Covenant of Mayors
in Sub-Saharan Africa

NAKURU COUNTY
COUNTY OF UNLIMITED OPPORTUNITIES

MITIGATION ACTION PLANNING REPORT

Nakuru County, Kenya

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Contents

Abbreviations

AFOLU	Agriculture, Forestry and Other Land Use
BAU	Business as usual
BEI	Baseline Emissions Inventory
CGN	County Government of Nakuru
CH_4	Methane
CIRIS	City Inventory Reporting and Information System
CO_2	Carbon dioxide
CO_2e	CO_2 equivalents
$CO_2(b)$	Biogenic CO_2
CoM SSA	Covenant of Mayors in Sub-Saharan Africa
DRE	Distributed renewable energy
EC	European Commission
EPRA	Energy and Petroleum Regulatory Authority
EU	European Union
GCoM	Global Covenant of Mayors for Climate & Energy
GHG	Greenhouse gas
GPC	Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
GWP	Global Warming Potential
IE	Included elsewhere
IPPU	Industrial Processes and Product Use
LED	Light-emitting diode
LPG	Liquid petroleum gas
LULUCF	Land Use, Land Use Change and Forestry
MWh	Megawatt hours

NASWAMA	Nakuru Solid Waste Management Association
NAWASSCO	Nakuru Waste and Sanitation Services Company
NCCAP	National Climate Change Action Plan
NDC	Nationally Determined Contribution
NE	Not estimated
NMT	Non-motorised transport
NO	Not occurring
N_2O	Nitrous oxide
PV	Photovoltaic
RVA	Risk and Vulnerability Assessment
SDGs	Sustainable Development Goals
SEACAP	Sustainable Energy Access and Climate Action Plan
tCO_2e	Metric tonnes of CO_2 equivalents

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1. The Covenant of Mayors Sub-Saharan Africa (CoM SSA) and Sustainable Energy Access and Climate Action Plans (SEACAPs)

1.1 The Covenant of Mayors in Sub-Saharan Africa (CoM SSA)

The Covenant of Mayors in Sub-Saharan Africa (CoM SSA) is an initiative launched by the European Union (EU) to support local authorities in sub-Saharan Africa in addressing climate challenges and ensuring access to clean energy. It is the "regional covenant" or chapter of the Global Covenant of Mayors for Climate & Energy (GCoM). CoM SSA is delivered through a partnership of global and local city networks as well as initiatives funded by the European Commission (EC). It is a bottom-up and voluntary initiative that invites cities to define and meet ambitious yet realistic energy access and climate targets set by themselves, in line with GCoM requirements. This means that targets are at least as ambitious as cities' respective government's Nationally Determined Contribution (NDC) under the Paris Agreement. Furthermore, targets need to be in line with national adaptation and/or mitigation plans (where these exist) and be consistent with the principles around energy access and urban sustainability embodied in the Sustainable Development Goals (SDGs). Local authorities are encouraged to voluntarily commit to the implementation of a climate and energy action plan in their area of influence. They are also encouraged to define a long-term vision and actions towards a sustainable future based on the pillars of climate change mitigation and adaptation, and sustainable, affordable and secure access to energy. CoM SSA is open to any city in sub-Saharan Africa, regardless of the size. In order to translate the political commitment into practical measures, CoM SSA signatories commit to producing and implementing a strategic and operational document called the Sustainable Energy Access and Climate Action Plan (SEACAP).

1.2 Sustainable Energy Access and Climate Action Plans (SEACAPs)

The Sustainable Energy Access and Climate Action Plan (SEACAP) is the key document that sets the strategies, plans and actions for a sustainable and low greenhouse gas (GHG) emission development pathway, while including climate adaptation actions and ensuring access to secure, affordable and sustainable energy, in response to the current and future impacts of climate change in the region. The SEACAP is both a strategic and an operational document. It uses the results of the Baseline Emissions Inventory (BEI) to identify the best fields of action and opportunities for reaching the local authority's greenhouse gas (GHG) emission reduction targets. It is based on the climate change Risk and Vulnerability Assessment (RVA), which identifies the most relevant city climate hazards and vulnerabilities. It also includes an Access to Energy Assessment, which articulates a plan to improve the access to secure, sustainable, affordable and reliable energy. The SEACAP defines concrete measures for climate mitigation, adaptation and access to sustainable energy, with timeframes and assigned responsibilities, translating the long-term strategy into action.

1.3 Phases of the SEACAP development within the Mitigation pillar

The Mitigation pillar of the Sustainable Energy Access and Climate Action plan (SEACAP) development typically involves four phases:

i. **Initiation phase** – Activities in this phase include the identification of national action plans on climate change mitigation, mobilising and engaging stakeholders and affirming political commitment of the heads of the municipality to the SEACAP development.

ii. **Planning phase** – This phase includes pre-assessment and development stages, and involves undertaking a baseline assessment of the status of mitigation in the city via a Baseline Emissions Inventory (BEI). The BEI offers an opportunity for local government authorities to obtain data specific to the city, thus increasing awareness of the current status and providing a premise for further action to improve the status quo. The baseline inventory should measure the emissions of three sectors: stationary energy, waste and transportation. Owing to the complexity in developing a BEI, a first inventory can be developed efficiently using a proxy data tool, and supplemented where/if local data is available. Thereafter, target setting and development of long-term action plans to achieve the set targets would begin. These actions, which aim at promoting mitigation, include the development of favourable policies for the consumption of efficient and/or renewable energy in buildings and lighting, efficient land use planning and urban design, low-carbon transport modes, waste and wastewater management and potential energy generation.

iii. **Implementation phase** –This phase involves delivering practical actions.

iv. **Monitoring and Reporting phase** – This phase involves reviewing progress and adjusting priorities. The proposed actions are monitored to ensure that the set targets are achieved in this phase. Specific procedures and processes for each of the actions are confirmed, while maintaining constant communication with the stakeholders throughout. On a regular basis, the progress made is assessed and priorities are adjusted to fit the current situation as needed. A progress report is to be submitted every second year after the SEACAP was developed, for monitoring and evaluation.

This document constitutes the Mitigation Action Planning Report, the action planning component for the Mitigation pillar, to limit the growth of GHG emissions in Nakuru County, Kenya.

1.4 Purpose of action planning

The action planning phase is the final step of the SEACAP development process. Actions developed under each pillar are designed to not only support the city in achieving its targets set for each sector but, more broadly, to initiate action that will support the city in moving towards enhanced climate resiliency and access to energy.

2. Summary of the BEI

2.1 Background of the BEI

The purpose of the BEI is to identify the activities in Nakuru County that are the primary sources of GHG emissions, thereby contributing to climate change on a global scale. If produced consistently, the emissions inventory can be used to track how emissions change over time and to identify and monitor the impact of appropriate mitigation interventions and low-emission targets.

The BEI for Nakuru County was developed in accordance with requirements of the Global Protocol for Community-scale Greenhouse Gas Emission Inventories (GPC) standard, an international standard for cities, using a Proxy Data Tool developed by ICLEI Africa, which was built on the City Inventory Reporting and Information System (CIRIS) tool for GHG inventories for subnational governments. The GHG inventory for Nakuru County uses a combination of local data, where available, and downscaled national and regional (proxy) data for Kenya and East Africa. The BEI includes GHG emissions from three sectors[1]: stationary energy, transport and waste. The **Nakuru County BEI covers a continuous 12-month period from January 2019 to December 2019** and estimates all emissions from the stationary energy, transport and waste sectors as a result of activities within the county's geographical boundary.

2.2 Overview of GHG emissions in Nakuru County

Nakuru County is located in the Great Rift Valley in central Kenya and occupies a land area of approximately 7 500 km^2. The county had a population of 2 162 0000 people in 2019 (4.5% of Kenya's total population). There are two main urban centres within Nakuru County: Nakuru city, which is Kenya's fourth largest city, and Naivasha. The major road connecting the port of Mombasa, and Nairobi, to Uganda traverses Nakuru County. In addition, Nakuru County holds some of Kenya's most signification electricity generation capacity, including one of the largest geothermal power plants in Africa.

Total GHG emissions for Nakuru County in 2019 were estimated at 1 642 867 tCO_2e (**Table 3**). This estimate includes emissions from the stationary energy, transportation and waste sectors. This is equivalent to approximately 0.8 tCO_2e per person. For comparison, national emissions for Kenya in 2010 were 17 000 000 tCO_2e when considering only the stationary energy, transport and waste sectors (Republic of Kenya, 2015). This is equivalent to approximately 0.4 tCO_2e per person. However, emissions per person in Nakuru County in 2019 were only about one sixth of the global average (World Bank, 2022a).

The total GHG emissions in Nakuru County for 2019 are equivalent to 37 000 cars travelling from Nakuru city centre to Nairobi city centre and back every day for a year.

