LDPE plastic bags



- Milk sachets
- PVC plastics
- Recycling of paper
  - Cartons
  - Paper
  - Newspaper
  - Tetrapak
- Recycling of glass
  - Bottles in all colours
  - Broken glasses in all colours
- Recycling of metals
  - Aluminum
  - Other metals
- Recycling of e-waste
- Recycling of textiles
  - Shoes
  - Clothes
- Composting of biodegradable/organic material.
- Recycling of all other waste fractions as residual waste through cement kilns

Although the GHG emission reductions will only be accounted for with respect to recycling of plastics and composting in line with the fractions included in the existing approved Clean Development Mechanism small-scale methodologies for recycling (AMS-III.AJ “Recovery and Recycling of Materials from Solid Waste”) and composting (AMS-III.F “Avoidance of methane emissions through composting”), the NAMA will also encourage the recycling of a wide variety of other fractions as listed above. This will significantly increase the GHG impacts of the NAMA beyond what is currently defined as the NAMA GHG emission reductions target. Efforts are being made by UNDP to amend the approved CDM methodologies and include additional fractions to increase the accountable NAMA ER volume (in an on-going assignment outside this NAMA support).

## 6.4 Eligibility Criteria and Support Mechanisms for Private Sector Companies

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In line with national policies such as the NCCAP, the NAMA will create incentives for private sector players. The NAMA provides a transparent guiding framework for private sector participation and thus provides predictability for private sector players wishing to engage. The guiding principles of the NAMA are defined through eligibility criteria for private sector engagement across the different project segments and are explained in Sections 7.4.1 – 7.4.5.

### 6.4.1 Eligibility Criteria for Waste Collection Companies (under WEMAK)

#### 6.4.1.1 Engagement requirements

##### Legal

- pays legally defined minimum wages to all employees;
- has proof of tax compliance and audited accounts;
- obtains required licences (from the City Council, NEMA, OSH, etc.);
- has required insurance (WIBA, Employer Liability, etc.);
- is a fee-paying member of the Waste Management Association.

##### Social

- all employees have safety equipment.

##### Economic

- pays tipping fee to operator(s) of recycling points

##### Technical

- can deliver non-loose waste to recycling/recycling points (in prescribed sacks);
- can offer proof of not dumping illegally.

#### 6.4.1.2 NAMA Measures to Support Waste Collectors

##### 6.4.1.2.1 Capacity development support

- Identification of incentives to increase participation in the Waste Management Association.
- Design of waste management policies that benefits the private sector
- Incentives such as technical gadgets for waste collection trucks (e.g. GPS tracking).
- Capacity development to facilitate working with recycling points.

## 6.4.2 Eligibility Criteria for Recycling Points

### 6.4.2.1 Engagement Requirements

#### Legal

- pays legally defined minimum wages to all employees
- has proof of tax compliance and audited accounts
- obtains required licences (City Council, NEMA, OSH, etc.)
- has required insurance (WIBA, Employer Liability, etc.).

#### Social

- all employees have safety equipment.

#### Economic

- Has buyers for at least 75 per cent of recyclable fractions;
- Has proof of a Service Level Agreement with a recycling company for 75 per cent of waste fractions

#### Technical

- Is currently sorting at least 15 tons of waste per day at least one existing recycling point;
- Is able to separate at least 75 per cent of recyclable materials into at least 20 different fractions;
- Has appropriate recording and documentation systems for waste sorting.
- Is able to sort incoming mixed waste

### 6.4.2.2 NAMA Measures to support recyclers

#### 6.4.2.2.1 Financial support

- Soft loans for land purchase;
- Grants for equipment to enhance operations
  - balers
  - scales for trucks
  - conveyor belts;
  - infrastructure at recycling points

#### 6.4.2.2.2 Capacity development support

- Capacity development and knowledge exchange with international experts from recycling/sorting plants.

### 6.4.3 Eligibility Criteria for Composting Companies

#### Legal

- pays legally defined minimum wages to all employees
- has proof of tax compliance and audited accounts
- has required licences (City Council, NEMA, OSH, etc)
- has required insurance (WIBA, Employer liability, etc).

#### Social

- all employees have safety equipment

#### Economic

- Has existing buyers for compost (purchase agreements);
- Is already operating a composting plant with at least 5 tons of input per day;
- Is undertaking market development (test farms, trials, etc.).

#### Technical

- Can collect waste from recycling points;
- Has environmentally compliant composting technology
  - leachate collection systems in place
  - standard technology in place (windrow turners, in-vessel composting, etc);
- Has qualified agricultural staff for marketing;
- Has Kenya Bureau of Standards certification for compost.

#### 6.4.3.1 NAMA Measures to Support Composters

##### 6.4.3.1.1 Financial support

- Soft loans for land purchase;
- Soft loans for composting equipment;

- Grants for climate efficient technologies;
- Grants for market development;
- Grants for developing co-composting feedstock options (charcoal);

#### 6.4.4 Eligibility Criteria for Recycling Industries

##### Legal

- pays minimum wages to all employees
- has proof of tax compliance and audited accounts
- obtains required licences (City Council, NEMA, OSH, etc.)
- has required insurance (WIBA, Employer liability, etc.)

##### Social

- All employees have safety equipment.

##### Economic

- Has existing market for end-product;
- Is already operating a recycling plant with at least 1 ton of input per day.

##### Technical

- Has Kenya Bureau of Standards certification for end-product;
- Is working in a target sub-sector of the NAMA:
  - Specific plastic fractions (low-grade, etc) recycling
  - Other sub-fractions that recycling points do not have buyers for

#### 6.4.5 Eligibility Criteria for New technologies

- Residual waste to cement kilns: This support will go to operators of recycling points. Hence, the criteria will be the same as for recycling points.
- Insect based animal feed: This support will go to an operator of both recycling points and composting plants. This is because the operator needs to control for the type of organic waste input as well as have the production capacities for organic waste. Hence, both the criteria for composting plants and recycling points will apply.

- Terra-preta production: This support will go to an operator of both recycling points and composting plants. This is because the operator needs to control for the type of organic waste input as well as have the production capacities for organic waste. Hence, both the criteria for composting plants and recycling points will apply.

## 6.5 Technical Requirements for Participation in Recycling and Composting

### 6.5.1 Recycling of Waste

This NAMA intervention comprises activities for the recovery and recycling of materials in municipal solid waste (MSW) to process them into intermediate or finished products, thereby resulting in energy savings.

**Table 9: Key Elements of the Intervention**

Typical projects	Plastic materials (HDPE, LDPE, PET, PP and PVC), paper (cartons, paper, newspaper, tetrapak), glass, metals, e-waste and textiles are recycled from municipal solid wastes (MSW) and processed into intermediate or finished products (e.g. plastic bags).
Type of GHG emissions mitigation action	Production of HDPE, LDPE, PET and PP from virgin materials is reduced, thus reducing related energy consumption.

The following technical requirements need to be met using new equipment to be eligible for funding under this NAMA.

**Table 10: Mandatory Technical Requirements**

Criteria	Mandatory Requirements
Recycling Facility	The recycling facility is an existing or newly built facility, operated and managed by the formal sector. It may receive recyclable materials from the informal waste sector, but has no informal sector participation in its organization or management functions.
Recycled Output	Mechanisms must be in place to directly measure and record the final output of the recycling facility and the input to the final processing/manufacturing facility (the weighing of materials leaving the recycling facility and of those entering the processing/manufacturing facilities, on a dry basis).
Value Chain	Each type of recycled material is sold directly to the processing/manufacturing facility or to an intermediary retailer that is able to transfer the materials to the final identifiable facility.
Energy Consumption	It is possible to measure and record the amount of fuel/electricity consumed by the recycling facility.
Waste Source	The recycling facility will source its material from formal collection companies of MSW; unidentified sources are not eligible.

### 6.5.2 Composting of Biodegradable Material

This NAMA intervention comprises measures to avoid emissions of methane into the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS).

The compost submitted for soil application must be properly handled in order to avoid methane emissions.

## 6.6 Approval Process for Grant Disbursement to Private Sector Participants

The NAMA intervention is defined as the recycling, reuse and composting of MSW. The initial focus area for the three interventions is Greater Nairobi.