[1] Under the BASIC reporting level of the GPC, reporting emissions from the stationary energy, transport and waste sectors is mandatory. Under the BASIC+ reporting level, emissions from agriculture, forestry and other land use (AFOLU) and industrial processes and product use (IPPU) can be optionally included.

Table 1: Summary of GHG emissions by sector for Nakuru County (tCO_2e)

Sector		Total by scope			Total by city-induced reporting level
		Scope 1	Scope 2	Scope 3	BASIC
Stationary Energy	Energy use	669 273	34 587	NE[2]	703 860
	Energy generation supplied to the grid	NE	–	–	
Transportation	All transportation	544 749	0	NE	544 749
Waste	Generated in the region	394 258	–	NO[3]	394 258
	Generated outside the region	*NE*	–	–	
IPPU	All IPPU	NE	–	NE	
AFOLU	All AFOLU	NE	–	NE	
TOTAL		**1 608 280**	**34 587**	**NE**	**1 642 867**

2.3 GHG emissions by sector and subsector in Nakuru County

The total GHG emissions for Nakuru County in 2019 (including emissions from stationary energy, transportation and waste) are estimated at 1.6 million tCO_2e. **The largest contributing sector was stationary energy, contributing 43% of emissions, followed by transportation (33%) and waste (24%)**, as shown in **Figure 1**.

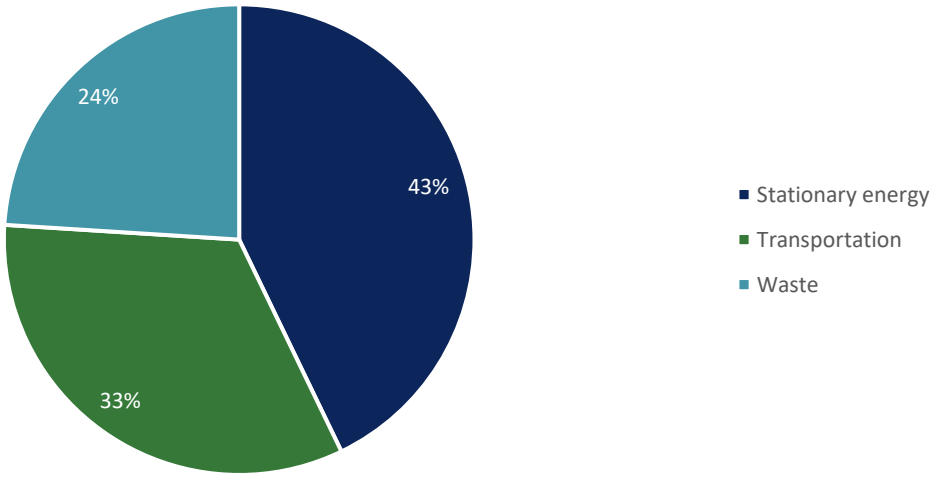

Figure 1: Sector contributions to GHG emissions in Nakuru County

In Nakuru County, the stationary energy sector accounted for 703 860 tCO_2e (43% of total GHG emissions) in 2019. The largest proportion of emissions in the stationary energy sector come from energy use in residential buildings (37%). This is followed by energy use in manufacturing and construction (30%) and in energy industries or charcoal production (23%). The remaining emissions in the stationary energy sector come primarily from energy use in commercial and institutional buildings (8%), while less than 1% come from energy use in agriculture, forestry and fishing activities (**Figure 2**).

[2] NE = Not estimated
[3] NO = Not occurring

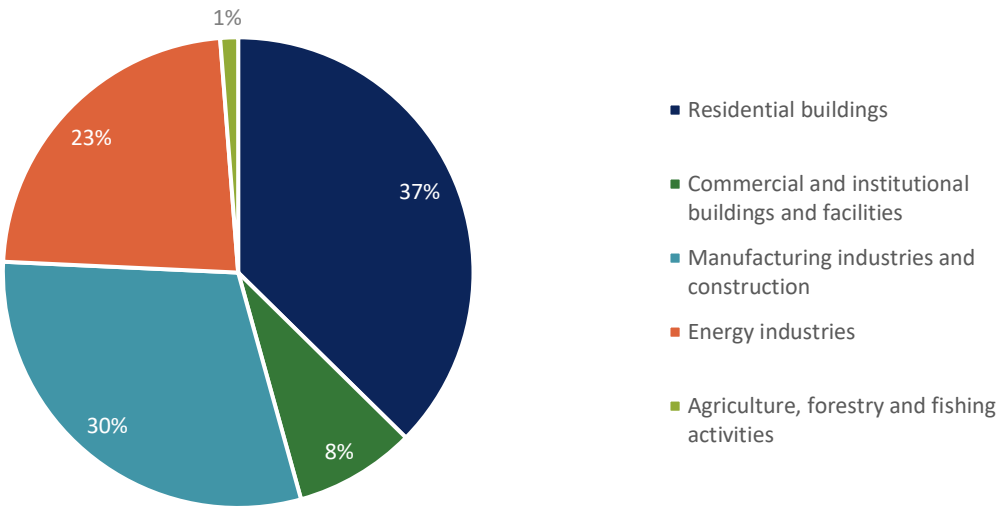

Figure 2: Subsector contributions to stationary energy GHG emissions in Nakuru County

The transportation sector accounted for 544 749 tCO_2e (33% of total GHG emissions) in 2019. Transport sector emissions included in the BEI are all a result of fossil fuel use for road transport (43% petrol and 57% diesel), including public and private passenger vehicles as well as freight transport (**Figure 3**).

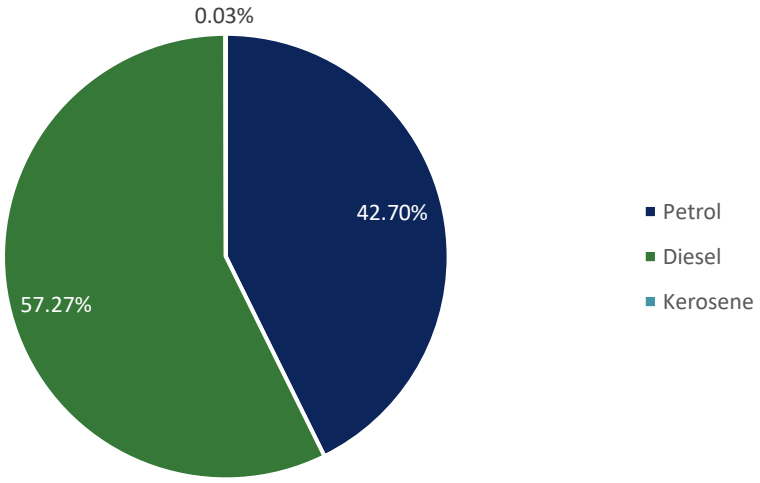

Figure 3: Emissions from the transportation sector in Nakuru County by fuel

The waste sector in Nakuru County was responsible for 394 258 tCO_2e (24% of the county's total GHG emissions) in 2019, all of which arise from waste and wastewater treated in the region. The largest contributor to waste sector emissions was the disposal of solid waste, which accounted for 46% of emissions in the sector. Landfilled and dumped solid waste accounts for the largest portion of waste emissions at 46%, while wastewater accounts for 27% of waste emissions. Incineration and burned waste accounts for a further 26% of the emissions. Biological treatment of waste accounts for 1% of emissions (**Figure 4**).

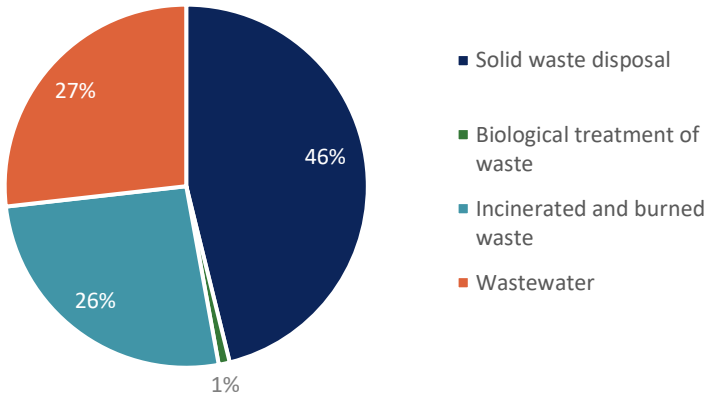

Figure 4: Subsector contributions to waste sector GHG emissions in Nakuru County

2.4 GHG emissions by gas for Nakuru County

Emissions of the three most common GHGs (Scope 1 emissions) are included in the BEI – carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Scope 2 emissions (i.e. emissions from electricity consumption) are only reported in CO_2e due to the grid emission factor being expressed as kg CO_2e/kWh and are therefore not disaggregated by gas. Similarly, emissions resulting from charcoal production are only reported in total CO_2e due to the emission factor being expressed as kg CO_2e/tonne. For Scope 1 emissions, carbon dioxide (CO_2) contributes 64% of total emissions, followed by methane (CH_4) at 30% and nitrous oxide (N_2O) at 6%.

Biogenic CO_2 emissions (shown as $CO_2(b)$) for each sector are shown in **Figure 5**. However, $CO_2(b)$ emissions are not included in the total GHG emissions reported from the inventory for Nakuru County. Biogenic CO_2 emissions are those emissions that result from biomass materials that naturally sequester CO_2, including fuels produced by living organisms or biological processes (for example through forestry or agriculture), but not fossilised or from fossil sources. This includes CO_2 emissions from the combustion of wood fuel and charcoal, as well as the combustion of biogenic materials during waste treatment. While CO_2 emitted from any source contributes to the greenhouse effect, following international protocols, these emissions are not included in the overall total for the GHG inventory. This is because they are considered to be offset by the growth of biomass, or accounted under land use and land use change (Greenhouse Gas Protocol, 2015). **It is estimated that 3 442 776 $tCO_2(b)$ were emitted in Nakuru County in 2019 – double the total emissions included in the inventory. 99% of these emissions are linked to the combustion of charcoal and wood in the stationary energy sector, especially in residential buildings.** The remaining 1% of biogenic CO_2 emissions result from solid waste disposal. Reducing the use of unsustainable biomass fuels and thereby reducing biogenic CO_2 emissions can contribute positively to climate change mitigation.

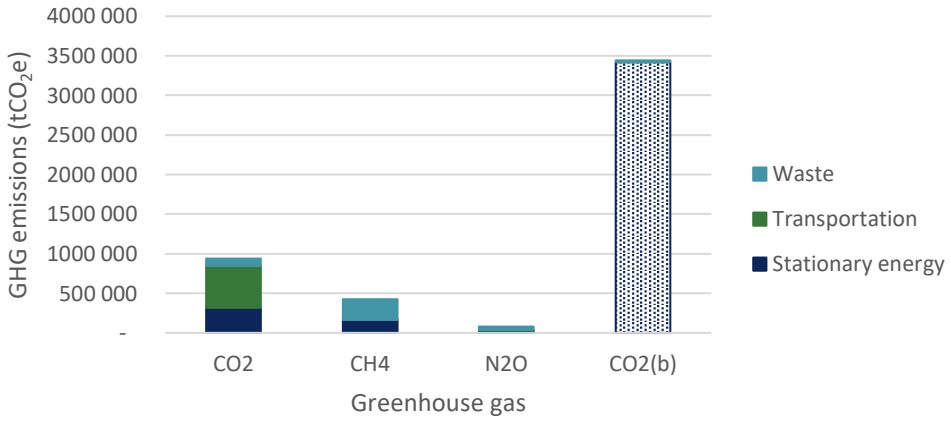

Figure 5: Emissions by sector for each greenhouse gas in Nakuru County

3. Summary of the Mitigation Target Setting Report

The objectives of the Mitigation Target Setting Report are to set a long-term overarching mitigation vision and target for Nakuru County, as well as individual targets for each emitting sector identified in the BEI. The mitigation vision and sector-specific targets for Nakuru County are informed by the BEI, existing county policies and plans, and national mitigation targets. They were formulated and discussed during a participatory workshop in November 2021. The vision and targets were then validated during a validation meeting with the County Government of Nakuru in February 2022.

The vision and targets are therefore aligned with national and local policies and strategies, including Kenya's updated Nationally Determined Contribution (NDC) and Kenya's National Climate Change Action Plan (NCCAP) 2018–2022. The targets meet the requirement of being at least as ambitious as the unconditional component of the NDC, set out in the SEACAP Development Guidebook (Palermo, 2018). In addition, like the national mitigation targets set out in the NDC, the mitigation targets for Nakuru County are set relative to a baseline or business-as-usual scenario, outlined below.

3.1 Emissions for Nakuru County under a business-as-usual scenario

A business-as-usual (BAU) scenario has been developed for Nakuru County to estimate how GHG emissions will change until 2030 in the absence of additional climate mitigation action. The BAU scenario uses emissions estimated in the BEI as a starting point and projects emissions to 2030 based on assumptions about how drivers of GHG emissions, including population and GDP, will change over the coming decade.

Under the BAU scenario, GHG emissions from Nakuru County are expected to increase by 65% in 11 years (approximately 4.7% per year) from 1 642 867 tCO_2e in 2019 to 2 718 694 tCO_2e in 2030 if no emissions reduction actions are taken (**Figure 6**). Proportionally, the largest expected growth in emissions is from the transportation sector, which is expected to increase from 33% of total emissions in 2019 to 37% in 2030.

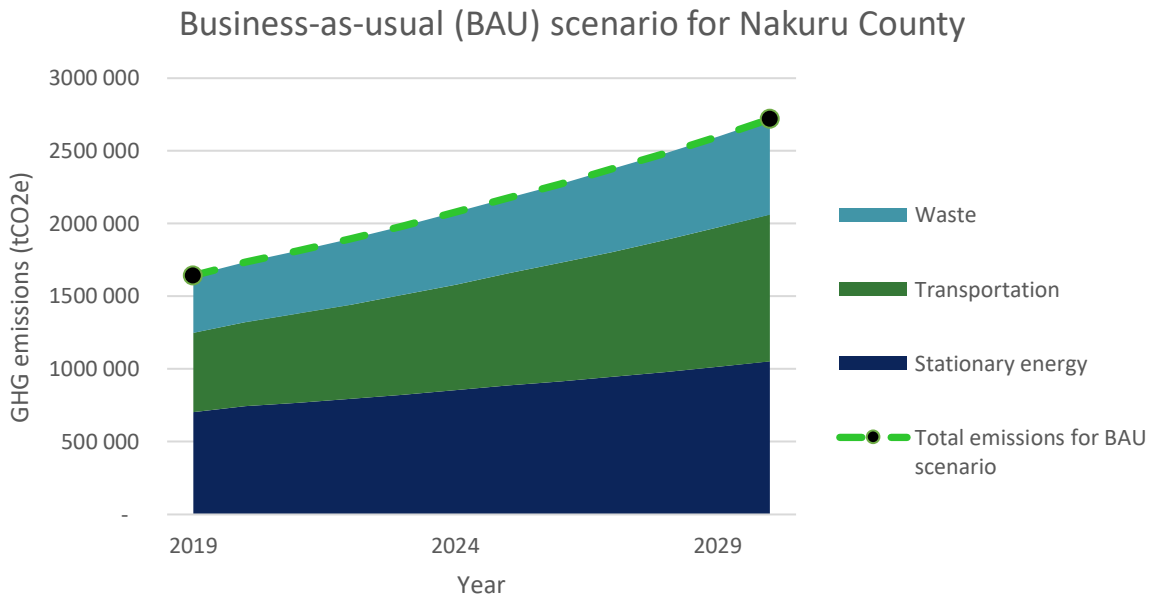

Figure 6: Estimated GHG emissions for Nakuru County from 2019 to 2030 under a BAU scenario

In alignment with Kenya's national climate change mitigation targets, the mitigation target setting process for Nakuru County uses the BAU scenario as a basis for developing targets for 2030.

3.2 Mitigation vision and targets for Nakuru County

3.2.1 Overarching vision

The long-term mitigation vision of Nakuru County formulated in line with the national and international policy environment is as follows:

"A low-carbon county that supports sustainable development by 2030."

3.2.2 County-wide mitigation target

In addition to the qualitative vision, Nakuru County has set an overall county-wide target to reduce GHG emissions incorporated in the BEI and projected in the BAU scenario. The county-wide target is as follows:

"Nakuru County seeks to reduce GHG emissions by 33% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions of at least 6% compared to the BAU scenario from domestic resources, while the remaining 27% is conditional on external support."

This overall target of 33% is equivalent to a reduction of 890 963 tCO_2e compared to the BAU scenario by 2030. If this target is achieved, GHG emissions in Nakuru County will be limited to 1 827 730 tCO_2e in 2030 (**Figure 7**). The unconditional target of 6% is equivalent to a reduction of 168 101 tCO_2e compared to the BAU scenario by 2030. If this target is achieved, GHG emissions in Nakuru County will be limited to 2 550 592 tCO_2e in 2030 (**Figure 7**).