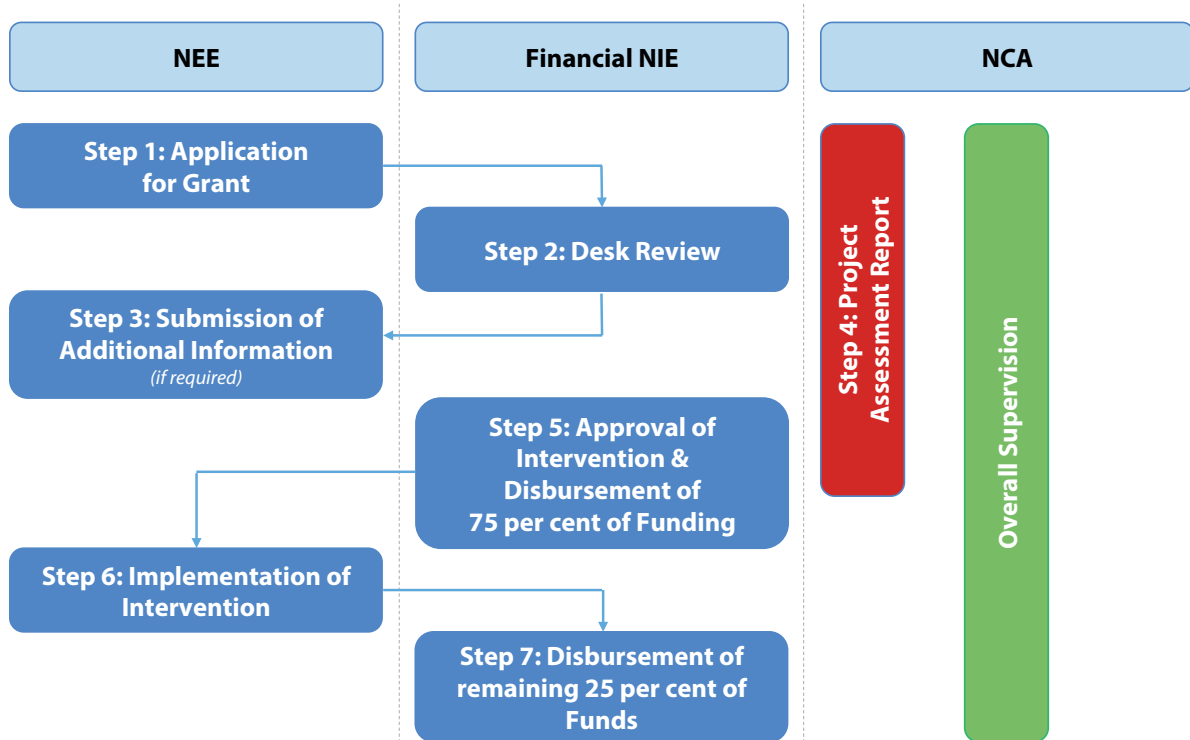
The NAMA interventions and eligibility criteria for private sector participation are already confirmed, so that the approval process for grant disbursement to private sector participants can effectively be accomplished in seven steps, as shown in Table 11.

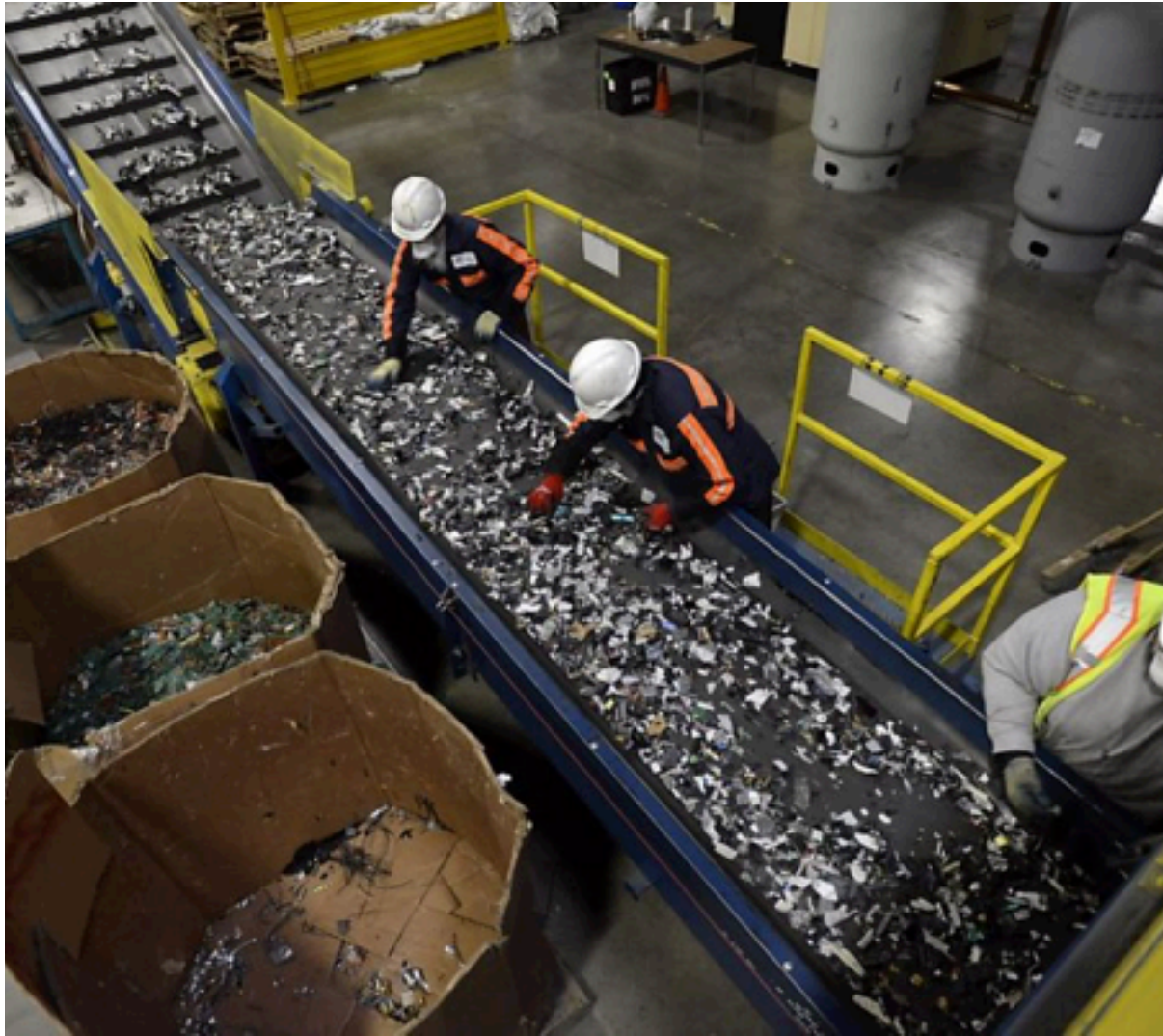
**Table 11: Description of NAMA Approval Process**

No.	Step	Description
1	Grant application by a NAMA Executing Entity (NEE) (recycling and/or composting)	The NEE will send either by postal service or email an application form requesting a grant for (i) purchasing land (recycling point), (ii) equipment (recycling point and composting facility) which is on a list of pre-approved equipment. The grant application must be submitted before the start of implementation. (Start of implementation is defined as receipt of unconditional purchase contract).
2	Desk review by Financial NAMA Implementing Entity (NIE)	The Financial NIE will carefully review the grant application submitted by the NEE against predefined criteria (eligible equipment, location and area of land, and technical requirements defined in Section 7.1).
3	Additional information request	If the application is not complete, the NIE will contact the NEE to ask for additional information.
4	Project assessment report	The project assessment report will include a description of the land and/or equipment to be purchased and a final recommendation for approval or rejection.
5	Approval or rejection by Financial NIE & Disbursement of 75 per cent of Funding	Based on the information provided, the NIE will either approve the application for funding or reject it and disburse 75 per cent of funding
6	Implementation of intervention by the NEE	The NEE will implement the intervention.
7	Disbursement of remaining 25 per cent of Funds	The Financial NIE will disburse the remaining 25 per cent of the funds after successful implementation of the intervention.



Figure 11: The NAMA Intervention Approval Process





# 7 THE NAMA INSTITUTIONAL STRUCTURE

## 7.1 Institutionalizing the NAMA

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The coordination and management of the NAMA requires an institutional structure which will meet the following requirements:

- Be embedded in national and sectoral policies and strategies;
- Undertake effective communication and reporting as required by international agencies (e.g. the UNFCCC Secretariat);
- Provide an interface with international bilateral and multilateral NAMA funding entities (e.g. the Green Climate Fund);
- Ensure proper management of financial flows between the NAMA funding entities and the recipients;
- Ensure achievement of NAMA targets for
  - i. increased recycling and composting,
  - ii. GHG mitigation, and
  - iii. sustainable development benefits;
- Allow transparent monitoring of GHG emission reductions and the Sustainable Development indicators.

The recommended institutional structure of the NAMA is based on the following principles:

- The strong involvement of national stakeholders to create country ownership and ensure political commitment;

- Utilization of existing, experienced entities and organizational systems, which, because they are already in place, allow for prompt and smooth implementation of the NAMA;
- Ensuring that the institutional structure is appropriate for receipt of international private and/or public donor funding.

The following sections provide an in-depth understanding of the roles and responsibilities of the institutional bodies listed above

## 7.2 NAMA Institutions

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The institutional structure for the NAMA in Kenya comprises the following institutional bodies on the country level:

- NAMA National Focal Point or National NAMA Approver (NA) and NAMA Coordinating Authority (NCA)
- NAMA Implementing Entities (NIEs)
- NAMA Executing Entities (NEEs)
- National Climate Change Steering Committee (NCCSC)

The **National Climate Change Secretariat** (NCCS) was established by the Ministry of Environment and Natural Resources (MENR) to help it gather and collate input and advice from key climate change stakeholders for its use in the coordination of Kenya’s climate change activities. It will oversee NAMA implementation and provide guidance to the UNFCCC National NAMA Approver and the NAMA Coordinating Authority.

### **National NAMA Approver or Focal Point**

The National NAMA Approver or Focal Point will inter alia:

- approve NAMAs which shall be registered at the UNFCCC;
- report to the NCCSC about international developments and the status of the national NAMA portfolio, and follow the guidance of NCCSC in international negotiations;
- provide guidance to the NAMA Coordinating Authority (on access to climate finance, financial flows, MRV etc.);
- issue procedures for accounting of emission reductions to avoid double counting of emission reductions from various implemented NAMAs ; and
- support the preparation of the National Communication, Biennial Update Reports, Summary of GHG reductions etc. for submission to the UNFCCC Secretariat.