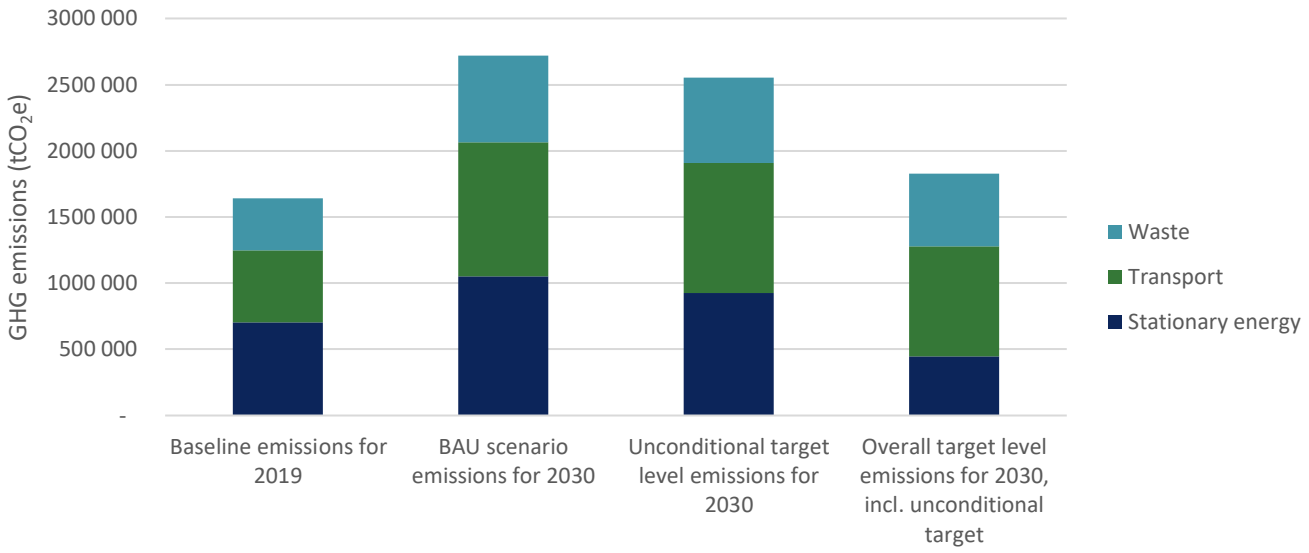

Figure 7: Baseline emissions for 2019, and emissions under a BAU and target scenario for Nakuru County in 2030

In addition to this overall target, specific targets have been set for each sector included in the BEI.

3.3 Sector targets

During the participatory mitigation target setting and action planning workshop, as well as the validation meeting, the key stakeholders of Nakuru County agreed on mitigation targets for each of the three emitting sectors included in BEI.

3.3.1 Stationary energy sector target

"Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support."

The targets for the stationary energy sector are aligned with the overall targets for the energy demand and electricity generation sectors in Kenya's NCCAP 2018–2022, and the proportion of the national NDC target that is unconditional. If the overall target of 57.5% is achieved, it is equivalent to a reduction in GHG emissions of 605 751 tCO_2e compared to the BAU scenario in 2030 (**Table 2**; **Figure 8**).

Table 2: Mitigation targets for the stationary energy sector in Nakuru County

Baseline emissions for 2019 (tCO_2e)	703 860	**Rationale**
BAU scenario emissions for 2030 (tCO_2e)	1 053 480	Aligned with unconditional and overall targets in Kenya's NDC and NCCAP 2018–2022 for the energy demand and electricity generation sectors.
Unconditional target reduction off BAU scenario by 2030 (%)	12%	
Unconditional target scenario emissions for 2030 (tCO_2e)	927 062	
Overall target reduction off BAU scenario by 2030 (%)	57.5%	
Overall target scenario emissions for 2030 (tCO_2e)	447 729	

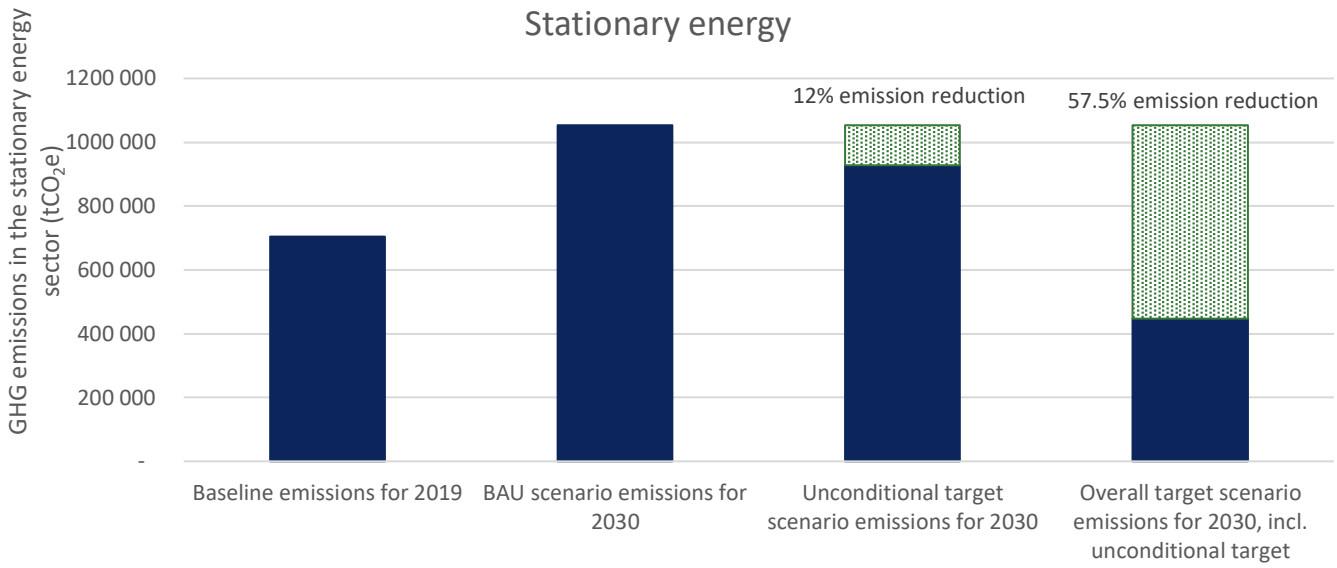

Figure 8: GHG emissions from the stationary energy sector in Nakuru County in the 2019 baseline, BAU and target scenarios

3.3.2 Transport sector target

"Nakuru County seeks to reduce GHG emissions from the transportation sector by 17.6% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the transportation sector of at least 2.7% compared to the BAU scenario from domestic resources, while the remaining 14.9% is conditional on external support."

The overall target for the transportation sector in Nakuru County is aligned with the overall target for the transportation sector in Kenya's NCCAP. The unconditional component of the transportation sector target for Nakuru County is proportionally slightly lower than the unconditional component of Kenya's NDC. This is because the County Government of Nakuru has limited ability to implement actions relating to the national road and standard gauge railway that run through the county, which are a major driver of emissions and a critical component of a sustainable transport system, respectively (**Table 3**; **Figure 9**).

Table 3: Mitigation targets for the transportation sector in Nakuru County

Baseline emissions for 2019 (tCO_2e)	544 749	**Rationale**
BAU scenario emissions for 2030 (tCO_2e)	1 009 769	Aligned with overall targets in NCCAP 2018–2022 for the transportation sector. Slightly less ambitious than NDC for unconditional target due to limited scope for county government to influence planning on national roads and railways.
Unconditional target reduction off BAU scenario by 2030 (%)	2.7%	
Unconditional target scenario emissions for 2030 (tCO_2e)	982 505	
Overall target reduction off BAU scenario by 2030 (%)	17.6%	
Overall target scenario emissions for 2030 (tCO_2e)	832 050	

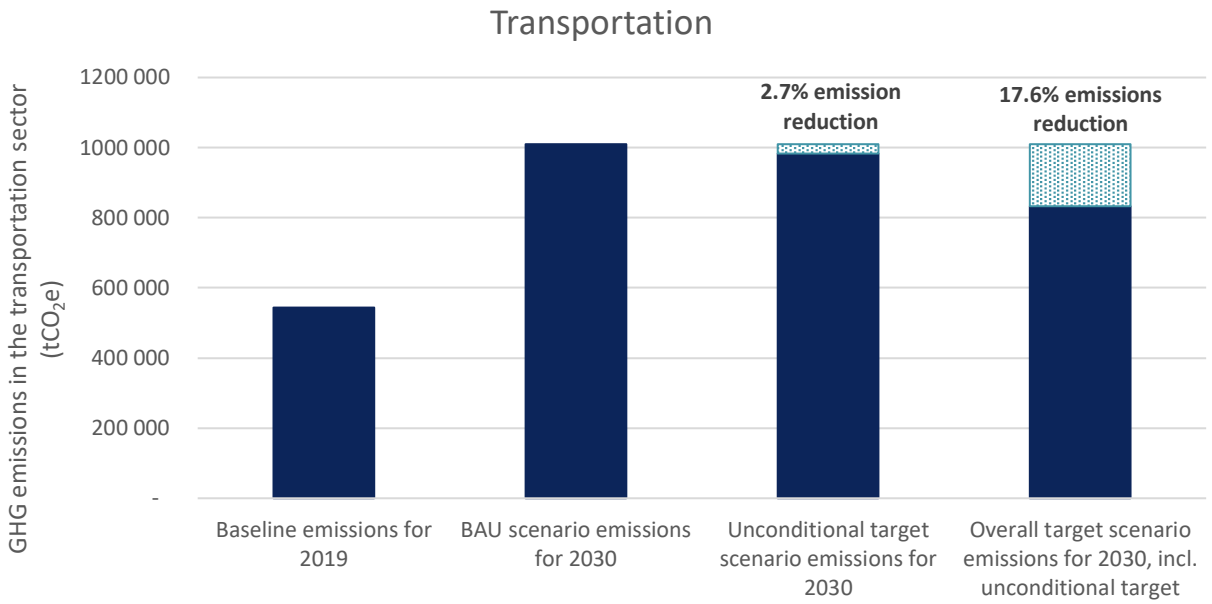

Figure 9: GHG emissions from the transportation sector in Nakuru County in the 2019 baseline, BAU and target scenarios

3.3.3 Waste sector target

"Nakuru County seeks to reduce GHG emissions from the waste sector by 16.4% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the waste sector of at least 2.2% compared to the BAU scenario from domestic resources, while the remaining 14.2% is conditional on external support."