### **The NAMA Coordinating Authority (NCA)**

The NAMA Coordinating Authority (NCA) is the entity which will coordinate environmental issues in Kenya. Its main tasks are:

- acting as primary contact for international donor(s);
- managing and directing the NAMA;
- approving NAMA targets in line with the implementation plan;
- overseeing the development of new waste standards under NEMA;
- supervising the financial flows between financial NIE and beneficiaries;
- updating the eligibility criteria for interventions;
- building capacity in institutions involved in the implementation of the NAMA;
- coordinating promotion and awareness raising campaigns to support the implementation of the NAMA;
- coordinating and approving annual monitoring reports prepared by the NIE (covering inter alia: number of projects implemented; calculation of emission reductions, SD impacts etc.);
- facilitating and coordinating verification through the external designated entity;
- reporting to the NA to fulfil reporting requirements to the donor(s);
- cooperating with financial internal and external auditors on the MRV process.

The **Ministry of Environment and Natural Resources through the National Climate Change Secretariat** has already been appointed as NAMA Approver/ Focal Point to the UNFCCC Secretariat and it is suggested that, as the relevant sectoral ministry, should also act the NAMA Coordinating Authority .

### **NAMA Implementing Entities (NIEs)**

The NAMA Implementing Entities (NIEs) constitute the main operational body of the NAMA.

Two specialized NIEs will manage their respective areas: the Financial NIE (Trustee) will manage the financial flows from the funding entities to the beneficiaries as well as approval of eligible private sector participants and the Technical NIE will manage the technical capacity development of the NAMA as well as summarizing monitoring data.

The main tasks of the Financial NIE are:

- handling the approval process with regard to the disbursement of funds (in close collaboration with the NCA);
- handling the approval process with regard to project applications (in close collaboration with the NCA);

- ensuring the proper transfer and disbursement of funds to the recipients based on an agreed set of criteria;
- preparing reports to the NCA/donors on the use of funds, in coordination with the Technical NIE;
- cooperating with internal and external financial auditors.

The main tasks of the Technical NIE are:

- providing capacity development for institutions and companies involved in the implementation of the NAMA;
- selecting international and national experts to implement the capacity development measures;
- implementing promotion and awareness raising campaigns about sustainable waste management;
- implementing business development activities for the recycling industry and compost market development;
- setting-up partnerships with cement factories for conversion of residual waste to energy;
- coordinating testing of new technologies in interested composting facilities;
- overseeing the expert studies for the application of new technologies; coordinating and compiling monitoring data;
- preparing reports to the NCA in coordination with the financial NIE on the MRV of GHG emission reductions and SD impacts; and
- cooperating with internal and external financial auditors.

The NAMA Technical and Financial Implementing Entities will be determined through a stakeholders consultation process organized by NCA, within a 3 months period after start of NAMA implementation.

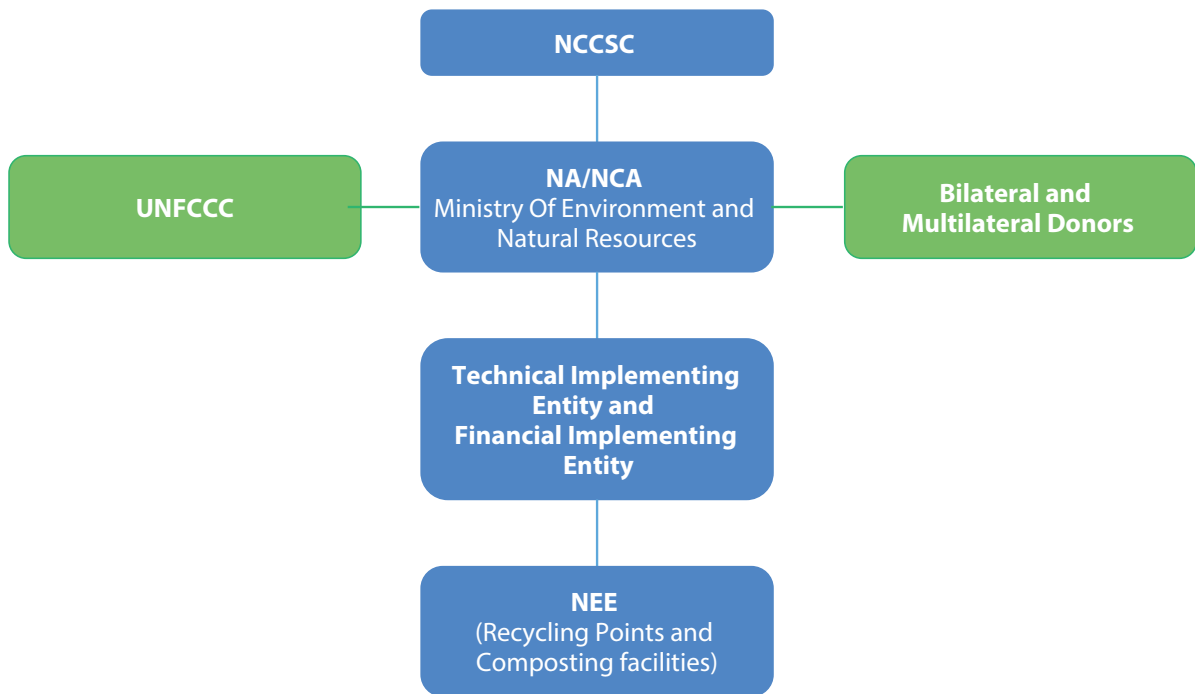
### **NAMA Executing Entities**

The NAMA Executing Entities (NEEs) are the companies which install the recycling points and composting facilities either for capacity expansion or as greenfield projects. NEEs will:

- install and operate recycling and composting facilities ; and
- collect data for monitoring purposes.

Figure 13 illustrates the institutional structure of the NAMA. Bilateral funding entities or donors will be in direct contact with the NCA. The NCCSC will act as the national high level political supervisory body of the NAMA.

**Figure 12: Institutional Structure of the NAMA**









## NAMA COSTS AND FINANCE

This chapter provides details about the funding requirements and the financial mechanisms which will be used in the NAMA.

### 8.1 Determination of NAMA Costs

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The total NAMA costs are split up into three components, investment loans and grants for the two interventions and technology development, capacity development, research and standard development and project management costs (see Table 12).

The total NAMA costs for investment loans and grants are based on actual investment costs in land and infrastructure in Nairobi and new sorting and state of the art composting technologies globally.

The total investment costs (to be met by international grants and investment loans, national grants and investment loans) for the 15 recycling points and 16 composting plants and the necessary technical infrastructure and trucks are estimated at approximately US\$ 35million (Table 12).

The expected costs for capacity development are approximately US\$3.8 million and the costs for project management are estimated at US\$2 million for the overall lifetime of the NAMA of 15 years (Phases 1 and 2).

#### 8.1.1 International and National Grants and Loans

Tables 12-15 provide a detailed breakdown of the investment needed for (i) the establishment of the recycling points, (ii) establishment of composting facilities, (iii) investment in new technologies and improved processes for recycling companies, (iv) compost market development and (v) state of the art technology transfer and application:

**Table 12: International Investment grants (to private sector)**

Intervention	Invest/Unit	Unit rate	Total Items	Investment grant	Nr Units	Total grant
	US\$					USD
<b>1. Recycling Points (per 1 acre)</b>						
Building & equipment	40,000	1	15	1	15	600,000
Cement floor	100,000	1	15	1	15	1,500,000
Baler recyclables	50,000	1	15	1	15	750,000
Conveyor belt	30,000	2	15	1	30	900,000
Other equipments	10,000	2	15	1	30	300,000
<b>Sub-Total Investment Grants Recycling Points</b>						<b>4,050,000</b>
<b>2. Composting plant (per 25 tons/day)</b>						
Gore-tex composting sheets	400,000	1	16	0.4	6	2,560,000
<b>Sub-Total Investment Grants Composting Plants</b>						<b>2,560,000</b>
<b>3. Compost market development</b>						
Trial farms	10,000	1	40	1	40	400,000
Vehicles	25,000	1	4	1	4	100,000
Transport costs	5,000	1	10	1	10	50,000
Marketing expert (salaries)	50,000	1	10	1	10	500,000
Agricultural experts (salaries)	50,000	1	10	1	10	500,000
<b>Sub-Total Compost Market Development</b>						<b>1,550,000</b>
<b>4. New technologies</b>						
Residual waste to cement kiln	100,000	1	1	1	1	100,000
Insect based animal feed	300,000	1	1	1	1	300,000
Charcoal production (co-composting)	300,000	1	1	1	1	300,000
<b>Sub-Total Investment Grants New Technologies</b>						<b>700,000</b>
<b>5. Recycling industries</b>						
Investment subsidy	30,000	1	20	1	20	600,000
<b>Sub-Total Investment Grants Recycling Industries</b>						<b>600,000</b>
<b>Total Investment Grants</b>						<b>9,460,000</b>

**Table 13: Local Investment grants (government contribution to private sector)**

Intervention	Invest/Unit	Unit rate	Total Units	Investment grant	Nr Units	Total grant
	USD					USD
<b>1. Recycling Points (per 1 acre)</b>						
Land	800,000	1	10	1	10	8,000,000
<b>Sub-Total Local Grants Recycling Points</b>						<b>8,000,000</b>
<b>2. Composting plant (per 25 tons/day)</b>						
Land	100,000	1	10	1	10	1,000,000
<b>Sub-Total Local Grants Composting Plants</b>						<b>1,000,000</b>
<b>Total Local Investment Grants</b>						<b>9,000,000</b>