The unconditional target for the waste sector in Nakuru County is aligned with the targets for the waste sector in Kenya's NCCAP 2018–2022 and NDC. The conditional component of the target, and therefore the overall target, is substantially more ambitious than the national waste sector target in the NCCAP 2018–2022. This is because Nakuru County is pioneering sustainable and low-emission waste management systems and the County Government of Nakuru, with external support, will be able to be more ambitious in its targets than the national waste management targets (**Table 4**; **Figure 10**).

Table 4: Mitigation targets for the waste sector in Nakuru County

Baseline emissions for 2019 (tCO_2e)	394 258	**Rationale**
BAU scenario emissions for 2030 (tCO_2e)	655 444	Aligned with unconditional targets in NCCAP 2018–2022 and NDC for the waste sector. More ambitious than NCCAP for overall target, due to proactive sustainable waste management approach of county government.
Unconditional target reduction off BAU scenario by 2030 (%)	2.2%	
Unconditional target scenario emissions for 2030 (tCO_2e)	641 024	
Overall target reduction off BAU scenario by 2030 (%)	16.4%	
Overall target scenario emissions for 2030 (tCO_2e)	547 951	

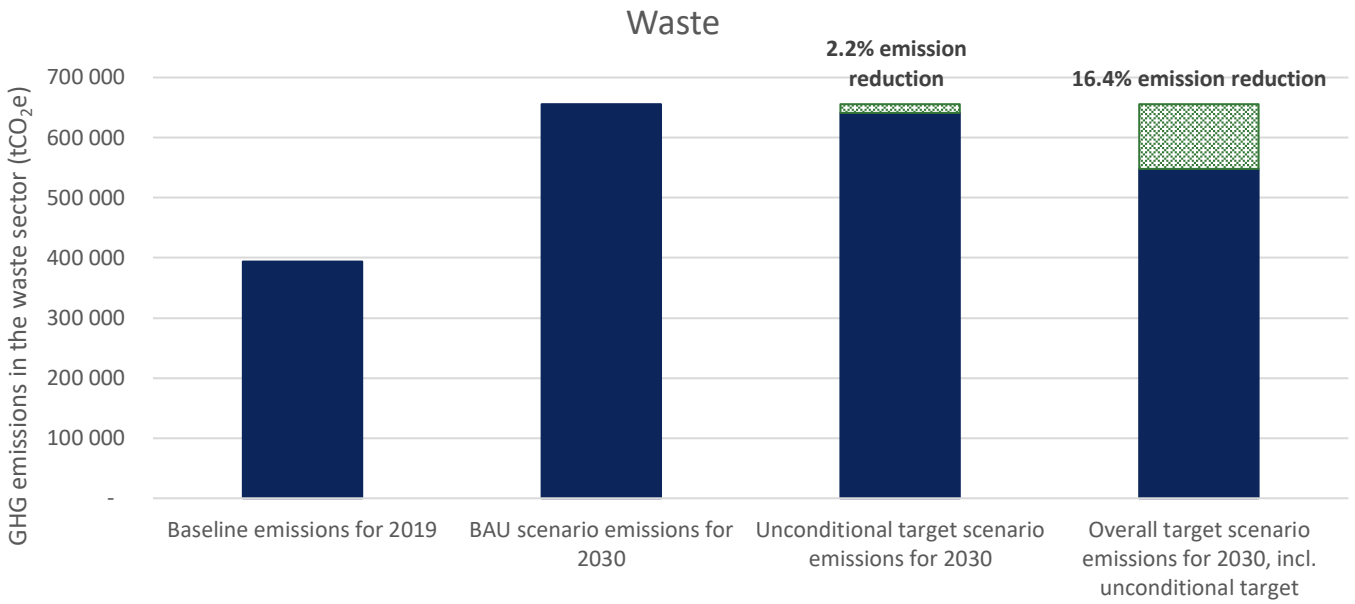

Figure 10: GHG emissions from the waste sector in Nakuru County in the 2019 baseline, BAU and target scenarios

4. Methodology for mitigation action planning

This section describes the methodology followed in gathering the necessary information to develop mitigation actions to achieve the targets set for each of the sectors indicated above.

4.1 Identifying and prioritising actions

A participatory workshop was held in Nakuru on 17 and 18 November 2021 to define an overarching mitigation vision for Nakuru County, to set sectoral targets and to develop mitigation actions. Forty-five participants attended this workshop, including representatives from Nakuru and Naivasha municipalities, civil society organisations, utilities like NAWASSCO, and the County Government of Nakuru (CGN). Departments of the CGN represented at the workshop included Health and Sanitation; Water, Energy, Environment and Natural Resources; Tourism; Public Works; Information and Computer Technology; the Legal Office; Agriculture; Livestock; Economic Planning; and Disaster Risk Management.

After the vision and target setting components of the workshop were completed, activities were undertaken to identify, prioritise and detail climate change mitigation actions to reduce GHG emissions in each of the three sectors: stationary energy; transport and waste. Participants were split into three groups (one per sector) and each group was provided with a list of actions pertaining to their sector from national and county-level policies and plans. These policies and plans included the NDC, NCCAP 2018–2022, the Nakuru County Climate Change Action Plan (2018), and the Nakuru County Clean Energy Action Plan (2016). Based on the list of actions and their expertise in the sector, participants were asked to develop 3–5 actions per sector and to provide a short description of each action (**Table 5**).

Once the actions from each sector had been presented and modified based on a discussion with all participants, the group for each sector was asked to evaluate and prioritise their actions based on the following criteria:

- **Technical feasibility:** whether the necessary skills and resources are available to implement the action;
- **Political feasibility:** whether the action has political and public support at national and county level and is aligned with existing priorities;
- **Financial feasibility:** whether the action is affordable or funding is available to implement it;
- **Co-benefits:** additional social, economic and environmental benefits apart from the GHG emission reductions;
- **Synergies:** links to other actions and development priorities; and
- **Trade-offs:** possible negative impacts or limitations created by the action.

The feasibility scores for each of the identified actions are presented in Appendix I, and the co-benefits, synergies and trade-offs in **Table 6**. A maximum of three prioritised actions were identified for each sector and presented to all participants at the workshop for discussion (**Table 7**). Following the prioritisation, participants in each group were asked to provide further details required for reporting the actions they had prioritised (**Table 8**).

4.2 Analysis of action impact

Following the identification and prioritisation of mitigation actions at the workshop in November 2021, actions were further refined and detailed through bilateral engagements between the SEACAP development team and the CGN. As part of this process, several actions identified during the workshop were split into two or three separate actions for ease of reporting. For the actions where sufficient detail was available, and that were assessed as likely to have direct GHG emission reduction impacts, an ex-ante estimate of GHG emission reductions was produced. Details of this modelling process are provided in Appendix II.

The outcomes of these ex-ante GHG emission reduction estimations were compared to the mitigation targets developed for Nakuru County to ensure alignment between the ambition level of the actions and targets.

4.3 Mitigation action validation

The draft targets and actions were presented to Nakuru County stakeholders in a validation meeting on 4 February 2022. Once the actions had been validated in this meeting, this Mitigation Action Planning Report, including the prioritised actions, was finalised.

5. GHG emissions reduction actions

As noted above, during the workshop and subsequent follow-up meetings in early 2022, **20 mitigation actions** were identified. **Table 5** presents these.