**Table 14: International investment Loans (to private sector)**

Intervention	Invest/Unit	Unit rate	Total Units	International Loan	Nr Units	Sub-Total
	USD					USD
<b>1. Recycling Points (per 1 acre)</b>						
Land	500,000	1	5	1	5	2,500,000
<u>Sub-Total Investment Loans Recycling Points</u>						<u>2,500,000</u>
<b>2. Composting plant (per 25 tons/day)</b>						
Skip trucks	110,000	0.7	16	0.5	6	616,000
Gore-tex composting sheets	400,000	1	16	0.6	10	3,840,000
Floor composting units	120,000	1	16	1	16	1,920,000
Shredder	100,000	0.5	16	1	8	800,000
Sieve	60,000	0.5	16	1	8	480,000
Land	100,000	1	16	1	16	1,600,000
<u>Sub-Total Investment Loans Composting Plants</u>						<u>9,256,000</u>
<b>Total International Investment Loans</b>						<b>11,756,000</b>

**Table 15: Local investment Loans (to private sector)**

Intervention	Invest/Unit	Unit rate	Total Units	Local Loan	Nr Units	Sub-Total
	USD					USD
<b>1. Collection</b>						
Collection trucks	50,000	1	40	1	40	2,000,000
<u>Sub-Total Investment Loans Recycling Points</u>						<u>2,000,000</u>
<b>2. Composting plant (per 25 tons/day)</b>						
Skip trucks	110,000	0.7	16	0.5	6	616,000
Wheel loader	180,000	0.6	16	1	10	1,728,000
<u>Sub-Total Investment Loans Composting Plants</u>						<u>2,344,000</u>
<b>Total Local Investment Loans</b>						<b>4,344,000</b>

### 8.1.2 Capacity Development costs

In order for the NAMA to be successfully implemented and to be extended after the implementation of the first 31 recycling and composting points, the capacity development needs must be met through the provision of capacity-building activities and additional personnel must be hired to manage the NAMA. Most of these capacity development activities will be provided in the first five years of the NAMA, which are seen as the critical phase, but continued support is needed over the NAMA's lifetime to ensure sustainability and that all actors are in a position to contribute to a transformational change in the waste sector of Kenya.

The following international expert positions will be created to provide technical expertise for the NAMA and will remain involved, though to a decreasing extent, over the full NAMA lifetime:

- Policy expert
- Recycling expert
- Composting expert

Their task will be to increase the capacity of the NAMA implementation team but in particular the NEEs (recycling and composting), the NCA, WEMAK and county governments. To create and increase the capacity of the staff to be hired, national experts will support the Technical and the Financial NIE.

Table 16 gives an overview of the costs associated with capacity development during the operation of the NAMA (Phases 1 and 2).

**Table 16: Indicative Costs of NAMA Capacity Development**

Costs	Units	Nr of Units	Unit Rate	Costs (US\$)
<b>Waste Management Association (WEMAK)</b>				
Capacity-building	Days	50	500	25,000
Operational support	Per month	60	1000	60,000
GPS trackers	Devices	100	800	80,000
<u>Sub-Total</u>				<u>165,000</u>
<b>County governments (4)</b>				
Policy change workshops	Workshops	30	4000	120,000
Best practice workshops	Workshops	30	4000	120,000
Foreign travel	Visits	45	3000	135,000
Local Travel	Days	2000	50	100,000
Project vehicles	Vehicles	4	25000	100,000
Per diems	Days	2000	50	100,000
Awareness creation		400	1000	400,000
<u>Sub-Total</u>				<u>1,075,000</u>

<b>Technical experts</b>					
Policy experts	Days	80	800	64,000	
Recycling experts	Days	100	800	80,000	
Composting experts	Days	80	800	64,000	
Travel	Flights	80	1000	80,000	
Per diems	Days	260	200	52,000	
<u>Sub-Total</u>					<u>340,000</u>
<b>Pilot technology studies</b>					
Residual waste to cement kiln study	Study	1	50,000	50,000	
Organic insect based protein study	Study	1	50,000	50,000	
Charcoal (co-composting) study	Study	1	50,000	50,000	
Hazardous waste treatment study	Study	1	50,000	50,000	
<u>Sub-Total</u>					<u>200,000</u>
<b>Standards Development</b>					
Recyclables standard		1	50000	50,000	
standard and laboratory capacity- building		1	50000	50,000	
<u>Sub-Total</u>					<u>100,000</u>

### 8.1.3 Potential Source(s) of Finance:

For technology transfer and technology application the financing scheme can be extended through Corporate Sustainability schemes for companies interested in contributing directly to the sustainable, circular economy model in Kenya and to the SDGs as part of their corporate strategy.

### Box 3: Enabling Private Sector Finance through Strategic Corporate Sustainability Actions (CSA) and Impact Investing

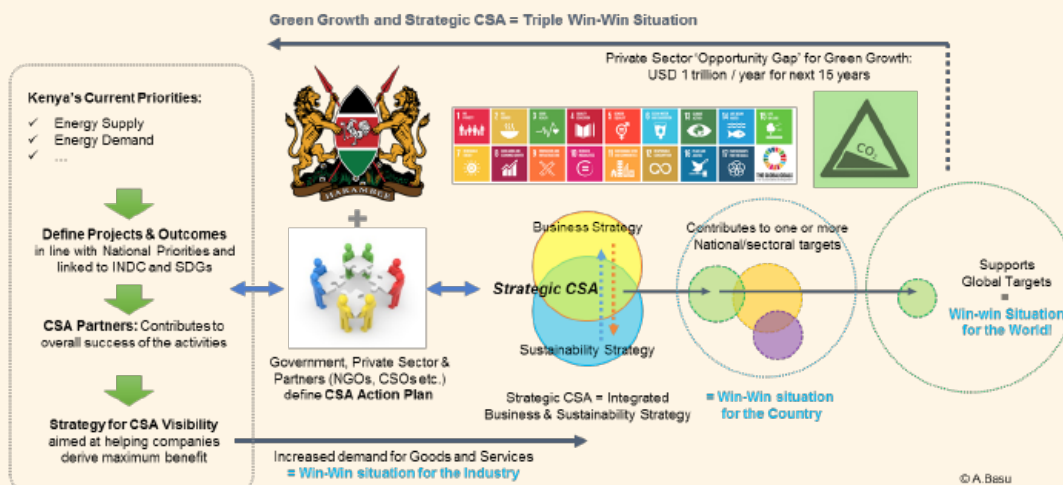
While there appears to be a good understanding of philanthropic Corporate Social Responsibility within business organizations in Kenya, there is a lack of understanding and awareness of the Paris Agreement and the SDGs and how they can potentially affect businesses in the coming years. An innovative approach to building private sector capacity adapt towards a low carbon future is by undertaking a strategic approach to Corporate Sustainability Actions or Strategic CSA

The concept combines elements of impact investing with the new global frameworks (i.e. Paris Agreement and SDGs). Businesses in Kenya take a pro-active approach to aligning socio-economic impacts, environmental benefits, and consistency with national and international priorities into business strategy development.

Some of the more innovative companies in the world are taking advantage of an increasingly connected and digital world to seek out business models drawing on the ideas of the “Circular Economy” and “Internet of Things” which combine elements of Strategic CSA with elements of information technology. These business models are challenging our very notion of markets, ownership and business value propositions and moving us towards a more sustainable and shared economy.

The figure below provides an overview of a strategic CSA model that allows the private sector in Kenya to take advantage of the emerging “Opportunity Gap” arising from the new global frameworks by integrating national priorities with elements of impact investing.

**Figure 13: Schematic Representation of a Strategic CSA Model**



### 8.1.4 National and International Finance

Financial flows and their management are a cornerstone of any NAMA, as they tie together many of the main NAMA components. In the context of this NAMA, the main focus will be on how to build and integrate a reliable and transparent structure of financial governance into the NAMA and how to manage the financial flows and establish the controls required to ensure a sustainable use of funds.

The basis of this NAMA is a co-financed effort between the Government of Kenya and international partners and local executing entities. Therefore, this section considers the different tracks of finance, national grants and loans, international grants and loans, and local revenues raised through waste collection and sales of compost and recyclable products. The local revenues generated by the executing entities will ensure that the operation of the interventions is sustainable.

As the financing for the NAMA is subject to negotiation with various parties, the sources of national and international finance that are outlined are only indicative at this time. Table 17, below, summarizes the proposed sources of finance by the various line items under the NAMA.

**Table 17: International and National Funding Needs**

		<b>Phase 1</b>	<b>Phase 2</b>
<b>Funding by type</b>	<b>Total cost</b>		
International investment grant	9,460,000	9,072,500	387,500
Government investment grant	9,000,000	9,000,000	0
International investment loan	11,756,000	11,756,000	0
Local Private Sector Investment Loan	4,344,000	4,344,000	0
International capacity development grant	2,105,600	1,133,253	972,347
International project management grant	1,215,400	810,485	404,924
Government project management grant	767,000	0	767,000
<b>Total NAMA budget</b>	<b>38,648,000</b>	<b>36,116,238</b>	<b>2,531,771</b>

For the purpose of this NAMA, **national grants** are defined as financial flows or capital directly influencing the interventions designed under the NAMA, and which are within the operational control of the national Government. In this NAMA, it is proposed that national finance will include the following financial flows.

The Government of Kenya will contribute 44 per cent of the total grant contribution required for NAMA implementation, comprising:

- Land for recycling points and composting plants (from Year 3 onwards): US\$9 million
- Project management contribution: US\$767,000(over the total NAMA lifetime)

For the purpose of this NAMA, **international grants** are defined as financial flows or capital directly influencing the interventions designed under the NAMA and which originate from and are controlled by international partners (consisting of multilateral financing institutions and/or multilateral/bilateral programmes). The NAMA donor(s) is/ are expected to contribute 56 per cent of the total grant contribution required for NAMA implementation:

- Grants for land for recycling points and composting plants, technology and process improvement for recycling industry and compost market development and technology transfer and application: US\$9.4 million
- Capacity development grant: US\$2.1 million
- Project management: US\$ 1.2million

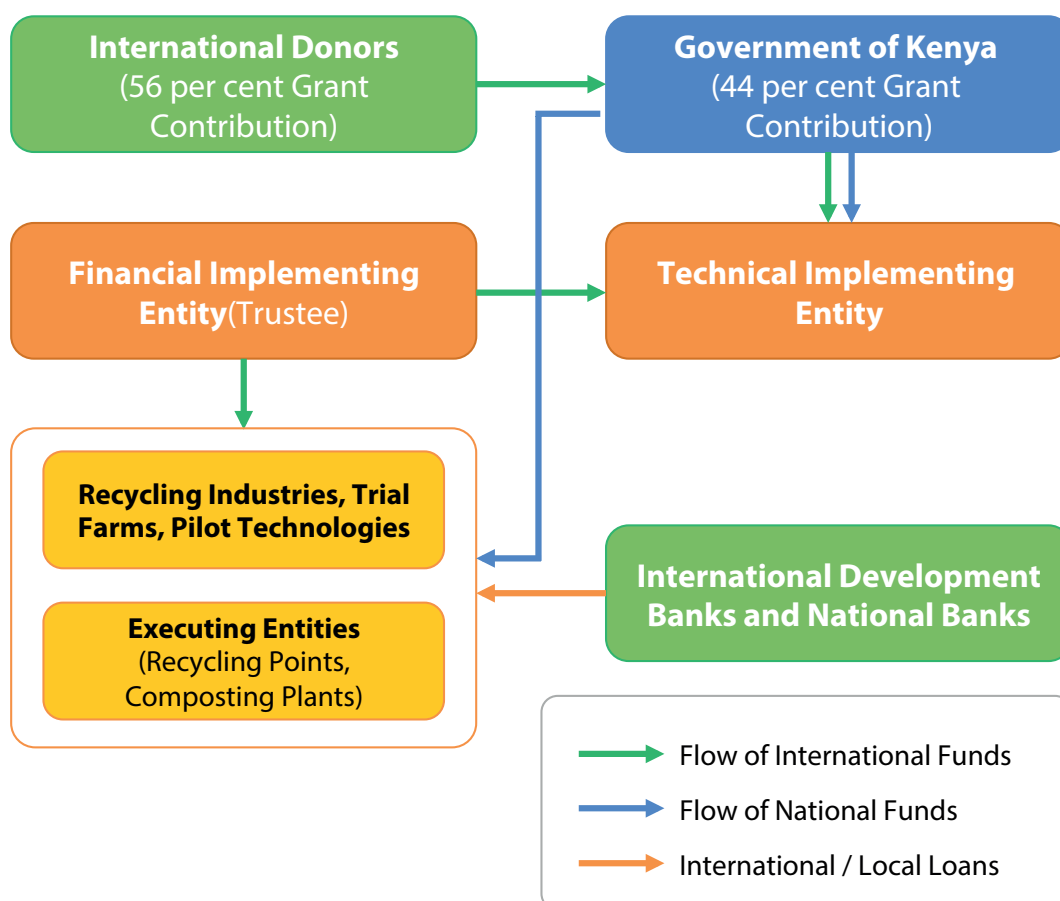


Since the NAMA is based on the principle of Output Based Aid (OBA), it is very important that the expectations of the NAMA stakeholders and their outputs are clearly and realistically defined at the start of NAMA implementation. There should be some flexibility in budgeting and in the completion of outputs, taking into account overall performance as well as minimum performance.

International contributions will be channeled through the Financial NIE (Trustee) to the NEEs. Part of the money will be given as a capacity development grant to the Government and as an international project management grant to the Technical NIE. National finance, in the form of equity and grants, will contribute to financing the NEEs' investments and supporting project management.

Based on the cost estimates for the technical intervention and capacity development, the following figure gives an overview of total NAMA implementation costs as well as the contributions of national and international sources.

**Figure 14: Flow Chart of International and National Finance**



# 9 MEASUREMENT, REPORTING AND VERIFICATION

A credible and transparent MRV framework is essential and will provide the country with an accurate and credible information framework that can serve as a basis for understanding the impact of such holistic mitigation actions and for identifying areas needing more targeted effort. On the international level, a strong MRV framework will help the country to receive due recognition for its contributions to GHG emissions reduction and the transformation to a sustainable low-emission industrial sector, while also increasing the likelihood of its gaining access to international financial support.

As a NAMA is an instrument of Output Based Aid, the results of implemented NAMAs need to be measurable, reportable and verifiable (MRV) to guarantee the sustainable success of the interventions introduced.

The methodology for monitoring the effects of NAMAs needs to follow the general principles of transparency, consistency, comparability, completeness and accuracy. This applies to all the components to be monitored. The NAMA MRV will cover the following components:

- GHG emissions reductions;
- Sustainable Development benefits; and
- Financial Support.

## 9.1 The MRV System for GHG Emission Reductions

This section describes the measuring, reporting and verification framework for GHG emission reductions associated with the NAMA and the specifics of each technical intervention.

The MRV framework for GHG emission reductions includes the following elements.

1. **System boundary definition.**  
The system boundary encompasses significant anthropogenic GHG emissions by source under the control of the project participant that are reasonably attributable to the NAMA intervention as a project activity.
2. **Baseline scenario.**  
The baseline scenario is the scenario for a NAMA activity that reasonably represents the anthropogenic emissions by source of GHG that would occur in the absence of the proposed NAMA intervention.
3. **Project activity scenario.**  
The project activity scenario is a NAMA intervention, in this instance a circular economy model of collecting and separating waste for onward recycling and conversion to compost, and the related anthropogenic emissions by source of GHG that occur due to the project activity.
4. **Emissions reduction calculation.**  
The GHG emissions reduction achieved by the project activity will be determined by calculating the difference between the baseline emissions and the project emissions.
5. **Monitoring.**  
Monitoring defines the parameters to be monitored.
6. **Reporting and verification.**  
Reporting and verification define the reporting requirements and verification procedures

### 9.1.1 Recycling of Plastics

GHG emissions will decrease by recycled plastics displacing the production of virgin plastic materials, thereby resulting in energy savings. It is assumed that the baseline scenario would include the projected use of energy for the production of virgin materials. The MRV framework is based on the small scale CDM methodology AMS-III.AJ "Recovery and Recycling of Materials from Solid Wastes" (UNFCCC, 2010).

#### Measuring/Calculating Emissions Reductions

The project boundary includes the physical geographical sites:

- a. Waste collection sites;
- b. Recycling facilities;
- c. Virgin material production sites;<sup>1</sup>
- d. The MSW disposal site or treatment plant in the baseline scenario.

The emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

1 Virgin material production is included in the project boundary, even if it is not on an identifiable site, because the emission factor for virgin material production for the baseline calculation is based on the assumption of typical conditions for the virgin material production in the host country or in a non-Annex I country.

Where:

$ER_y$	=	Emission reductions in year $y$ (tCO <sub>2</sub> e)
$BE_y$	=	Baseline emissions in year $y$ (tCO <sub>2</sub> e)
$PE_y$	=	Project emissions in year $y$ (tCO <sub>2</sub> e)

Baseline emissions include emissions associated with energy consumed in the production of plastic pellets from virgin plastic material and are calculated as follows on conservative assumptions.

- a. A default specific energy consumption of 15 GJ/t will be used for HDPE, LDPE, MEG and PTA or of 11.6GJ/t for PP;
- b. It is assumed that process energy for polymerization is supplied with electricity. The following default values shall be used.
  - i. 0.83 MWh/t (3 GJ/t) and 1.67 MWh/t (6 GJ/t) for HDPE and LDPE;
  - ii. 1.11 MWh/t (4.0 GJ/t) for PET; and
  - iii. 0.56 MWh/t (2.0 GJ/t) for PP.

Baseline emissions for the production of pellet type  $i$  from virgin inputs are calculated using:

$$BE_y = \sum_i [Q_{i,y} \times L_i \times (SEC_{Bl,i} \times EF_{el,y} + SFC_{Bl,i} \times EF_{FF,CO2})]$$

Where:

$BE_y$	=	Baseline emissions in year $y$ (tCO <sub>2</sub> e/y)
$i$	=	Indices for material type $i$ ( $i = 1,2,3$ for HDPE, LDPE, PET and PP)
$Q_{i,y}$	=	Quantity of plastic type $i$ recycled in year $y$ (t/y)
$L_i$	=	Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material (use 0.75)
$SEC_{Bl,i}$	=	Specific electricity consumption for the production of virgin material type $i$ (MWh/t), (default values)
$EF_{el,y}$	=	Emission factor for grid electricity generation, as per the most recent version of the "Tool to calculate emission factor for an electricity system" (tCO <sub>2</sub> /MWh).
$SFC_{Bl,i}$	=	Specific fuel consumption for the production of virgin material type $i$ (GJ/t) (default values)
$EF_{FF,CO2}$	=	CO <sub>2</sub> emission factor for fossil fuel (tCO <sub>2</sub> /GJ)

Project emissions include emissions from energy use at the recycling facilities.<sup>2</sup>

Recycling activities will commence throughout the year. Emission reductions will be calculated on a bi-annual basis.