Table 5: GHG emissions reduction actions

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR:	**STATIONARY ENERGY**		
TARGET:	**Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support.**		
1	Install solar photovoltaic (PV) systems on 25 county government facilities	Under this action, the County Government of Nakuru (CGN) plans to install solar photovoltaic (PV) systems to generate renewable energy on at least 25 of its buildings and facilities. The solar PV systems will supply electricity to these buildings and facilities, complementing or replacing existing electricity sources with sustainable and reliable renewable energy. In this way, the CGN will encourage uptake of solar PV in the county and reduce GHG emissions from other less sustainable energy sources in its buildings and facilities.	Renewable energy generation: 215 MWh per year GHG emissions reduction: 26.83 tCO_2e
2	Create incentives to promote the uptake of renewable energy technologies by businesses, households and communities in Nakuru County	This action aims to promote uptake of renewable energy technologies by businesses, households and communities within the county, with a focus on solar PV and bio-energy. This action will include: • Developing a standard requiring new buildings to make use of renewable energy, like rooftop PV, linked to Action 7 relating to the promotion of green buildings • Streamlining the licensing process for renewable energy sources • Providing incentives to private sector suppliers of distributed renewable energy (DRE) technologies to supply these to underserved communities. The action aims to drive the transitions to widespread uptake of DRE in Nakuru County, building on the increased use of solar PV at county government facilities. This will include encouraging the substitution of at least 1 200 diesel generators with solar PV as a back-up electricity source for businesses and households, as well as encouraging the uptake of bioenergy for businesses and households. The action will also link to the creation of sensitisation and awareness forums for community members, in synergy with other stationary energy sector actions.	Renewable energy generation: 6 192 MWh per year GHG emissions reduction: 1 611.07 tCO_2e

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR:	**STATIONARY ENERGY**		
TARGET:	**Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support.**		
3	Develop and enforce an Energy Act and regulations on energy efficiency within Nakuru County by 2027	Improving energy efficiency is one of the most cost-effective and technically feasible ways to reduce GHG emissions in the stationary energy sector. Under this action, the County Government of Nakuru plans to develop a strong institutional and regulatory framework to improve energy efficiency across the county. This will be done by developing, passing and enforcing an energy policy, an Energy Act and regulations on energy efficiency at the county level by 2027. This action will be closely aligned with the County Energy Plan, under development at the time of writing this report. The regulatory framework will consider energy efficiency across sectors, at household level, in institutional and commercial facilities, and in industrial processes.	*Impact included under Action 5*
4	Undertake regular energy audits on 2 000 buildings and facilities within the county	Under this action, the CGN aims to improve efficient use of electricity within its own facilities, as well as in commercial, institutional and residential buildings. This will be done by undertaking energy audits on 2 000 buildings and facilities within the county in collaboration with the Energy and Petroleum Regulatory Authority (EPRA) and promoting uptake of energy audits for other commercial and institutional buildings. The energy audits will highlight areas where energy-efficiency improvements can be made in these buildings, and contribute to behaviour change and the uptake of more energy efficient technologies, for example under Action 5.	*Impact included under Action 5*
5	Install energy-efficient lighting in commercial, institutional and residential buildings	Under this action, Nakuru County aims to promote the uptake of energy efficient LED lights and other energy-efficient technologies. This will be done through the replacement of conventional lightbulbs with energy-saving LEDs in CGN buildings and facilities to reduce resources spent on energy bills. In addition to this and the previous actions, the targets of improving energy efficiency by 20% in institutional and commercial buildings and facilities and by 15% in households will be further pursued through awareness-raising and educational activities, including community meetings, exhibitions, and awareness-raising materials. This will be supported through the creation of the energy centres under Action 8.	Energy savings: 41 906.74 MWh per year GHG emissions reduction: 3 529.30 tCO_2e

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR:	**STATIONARY ENERGY**		
TARGET:	**Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support.**		
6	Develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector	Under this action, the county aims to increase use of clean energy for cooking and lighting to 75% of all households in the county by 2030. This includes promoting the uptake of liquid petroleum gas (LPG), biogas and ethanol as cooking fuels. To achieve this, the county government will support the development of small-scale biogas production facilities to encourage uptake in 25% of households in the county, with a focus on low-income households in rural areas, like Rongai and Kiambogo. This will be done through partnerships with the private sector to make biogas generation equipment more accessible and through the development of innovative mechanisms to provide finance to households and consumers to use these clean energy technologies. In this way, the action aims to improve the affordability and access to clean cooking and lighting for households. The uptake of biogas production and its use as a cooking fuel will be promoted through public awareness raising and community engagement undertaken through the energy centres under Action 8. In addition to reducing GHG emissions and contributing to the achievement of the stationary energy sector mitigation target, this action will contribute substantially to the reducing of biogenic CO_2 emissions, reducing them by more than one million tonnes per year.	Renewable energy generation: 67 207.20 MWh per year GHG emissions reduction: 101 015.20 tCO_2e
7	Develop policies and guidelines on green buildings to encourage the use of green building technologies	This action aims to encourage the uptake of green building technologies in new and existing buildings across Nakuru County. These technologies include the use of sustainable building materials and renewable energy, as well as the incorporation of design features that prioritise passive lighting and ventilation and energy efficiency. Uptake of these technologies will be encouraged through the development of policies and guidelines to promote their use, and through partnerships in the building sector, information sharing, exhibitions, and sensitisation on the use of green building technologies. In addition, the development of a building code and enforcement of existing regulations and standards, for example relating to solar water heating, will be prioritised. This action will be closely linked to the development of energy efficiency regulations under Action 3.	*Not applicable*

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR:	**STATIONARY ENERGY**		
TARGET:	**Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support.**		
8	Create three energy centres to disseminate information and raise awareness on sustainable energy	Under this action, the County Government of Nakuru aims to establish three energy information centres in the county, at the headquarters of selected subcounties. The energy centres will be used to disseminate information and education materials relating to sustainable energy. For example, these centres will be used to raise awareness about the benefits of energy efficiency and electricity-saving practices, clean cooking solutions, and green building practices. The energy centres can also host exhibitions of sustainable energy technologies. The energy centres will be hubs for the sustainable energy transition in Nakuru County. In particular, the energy centres will be used to run awareness raising and community engagement campaigns relating to clean cooking and lighting solutions to support the uptake of biogas as a clean cooking fuel under Action 6. Similarly, awareness raising through the energy centres will support the uptake of energy-efficient technologies and behaviours under Actions 3 and 5, and renewable energy technologies under Action 2.	*Not applicable*
SECTOR:	**TRANSPORTATION**		
TARGET	**Nakuru County seeks to reduce GHG emissions from the transportation sector by 17.6% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the transportation sector of at least 2.7% compared to the BAU scenario from domestic resources, while the remaining 14.9% is conditional on external support.**		
9	Construct and/or upgrade 10 km of non-motorised transport routes in urban centres	Over the last three years, the County Government of Nakuru have upgraded several non-motorised transport (NMT) corridors in the county to improve facilities for pedestrians and cyclists. This includes the corridor between the A104 (Old Nairobi Road) and Oginga Odinga Avenue to the east of the Nakuru City Centre. Under this action, the county aims to expand the uptake of NMT by constructing/upgrading an additional 10 km of NMT pathways in major urban centres in the county. These upgraded pathways will improve access for pedestrians and cyclists, making it safer and easier for people to move around urban centres without requiring motorised transport. By making walking and cycling safer, this action will reduce congestion and road accidents in urban centres, in addition to reducing GHG emissions from the transport sector. In addition to physically upgrading the NMT corridors, the action will improve the integration of NMT into transport sector development plans for the county to facilitate continued improvement of NMT facilities.	GHG emissions reduction: 31.3 tCO_2e

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR:	**TRANSPORTATION**		
TARGET	**Nakuru County seeks to reduce GHG emissions from the transportation sector by 17.6% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the transportation sector of at least 2.7% compared to the BAU scenario from domestic resources, while the remaining 14.9% is conditional on external support.**		
10	Create green open spaces in the county's urban centres, including NMT corridors	One of the priorities of the County Government of Nakuru is to create green open spaces in the county's urban centres to offer recreational areas for public use and provide a host of benefits in terms of climate resilience and low-carbon development. Areas that have been upgraded already include the Nyayo Gardens and the A104 corridor. Under this action, greening and beautification will be expanded to include other well-used NMT corridors and along major roads, including Geoffrey Kamau Avenue in Nakuru city. The action will involve planting trees and plant beds as well as the maintenance of the green open spaces created. The aim of the action is to encourage adoption of NMT by creating safe and beautiful corridors for pedestrians and cyclists in urban centres.	*Impact included under Action 9*
11	Improve parking facilities on the edge of urban centres to reduce congestion	As a component of developing a low-carbon and efficient transport system, this action aims to reduce congestion caused by private vehicles in urban centres. Four 'park-and-ride' facilities will be developed on the edge of urban centres, from which drivers can access the centre through walking, cycling or non-motorised transport. These facilities would be strategically located to link to public transport and NMT routes to effectively reduce congestion in the urban centres. Possible locations include Mai Mai Hill, Naivasha or the Barnabas Centre, Nakuru. This action would create the opportunity to further develop the 'park-and-ride' facilities into green hubs by partnering with Nakuru and Naivasha municipalities and businesses to facilitate bicycle hire in the urban centres, for example. The improved parking facilities will be accompanied by financial incentives to reduce private vehicle use in urban centres.	GHG emissions reduction: 762.95 tCO_2e
12	Expand the public transport system to include bus mass transport along major transit routes	This action aims to increase the capacity and efficiency of public transport systems by introducing large buses along major routes. Large 30-seater buses will be integrated into the transport system to service the busiest routes, connecting with additional routes serviced by *matatus* (minibuses), *tuk-tuks* (three-wheelers), and *boda bodas* (motorcycles). The large buses will increase the efficiency of transport along these major routes, thereby reducing congestion. The introduction of these buses would be informed by lessons from the bus rapid transit system in Nairobi. It would include the engagement of current transport service providers, including for example *tuk-tuk* drivers, to ensure no one is left behind. Possible routes for bus mass transport are: • Between Nakuru city centre and Bahati • Between Naivasha and the university • Along Moi Avenue and Kenyatta Avenue, Naivasha	GHG emissions reduction: 2 400.4 tCO_2e