Emissions reductions will be counted from the date of approval of participation of an NEE in the NAMA activity.

### 9.1.2 Monitoring and Verification

The following information will be monitored by the Technical NIE.

Data/parameter	Municipal Solid Waste
Unit	t/y
Description	Quantity of municipal solid waste collected at the recycling facility
Measurement procedures	Quantity
Monitoring frequency	Continuously
Measurement methods	Each recycling point will determine the amount of solid waste collected

### 9.1.3 Composting of Biodegradable Material

Emissions will decrease by avoiding methane emissions to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a SWDS. It is assumed that the baseline scenario would be the projected anaerobic decay of biodegradable material where methane is emitted to the atmosphere. The MRV framework is based on the CDM methodology AMS-III.F “Avoidance of methane emissions through composting” and relevant tools (UNFCCC, 2012).

#### Measuring/Calculating Emissions Reductions

For the determination of the project boundary the following two parameters will be taken into consideration:

- a. Source of waste (up to 50 km);
- b. Distance to which the final product will be transported (up to 30 km);
- c. Where the composting takes place; and
- d. Where the composting is handled, disposed of and applied to the soil.

The emissions reductions are calculated as follows:

$$ER_y = BE_y - PE_y$$

2 Emissions associated with the transportation of recyclable materials and processing/manufacturing under the project activity are considered as equivalent to the corresponding emissions for the virgin materials and are therefore ignored in this methodology.

Where:

$ER_y$	Emission reduction in the year y (tCO <sub>2</sub> e)
$BE_y$	Baseline emissions in year y (tCO <sub>2</sub> e)

The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass solid waste or manure and calculated as per the following formula:

$$BE_y = BE_{CH_4,SWDS,y}$$

Where:

$BE_y$	Baseline emissions in year y (tCO <sub>2</sub> e)
$BE_{CH_4,SWDS,y}$	Yearly methane generation potential of the solid waste composted by the project activity (tCO <sub>2</sub> e). The tool may be used with the factor "f=0.1" taking into account the methane oxidation effect by the upper layer of the landfill.

Project emissions from composting process shall be determined as follows.

$$PE_y = PE_{comp,y}$$

$$PE_{comp,y} = PE_{comp,CH_4,y} + PE_{comp,N_2O,y}$$

$$PE_{comp,CH_4,y} = Q_y \cdot EF_{CH_4,y} \cdot GWP_{CH_4}$$

$$PE_{comp,N_2O,y} = Q_y \cdot EF_{N_2O,y} \cdot GWP_{N_2O}$$

Where:

$PE_{comp,y}$	Project Emissions from composting in year y (tCO <sub>2</sub> e)
$PE_{comp,CH_4,y}$	Project Emissions from methane in year y (tCO <sub>2</sub> e)
$PE_{comp,N_2O,y}$	Project Emissions from nitrous oxide in year y (tCO <sub>2</sub> e)
$Q_y$	Quantity of waste composted in year y (tCO <sub>2</sub> e)
$EF_{CH_4,y}$	Emission Factor of methane per tonne of waste composted valid for year y (tCH <sub>4</sub> /t)
$GWP_{CH_4}$	Global Warming Potential of methane (value of 25 is used)
$EF_{N_2O,y}$	Emission Factor of nitrous oxide per tonne of waste composted for year y (tN <sub>2O</sub> /t)
$GWP_{N_2O}$	Global Warming Potential of nitrous oxide (value of 298 is used)

### 9.1.4 Monitoring and Verification

The following information will be monitored individually by the Technical NIE.

<b>Data/parameter</b>	Compost
<b>Unit</b>	t/y
<b>Description</b>	Quantity of compost composted at the composting facility
<b>Measurement procedures</b>	Quantity
<b>Monitoring frequency</b>	Continuously
<b>Measurement methods</b>	Each composting facility will determine the amount of compost produced

## 9.2 Measurement and Monitoring of Sustainable Development Benefits

In addition to GHG emissions reductions, the MRV system for this NAMA will monitor the impacts of the NAMA interventions on the selected sustainable development (SD) indicators.

The selection of the SD indicators was done using the Sustainable Development Evaluation Tool (SD Tool) developed by UNDP (UNDP MDG Carbon, 2014). The SD Tool divides the SD indicators into five different domains: environment; social; growth and development; economic; and institutional.

The tool requires for each of the Interventions to decide whether an indicator (such as air pollution, biodiversity, health, etc.) is selected, identify the impact, add an explanation on the chosen indicator, define the effect (positive, negative, both) and indicate whether monitoring is done.

The indicators selected for the NAMA interventions in each of the four SD domains are as follows.

**Table 18: SD Indicators for the NAMA**

Domain	Indicator	Identified Impact	Target Value
Environment	Soil Pollution	Better quality of soil	14,235 ha
	Climate Change Adaptation and Mitigation	Reduced GHG emissions	832,032 tCO <sub>2</sub> e
Social	Livelihood of poor, poverty alleviation, peace	Poverty reduction	1,600 people
Growth and Development	Empowerment of women	More jobs for women	1,000 women
	Access to sustainable technology	Increased access to improved or state of the art recycling and composting technologies, leading to increased process efficiency	200 pieces equipment
	Capacity-building	Build extensive capacity on both the national and regional levels for the development and implementation of circular economy projects	105 SMEs

Domain	Indicator	Identified Impact	Target Value
Economic	Job creation (number of men and women employed)	Creation of skilled and semi-skilled jobs	1,600 jobs
Institutional	Enabling policy environment	Management, Coordination & Approvals NCA	1 NCA
	Laws and regulations	Management, Coordination & Approvals Technical and Financial NIEs.	2 NIEs
	Laws and Regulations	NEEs coordination and participation	40 NEEs

The SD benefits achieved due to the NAMA intervention should be measured continuously, and reported by the responsible entity regularly. Hard copies or soft copies of the reports should be kept at a safe centralized point, and be archived.

### 9.2.1 Baseline and Project SD scenario

**Table 19: Overview of Baseline and Project SD Scenarios**

	Parameter active monitored	Unit	Baseline	Project
1	GHG emissions	tCO <sub>2</sub> e	943,701	111,669
2	Track number of people in new or improved businesses	No. of businesses	0	1600
3	Record number of women in new jobs	No. of jobs for women	200	1000
4	Record number of new equipment	No. of items of new equipment	20	200
5	Record number of SMEs trained	No. of SMEs	0	105
6	Record number of new jobs created by gender	No. of jobs by gender	800	1,600
7	Evaluate the management system implemented in the NCA	System Y/N	0	1
8	Evaluate the management system implemented in the Technical NIE	System Y/N	0	1
9	Evaluate the management system implemented in the Financial NCA	System Y/N	0	1
10	Record the number of NEEs successfully participating in the NAMA intervention	No. of NEEs	0	40
11	Record ha where compost is applied	Ha	500	14,235



### 9.2.2 Monitored SD Parameters

The SD benefits achieved due to the NAMA interventions should be measured continuously, and reported by the responsible technical NIE regularly. Hard copies or soft copies of the reports should be kept at a safe centralized point, and be archived by the NCA.

**Table 20: Monitored SD Parameters**

Serial number	1	
Indicator Name	Climate Change Mitigation	
Domain	Environment	
Parameter Name	GHG emissions (tCO <sub>2</sub> e)	
Baseline Value	943,701	
Way of monitoring	How	Calculated in accordance with methodologies defined in the NAMA
	Frequency	Continuously
	By whom	NEEs
Project Value	832,032	
QA/QC procedures		
	QC check done	Third party verification organization (DOE)
Serial number	2	
Indicator Name	Livelihood of Poor, Poverty Alleviation	
Domain	Social	
Parameter Name	Number of people in improved businesses	
Baseline Value	0	
Way of monitoring	How	Track number of people in new or improved businesses
	Frequency	Bi-annually
	By whom	Technical NIE
Project Value	1,600	
QA/QC procedures		
	QC check done	NCA

Serial number	3	
Indicator Name	Empowerment of Women	
Domain	Growth and Development	
Parameter Name	Number of Women in jobs	
Baseline Value	200	
Way of monitoring	How	Record number of women in new jobs
	Frequency	Quarterly
	By whom	Technical NIE
Project Value	1,000	
QA/QC procedures		
	QC check done	NCA

Serial number	4	
Indicator Name	Access to Sustainable Technology	
Domain	Growth and Development	
Parameter Name	Innovation of new equipment and process	
Baseline Value	20	
Way of monitoring	How	Record number of new equipment
	Frequency	Quarterly
	By whom	Technical NIE
Project Value	200	
QA/QC procedures		
	QC check done	NCA

Serial number	5	
Indicator Name	Capacity-Building	
Domain	Growth and Development	
Parameter Name	Private Sector Dialogue	
Baseline Value	0	
Way of monitoring	How	Record number of SMEs trained
	Frequency	Quarterly
	By whom	Technical NIE
Project Value	105	
QA/QC procedures		
	QC check done	NCA

Serial number	6	Active Monitor
Indicator Name	Job Creation	
Domain	Economic	
Parameter Name	Number of Jobs (male/female)	
Baseline Value	800	
Way of monitoring	How	Record number of new jobs created by gender
	Frequency	Quarterly
	By whom	Technical NIE
Project Value	1,600	
QA/QC procedures		
	QC check done	NCA