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR:	**TRANSPORTATION**		
TARGET	**Nakuru County seeks to reduce GHG emissions from the transportation sector by 17.6% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the transportation sector of at least 2.7% compared to the BAU scenario from domestic resources, while the remaining 14.9% is conditional on external support.**		
13	Import and pilot the use of electric hybrid vehicles in the county fleet	The aim of this action is to initiate uptake of and transition to electric mobility in Nakuru County through piloting electric vehicles for public transport. This action will prioritise the import of electric buses, in alignment with Action 12, to support the integration of low-carbon and efficient bus mass transport into the transport system in Nakuru County, in addition to electric minibuses (*matatus*). By replacing petrol or diesel-powered vehicles with electric ones, this action will reduce GHG emissions from the transport sector. To implement the action, the County Government of Nakuru will partner with the national Ministry of Transport and private sector stakeholders. As Nakuru County introduces electric vehicles into the fleet, several additional actions to support e-mobility will be considered. These actions are still in the early stages of consideration and will be developed further as local and national support for e-mobility grows and the need for a more comprehensive infrastructural, regulatory and financial framework arises. The actions include: • Developing infrastructure to support e-mobility, including electric vehicle charging facilities; • Developing an e-mobility policy and plan for Nakuru County; and • Creating an enabling environment for the private sector to invest in e-mobility.	*Information required to calculate direct impact not available*

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR	**WASTE[4]**		
TARGET	**Nakuru County seeks to reduce GHG emissions from the waste sector by 16.4% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the waste sector of at least 2.2% compared to the BAU scenario from domestic resources, while the remaining 14.2% is conditional on external support.**		
14	Upgrade three existing waste disposal sites in Nakuru County by improving access roads, fencing and zoning of the tipping areas	This action aims to improve the effectiveness of waste management in Nakuru County by improving facilities and the organisation of three waste disposal sites in the county. The targeted waste disposal sites are Gioto (to the northwest of Nakuru city centre), Naivasha, and Mai Mahiu. The upgrades will include: i. Improving access roads into the waste disposal sites, to enable waste deliveries and recycling collectors to more easily access tipping areas and prevent disorganised dumping; ii. Fencing the waste disposal sites to reduce movement of waste into the surrounding environment, and therefore reduce pollution; and iii. Zoning tipping areas to enable more effective waste sorting and recovery as well as zoned management of the disposal sites. By improving organisation of the disposal sites, this action will enable better management and more effective waste recovery, thereby reducing emissions from the waste sector. The upgrade of Gioto waste disposal site near the centre of Nakuru city is already underway, including improved access roads, fencing and tipping zones.	GHG emissions reduction: 24 074 tCO_2e
15	Develop a sanitary landfill and waste recovery facility at Gilgil	Under this action, the County Government of Nakuru aims to establish the county's first sanitary landfill site in Gilgil, a town between Nakuru and Naivasha. The county will aim to mobilise resources for the development of the landfill and waste recovery site in partnership with the private sector and national government. The sound environmental management of waste through a sanitary landfill will reduce GHG emissions and the production of Unintentionally Produced Persistent Organic Pollutants (UPOPs) from the waste sector by reducing open burning and dumping of waste and enabling waste recovery and methane capture. In addition, centralising waste management at the landfill site will enable the creation of economic opportunities related to the recovery, recycling and reuse of materials.	GHG emissions reduction: 21 115 tCO_2e

[4] GHG emission reduction estimates for waste sector actions presented in this table are based on estimates of the impact of each action if it were implemented in isolation. To address the interdependence of emission reductions from waste sector actions, a model was developed to estimate combined emission reductions of all actions relating to solid waste management. This model was used to estimate total emission reductions in the waste sector, presented below in Section 8. Therefore, the sum of the emissions reduction from each action presented here is different to the total emissions reduction for the sector.

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR	**WASTE**		
TARGET	**Nakuru County seeks to reduce GHG emissions from the waste sector by 16.4% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the waste sector of at least 2.2% compared to the BAU scenario from domestic resources, while the remaining 14.2% is conditional on external support.**		
16	Establish a resource recovery centre in Nakuru County to increase waste recovery	The aim of this action is to reduce the amount of solid waste ending up in disposal sites or subject to open burning by increasing waste recovery. This action will involve empowering Nakuru Solid Waste Management Association (NASWAMA) by establishing and equipping a resource recovery centre within the county. The resource recovery centre will be integrated into the county's solid waste management system, including the collection of solid waste and existing disposal sites or the new sanitary landfill. In synergy with the other actions in the waste sector, this action will aim to reduce emissions from the waste sector by reducing the amount of waste burned, dumped and sent to landfill.	GHG emissions reduction: 60 457 tCO_2e
17	Organise annual public awareness-raising campaigns and incentives to increase household level waste segregation	Increased waste segregation at household level is an important component of increasing waste segregation in Nakuru County. In partnership with private waste collection services and other waste sector stakeholders, this action aims to increase awareness of the benefits of waste segregation at household level and provide incentives (for example reduced costs for waste collection) for households to separate their waste. Annual awareness-raising campaigns will be undertaken in the county through local media channels to provide information on the benefits of waste segregation and how to do it.	GHG emissions reduction: 55 431 tCO_2e
18	Increase briquette production from organic waste and faecal sludge to contribute to waste recovery	This action aims to increase resource recovery through waste-to-energy conversion. This will involve the production of 25 tonnes of briquettes per month from the NAWASCO wastewater treatment plant, in partnership with NAWASSCOAL. The briquettes will be produced by reusing organic waste and faecal sludge. They can be used as a cleaner and more energy-dense biomass fuel, providing an alternative energy for local industry and businesses.	*Information required to calculate direct impact not available*

ACTION #	ACTION TITLE	ACTION DESCRIPTION	ENERGY AND GHG EMISSION IMPACTS
SECTOR	**WASTE**		
TARGET	**Nakuru County seeks to reduce GHG emissions from the waste sector by 16.4% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the waste sector of at least 2.2% compared to the BAU scenario from domestic resources, while the remaining 14.2% is conditional on external support.**		
19	Increase the extent of the sewer network and the capacity of the wastewater treatment infrastructure to service 60% of the population of Nakuru County	Coverage of the sewer network and centralised wastewater treatment in Nakuru County is currently estimated at 27% (NAWASSCO, 2021). This action aims to increase coverage to 60% of the population by increasing the capacity of the wastewater treatment plants as well as the sewerage network. The Njoro Sewerage Treatment Plant (to the west of the Nakuru city centre) currently has a capacity of 9 600 m^3 per day, which is ~45% utilised. The sewer network extends approximately 200 km across Nakuru town. Increasing the extent of the sewer network and capacity of the sewerage treatment plant would reduce GHG emissions from untreated wastewater and increase the efficiency of Nakuru's wastewater treatment system.	GHG emission reduction: 13 302.32 tCO_2e
20	Strengthen enforcement of existing laws and regulations on waste management in Nakuru County	This action will aim to strengthen enforcement and improve effectiveness of the waste management laws and regulations in the Nakuru County Waste Management Act of 2021, the Nakuru County Water and Sanitation Act of 2021 and the Nakuru County Climate Change Act of 2021. This will be done by building capacity within the County Government of Nakuru on the existing laws, policies and regulations, and their enforcement. In addition, the county will seek to enhance partnerships and collaboration with other waste sector stakeholders to improve compliance with the laws and regulations.	*Not applicable*

6. Co-benefits, synergies and trade-offs of mitigation actions

Whilst not mandatory under the CoM SSA SEACAP Reporting Guideline, each action should ideally be accompanied by a description of its co-benefits and an overview on whether the actions have synergies with the other pillars (Adaptation and Access to Energy) and existing regulations, policies and plans. Describing co-benefits supports local governments in 'making the case' for why actions should be prioritised and implemented in the event that climate change considerations are removed. Detail on synergies of the action with other work that the local government is undertaking (or plans and legislation) should be included. Detail on potential trade-offs associated with the action should also be included. Detail on whether the action also affects the Adaptation or Access to Energy pillar is mandatory. **Table 6** shows this information for each action.