Serial number	7	
Indicator Name	Enabling Policy Environment	
Domain	Institutional	
Parameter Name	Management, Approval and Coordination of NCA	
Baseline Value	0	
Way of monitoring	How	Evaluate the management system implemented with the NCA
	Frequency	Annually
	By whom	NCA
Project Value	1	
QA/QC procedures		
	QC check done	Third party verification organization

Serial number	8	
Indicator Name	Management, Coordination and Approvals	
Domain	Institutional	
Parameter Name	Technical NIE management system implemented	
Baseline Value	0	
Way of monitoring	How	Evaluate the management system implemented with the technical NIE
	Frequency	Annually
	By whom	Technical NIE
Project Value	1	
QA/QC procedures		
	QC check done	NCA with third party verification organization

Serial number	9	
Indicator Name	Management, Coordination and Approvals	
Domain	Institutional	
Parameter Name	Financial NIE management system implemented	
Baseline Value	0	
Way of monitoring	How	Evaluate the management system implemented with the financial NCA
	Frequency	Annually
	By whom	Financial NIE
Project Value	1	
QA/QC procedures		
	QC check done	NCA with third party verification organization

Serial number	10	
Indicator Name	Management, Coordination and Approvals	
Domain	Institutional	
Parameter Name	NEE coordination and participation	
Baseline Value	0	
Way of monitoring	How	Record the number of NEEs successfully participating in the NAMA intervention
	Frequency	Annually
	By whom	Technical NIE
Project Value	40	
QA/QC procedures		
	QC check done	NCA

Serial number	11	
Indicator Name	Climate Change Mitigation	
Domain	Environment	
Parameter Name	Production and use of compost	
Baseline Value	500	
Way of monitoring	How	Record ha where compost is applied
	Frequency	Continuously
	By whom	NEEs
Project Value	14,235	
QA/QC procedures		
	QC check done	NCA

### 9.3 Measurement and Monitoring of financial support

The support provided as part of the NAMA will also need to be measured. Support will be provided in many forms: capacity development, technology transfer and financial. As the bulk of support will come in the form of financing, it is the financial support which should be measured.

<b>Data/Parameter:</b>	FS <sub>international_loans</sub>
<b>Data unit:</b>	US\$
<b>Description:</b>	International loan support spent per activity
<b>Measurement procedures (if any):</b>	All loans disbursed need to be tracked as per the standard governmental tracking procedures
<b>Monitoring frequency:</b>	Measured continuously and recorded at least monthly

<b>Data/Parameter:</b>	FS <sub>national_loans</sub>
<b>Data unit:</b>	US\$
<b>Description:</b>	National loan support spent per activity
<b>Measurement procedures (if any):</b>	All loans disbursed need to be tracked as per the standard governmental tracking procedures
<b>Monitoring frequency:</b>	Measured continuously and recorded at least monthly

<b>Data/Parameter:</b>	FS <sub>international_grants</sub>
<b>Data unit:</b>	US\$
<b>Description:</b>	International grant support spent per activity
<b>Measurement procedures (if any):</b>	All grants disbursed need to be tracked as per the standard governmental tracking procedures
<b>Monitoring frequency:</b>	Measured continuously and recorded at least monthly

<b>Data/Parameter:</b>	FS <sub>national_grants</sub>
<b>Data unit:</b>	US\$
<b>Description:</b>	International grant support spent per activity
<b>Measurement procedures (if any):</b>	All grants disbursed need to be tracked as per the standard governmental tracking procedures
<b>Monitoring frequency:</b>	Measured continuously and recorded at least monthly

## 9.4 MRV Management

### 9.4.1 Responsibilities and process workflow

Responsibility for the MRV system lies mainly with the managing institution, which may delegate some of the tasks to the NEEs.

The process should unfold in the following sequence.

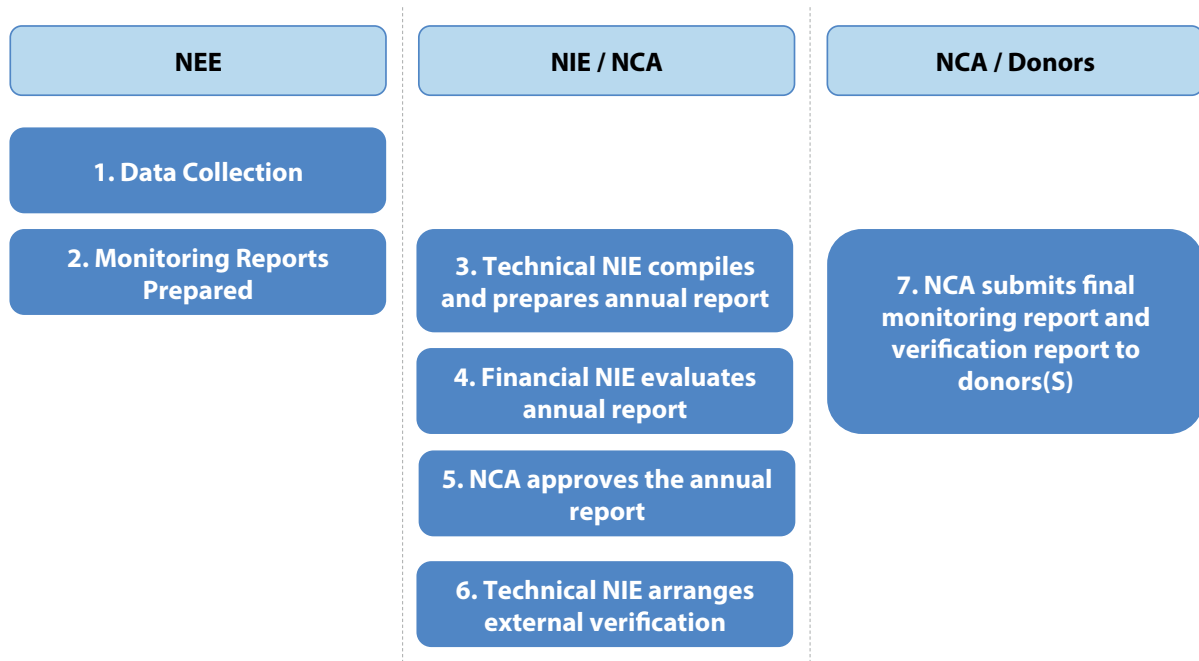
- The NEEs collect data according to the monitoring plan (as part of their approved application) and ensure they fulfill all related requirements such as record keeping and quality control.
- The NEEs report the monitoring results to the Technical NIE in an annual report.
- The Technical NIE collects all monitoring reports, combines them in a central monitoring database and summarizes the results in a NAMA monitoring report.

This report contains information on GHG emission reductions, progress on the SD indicators, and the financial performance of the NAMA activities.

- The Financial NIE evaluates the annual monitoring report and submits it to the NCA for approval.
- The Technical NIE arranges for an external verification entity to verify the annual monitoring report.
- The final monitoring report together with the verification report of the external verifier is submitted to the NAMA donor(s) by the NCA.

The following figure summarizes the process in graphic form.

**Figure 15: The NAMA MRV Process**



## 9.5 Reporting

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The NAMA will establish the institutional system needed for the coordination, implementation and MRV of the NAMA in the form of NCA, NIEs and NEEs. The overall responsibility for the NAMA lies with the NCA. It will be the key Ministry responsible for communication of the MRV to the designated national focal points for national/sectoral level reporting (e.g. National Communication, or bi-annual reporting to the UNFCCC, or any new reporting requirements established under the Post Paris Agreement). The day-to-day responsibility for data collection, data management, reporting and verification will be undertaken by the technical NIE. The technical NIE will therefore be responsible for the overall management and ownership of the MRV process and for overseeing the preparation of the annual MRV reports.

Three broad categories of data sets will be reported:

- Information on the technical implementation. These data sets will directly contribute towards estimation of GHG emission reductions.
- Information on Sustainable Development Benefits, including capacity development efforts undertaken (e.g. the new employment created, women / youth employed, staff trained, training programmes conducted etc.).
- Information related to finance that will be directly provided by the financial NIE. This information may be a specific requirement of international donors.

### 9.5.1 Reporting forms

The Technical NIE is charged with creating reporting form templates. These forms will include at a minimum the following information:

- details about the approved NEEs;
- intervention implementation status;
- a description of the monitoring system;
- the data parameters measured (GHG ERs, SD impacts, financial support);
- the default values applied to GHG ERs;
- details of the sampling plans; and
- calculations of emission reductions.

The Financial NIE is also charged with creating reporting form templates. These forms will include at a minimum the following information:

- grant application forms for NEEs;
- application assessment report forms;
- financial reporting forms.

## 9.6 Verification

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The technical NIE will implement a monitoring protocol that allows any third party verifier to verify all relevant data. A NAMA monitoring database shall be established that contains all the specific data required. This database is going to be operated and maintained by the NIE, potentially under the supervision of the NCA.

### 9.6.1 Verification Procedures

As noted, the technical NIE will be responsible for the preparation of monitoring report(s) and for communication with an appointed verifier during verification activities.

Verification initiated by the technical NIE will occur for the baseline and the NAMA activities. The technical NIE will be responsible for the preparation of monitoring reports based on the monitoring records and according to the applied baseline and monitoring methodology at least once every other year. The monitoring reports will aggregate all required monitoring information, i.e. monitoring records, in order to allow third party verification. Each monitoring report will unambiguously set out the data on emission reductions generation, SD impact, and financial management during the monitoring period, consistent with the requirements of this MRV system.

The objective of the verification is to have an independent third party auditor ensure that the NAMA is operating as planned and that the measuring and reporting system is being implemented as planned. The verification also ensures that emissions reductions and SD benefits are real and measurable. Auditors should be accredited entities, such as under the CDM or under another accreditation system.

Verification should occur every one or two years. The verification will consist of:

- Desk review of NAMA monitoring reports prepared by the NIE;
- Site visits/interviews with key stakeholders;
- Drafting of a verification report;
- Providing feedback on the report by the technical NIE and the NA;
- Finalization the verification report.

### 9.6.2 Quality Assurance Procedures

Use of the monitoring database, including monitoring and identification records, will ensure that there is no double counting of emission reductions.

The duration, i.e. the start and end date of each monitoring period, together with the corresponding monitoring records for that monitoring period, will be recorded in the database.

Record-keeping procedures undertaken by the technical NIE will ensure that the monitoring records attributed to a monitoring period can be clearly attributed to the NAMA activities and will prevent double counting of emission reductions.



For data quality control, the data and information provided to the technical NIE will be checked internally to ensure the accuracy and completeness of data. In the case of mistakes, corrective action will be applied to avoid future similar mistakes. Subject to the requirements of the NA and the donor there might be additional requirements of the MRV system, e.g. donors might wish to send their own QA/QC teams to check the NAMA performance.

In order to assure quality of data handling, training will be provided to monitoring personnel. The technical NIE, will provide all necessary information and training material that enables every NEE to conduct the monitoring process as required by the NAMA MRV system.



# 10 NAMA IMPLEMENTATION PLAN

## 10.1 Step 1. NAMA Operationalization

The operationalization and implementation of the NAMA will be carried out in two Phases and three distinct steps. The following section describes each of the steps and the two-phased implementation approach.

### 10.1.1 Operationalizing the institutional structure for NAMA implementation

It is suggested that implementation should start with an initial meeting of a NAMA Technical Working Group in the NCA, which is to act as a kind of temporary supervisory board for the NAMA.

The technical working group will be responsible for:

- **Setting up the Trustee:** After appointment of the Trustee, funds will be secured from national and international sources. Financial expertise will include: a) significant knowledge of corporate finance, bank loans, financial analysis (including capital investment appraisal); b) proven expertise in investing, particularly in financial structuring of cash flow based lending projects;
- **Setting up the Technical Implementing Entity:** A local team leader will be based in the Technical NIE with: a) extensive expertise managing sustainable waste management projects and dealing with financial institutions; b) extensive technical experience in recycling projects; c) proven expertise in planning implementation of projects, including those related to waste management; d) experience in public outreach and marketing;
  - 1 support staff with: a) experience in planning and implementation of projects, including ones related to waste management; b) excellent knowledge of Microsoft Word and experience in managing complex data sheets; c) language skills (must be fluent in spoken and written English the and relevant local language);

- 1 expert in communications, marketing and IT based in the Technical NIE, with a track record marketing projects in business to business as well as consumer marketing contexts and proven experience with design, implementation and operation of web-based information, transaction and monitoring systems;

### 10.1.2 Launching the NAMA and Promoting the NAMA Achievements

The Technical NIE and in particular the communications expert will be responsible for the development of the marketing materials and the NAMA launch event. The launch event will be the countrywide kick off for the NAMA and will inform the target audience about its objectives, stakeholders and timelines. The target audiences for the launch event will be senior management from national authorities, banks and business, and the media, the key counterparts and partners for the NAMA. A high level of participation from the target audience would instantly draw attention to the NAMA and facilitate feedback from key decision makers. The launch event will include a press briefing and will provide some informal networking opportunities.

- NAMA Website will be maintained as the main communication tool, providing information about:
  - the criteria for qualification for projects,
  - case studies,
  - best practices,
  - success stories,
  - templates, news and achievements of the NAMA and
  - donors.

**NAMA Marketing Material** such as leaflets, pens, notepads, a best practice guide, folders, banners, etc. will be developed and a continuous flow of information to the public media about the NAMA implementation will be maintained.

**NAMA Best Practice Awards** will promote the most ambitious and innovative composting and recycling projects. The winners will receive the awards during one of the awareness raising events.

These tasks will be accomplished in the initial year of NAMA project initiation, which is currently expected to be 2017.

### 10.1.3 Hiring International Experts

International experts will be hired and NAMA stakeholder targeted activities will begin immediately after the launch of the NAMA at the end of year 1. The Technical NIE will be in charge of the procurement of international experts for institutional strengthening (policy), recycling and composting.

Table 18 lists the stakeholders being targeted for specific activities and those with responsibility for overseeing them.

**Table 21: Overview of NAMA Stakeholders' Capacity Development**

Stakeholder	Responsibility
NAMA Executing Entities	Prepared and carried out by international/national experts
Recycling Companies	Prepared and carried out by international/national experts
Waste Management Association	Prepared and carried out by national experts
Country Governments	Prepared and carried out by international/national experts

The stakeholder targeted activities will last over the full implementation Phase I of the NAMA during the implementation of the infrastructure development.

## 10.2 Implementation Phase 1: Infrastructure Development (Years 1–5)

The infrastructure development phase will accelerate access to the infrastructure required to collect and recycle 600 tons of waste per day. Phase 1 establishes the recycling points, the composting facilities and the pilots for new recycling processes. Recycling points will be opened up to existing waste collection companies, enabling them to benefit from the NAMA framework. At the end of this phase, approximately 200 tons of waste will be collected and recycled per day.

## 10.3 Full-scale Operations Phase 2 (Years 6–15)

This last phase of the NAMA will start with the finalization of Phase 1 and will continue until year 15 and over the NAMA lifetime.

This phase builds on experience gained during Phase 1 and will scale the operations of the NAMA to 600 tons of waste per day. As private sector companies will operate each part of the NAMA, all activities will continue operating past the end of the NAMA timeline.





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# ANNEXES

## NAMA Summary

### Overall Goal of the NAMA:

Establish a circular economy business model to accelerate access by the private sector to sustainable waste management.

### Outcomes and Outputs and Physical Outcomes of the NAMA:

**Objective 1:** Establish Infrastructure for recycling and reuse of waste to substantially reduce the amount of disposed waste

**Outcome A:** 15 recycling points established in Greater Nairobi

**Outcome B:** 15 composting facilities established in Greater Nairobi

**Objective 2:** Establish a framework for the private sector to participate in the recycling and reuse of waste

**Outcome C:** New or improved technologies installed to increase recyclable fractions and improve recycling processes

**Outcome D:** Compost market is developed and sale of compost a viable business model

## Outcomes, Outputs and Activities

<b>Objective 1 + 2: NAMA Operationalization</b>			
<b>Outcome 0: NAMA Operationalized</b>			
<b>Output 0.1: Setting-up the NAMA Implementation Structure</b>			
0.1.1	Project Management in Netfund set up	Financial Measure (Salaries and Operating Costs)	US\$ 1,225,500
0.1.4	Financial Administration/ Trustee set up	Financial Measure (Operating Costs)	US\$ 115,200
0.1.2	Project management office set-up procured	Financial Measure (Operating Costs)	US\$ 381,500
0.1.3	Marketing Material developed	Capacity development measure (Institutional)	US\$ 40,000
<b>Output 0.2: Hiring International Experts</b>			
0.2.1	3 International Experts hired	Capacity development measure (Operational)	US\$ 340,000
<b>Outcome 1: Institutions Strengthened</b>			
<b>Output 1.1: Waste standards developed</b>			
1.1.1	2 New Waste Standard Developed	Policy De-Risking (Institutional)	US\$ 100,000
<b>Output 1.2: International Best Practices disseminated</b>			
1.2.1	International travel, site visits, conferences and workshops completed	Capacity Development Measure (Institutional)	US\$ 1,240,000

<b>Objective 2:</b> Establish a framework for the private sector to participate in the recycling and reuse of waste			
<b>Outcome C:</b> New or improved technologies installed to increase recyclable fractions and improve recycling processes			
<b>Output C.1: New Technologies tested</b>			
C.1.1	4 Studies on new technologies completed	Technology measure (Individual/Institutional)	US\$ 200,000
C.1.2	4 Pilots implemented to test new technologies (building on studies)	Technology measure (Individual/Institutional)	US\$ 700,000
<b>Outcome D:</b> Compost market is developed and sale of compost a viable business model			
<b>Output D.2: Compost and Recycling Market Developed and Improved</b>			
D.2.1	40 Test Farms established	Technology/Capacity development Measures (Individual)	US\$ 1,550,000
D.2.2	New Practices and Technologies applied in 20 Recycling Industries	Technology Measures (Individual)	US\$ 600,000
<b>Objective 1:</b> Establish Infrastructure for recycling and reuse of waste to substantially reduce the amount of disposed waste			
<b>Outcome A:</b> 15 recycling points established in Greater Nairobi			
<b>Output A.1: Loans and Grants for infrastructure and technology investment disbursed</b>			
A.1.1	Investment Loans for land disbursed	Financial measure (Individual)	US\$ 2,000,000
A.1.2	Grant for State of the Art Technology investment disbursed	Financial Measure (Individual)	US\$ 4,050,000
<b>Outcome B:</b> 15 composting facilities established in Greater Nairobi			
<b>Output B.1: Loans and Grants for equipment and technology investment disbursed</b>			
C.2.1	Investment Loans for Machines and Technology	Financial Measure (Individual)	US\$ 9,256,000
C.2.2	Grant for State of the Art Technology disbursed	Financial Measure (Individual)	US\$ 2,560,000





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