Table 6: Co-benefits, synergies and trade-offs of mitigation actions

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: STATIONARY ENERGY						
1	Install solar photovoltaic (PV) systems on 25 county government facilities	• Reduced energy costs for CGN • More reliable electricity supply for government facilities • Reduced dependence on centralised electricity infrastructure	• Aligns with public health priorities relating to air quality • Alignment with Action 2 under the stationary energy sector and the county's priorities for sustainable energy access and climate change adaptation	• High installation costs of RE • Potential for increasing taxes	Y	Y
2	Create incentives to promote the uptake of renewable energy technologies by businesses, households and communities in Nakuru County	• Increased skilled job creation and development of technical capacity • Improved air quality • Reduced noise pollution from generators • Reduced risk of respiratory diseases • Reduced dependence on centralised electricity infrastructure	• Alignment with Sustainable Development Goals (SDGs) 7 and 8 • Promotion of bioenergy use links to efforts to promote climate-smart agriculture • Aligns with public health priorities relating to air quality • Alignment with Action 1 to promote renewable energy and Action 6 to increase biogas production under the stationary energy sector, as well as the county's priorities for sustainable energy access and climate change adaptation	• High installation costs of RE • Potential for increasing taxes	Y	Y
3	Develop and enforce an Energy Act and regulations on energy efficiency within Nakuru County by 2027	• Reduced energy costs for households, businesses and institutions • Increased knowledge of energy efficiency	• Alignment with SDGs 7, 9 and 11 • Alignment with Action 4 and 5 to increase energy efficiency, and Action 7 to promote green building principles under the stationary energy sector and the county's priorities for sustainable energy access	• Challenges in monitoring progress on energy efficiency	N	Y

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: STATIONARY ENERGY … *continued*						
4	Undertake regular energy audits on 2 000 buildings and facilities within the county	• Reduced energy costs for businesses and institutions • Increased employment opportunities through energy audits • Increased knowledge of sustainable energy and energy efficiency • Increased understanding of energy use within buildings and facilities within the county	• Alignment with SDGs 7 and 9 • Alignment with Action 3 and Action 5 to increase energy efficiency in the stationary energy sector, and the county's priorities for sustainable energy access	• Challenges in monitoring and data availability • Requirement for ongoing maintenance • Potential rebound effect of increasing electricity use	N	N
5	Install energy-efficient lighting in commercial, institutional and residential buildings	• Reduced power cuts/interruptions Reduce energy costs for households, businesses and institutions • Increased uptake of cleaner energy technologies	• Alignment with SDG 7, 8 and 9 • Alignment with Action 3 and Action 4 to increase energy efficiency, and Action 8 to raise public awareness under the stationary energy sector, and the county's priorities for sustainable energy access	• Challenges in monitoring progress in energy efficiency • Requirement for ongoing maintenance • Uptake to date has been slow • Potential rebound effect of increasing electricity use	N	Y

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: STATIONARY ENERGY … ***continued***						
6	Develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector	• Improved air quality • Reduced risk of respiratory diseases • Reduced risk of fires • Reduced energy costs • Reduced deforestation and dependence on wood fuel • Reduced time spent by women and children gathering fuel wood	• Alignment with SDGs 3, 7 and 15 • Alignment with public health priorities relating to air quality • Alignment with priorities in the County Integrated Development Plan (CIDP) • Alignment with agricultural sector priorities (biogas production) • Alignment with Action 2 under the stationary energy sector and the county's priorities for sustainable energy access and climate change adaptation	• Change in livelihood activities and social interactions of women collecting fuel wood • Potential increasing cost of living, where households go from gathering fuel wood to buying fuel	Y	Y
7	Develop policies and guidelines on green buildings to encourage the use of green building technologies	• Reduced energy costs • Contribution to creating a clean and safe environment • Improved capacity for sustainable design • Improved aesthetic value of built environment	• Alignment with SDG 9 • Alignment with the Environmental Management and Coordination Act No. 8 of 1999 (EMCA) and priorities of the National Environmental Management Authority (NEMA) • Alignment with Action 3 to strengthen regulations for energy efficiency under the stationary energy sector	• High costs of construction and retrofitting	Y	N
8	Create three energy centres to disseminate information and raise awareness on sustainable energy	• Increased knowledge of sustainable energy among communities • Reduced environmental pollution • Improved safety of humans and wildlife	• Alignment with SDG 7 • Alignment with public education priorities and access to information and computer technologies (ICT) • Alignment with Actions 2, 5 and 6 in the stationary energy sector and the county's priorities for sustainable energy access	• Influencing attitudes of communities may be challenging	Y	Y

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: TRANSPORTATION						
9	Construct and/or upgrade 10 km of non-motorised transport routes in urban centres	• Improved health and physical well-being of communities • Improved uptake and usage of NMT options (walking, cycling etc.) • Reduced air and noise pollution • Reduced risk of traffic accidents • Jobs created for construction and maintenance of facilities • Reduced cost of transport	• Alignment with SDGs 3, 9 and 11 • Alignment with public health priorities • Alignment with other actions in the transport sector, including Action 10 to create green open spaces and Action 11 to improve parking facilities	• Possible increase in littering • Possible increase in insecurity, for example mugging • Reduced income and employment for public transport operators, for example *boda boda* drivers • Reduced revenue for county, for example, through parking fees	Y	N
10	Create green open spaces in the county's urban centres, including NMT corridors	• Increased aesthetic value of urban spaces • Reduced air pollution • Reduced urban heat island effect • Improved urban ecosystems and ecological processes • Improved access to green open spaces within the county	• Alignment with SDG 11 • Alignment with national and county-level target of achieving 10% tree cover • Alignment with CIDP • Alignment with other transport sector actions, including Action 9 to construct and improve NMT corridors	• Planting trees may increase space limitations along road verges • High maintenance costs • Possibility of malicious damage to greened spaces	Y	N

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: TRANSPORTATION … *continued*						
11	Improve parking facilities on the edge of urban centres to reduce congestion	• Reduced congestion and air pollution • Improved road safety for vehicles and pedestrians • Creation of opportunities for small businesses related to the green hub • Improved integration in the transport sector	• Alignment with SDGs 3 and 11 • Alignment with the CIDP, Nakuru County Climate Change Action Plan, Integrated Sustainable Urban Development Plan • Alignment with other actions in the transport sector, including Action 9 to upgrade NMT corridors and Action 12 to expand the public transport system	• Expense of developing or improving parking facilities	N	N
12	Expand the public transport system to include bus mass transport along major transit routes	• Reduced congestion and air pollution • Improved integration in the transport sector • Improved road safety for vehicles and pedestrians • Potentially reduced cost of transport • Enhanced accessibility to the county, particularly for people who do not own a car • Job creation as bus drivers will be needed	• Alignment with SDGs 3 and 11 • Alignment with national and county-level priorities in the transport sector, including the NDC and NCCAP • Alignment with other actions in the transport sector, including Action 11 to provide park-and-ride facilities and Action 13 to import and pilot electric hybrid vehicles	• Expense of investing in buses and related infrastructure • Political difficulty of replacing *matatus, boda bodas* and other existing transport modes • Possibility of job losses for existing transport operators	N	N
13	Import and pilot the use of electric hybrid vehicles in the county fleet	• Source of revenue for county government • Improved partnerships between national and county governments and with private sector actors	• Alignment with Kenya's NCCAP 2018–2022 and Vision 2030 • Alignment with other actions in the transport sector, including expansion of the public transport system to include bus mass transport	• Capital intensity of importing vehicles • Risk that there is no/slow uptake	N	Y

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: WASTE						
14	Upgrade three existing municipal waste disposal sites in Nakuru County by improving access roads, fencing and zoning of the tipping areas	• Creation of employment opportunities for waste recovery • Improved environmental health • Improved water quality • Improved aesthetic value of environment	• Alignment with SDG 3 and 11 • Alignment with the Article 69 of the Constitution of Kenya • Alignment with priorities in the CIDP	• Cost of upgrading waste disposal facilities	Y	N
15	Develop a sanitary landfill and waste recovery facility at Gilgil	• Reduced land pollution from dumping • Reduced air pollution from open burning • Reduced water pollution from leeching • Employment creation for waste recovery and landfill management • Potential for energy generation from methane	• Alignment with SDGs 3, 9 and 11 • Alignment with the CIDP • Alignment with Kenya's National Solid Waste Management Strategy and Nakuru County's Waste Management priorities • Alignment with other actions in the waste sector, including Action 16 and 17 to improve sorting and recovery of waste	• High cost of developing sanitary landfill • Need to rehabilitate land before any other use • Political challenges	N	N

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: WASTE … *continued*						
16	Establish a resource recovery centre in Nakuru County to increase waste recovery	• Economic opportunities created for valorisation of waste and circular economy activities • Increased lifespan of waste disposal sites	• Alignment with SDG 8 and 12 • Alignment with Kenya's National Solid Waste Management Strategy • Alignment with Nakuru County Waste Management Act of 2021 and Waste Management Regulation of 2006 • Alignment with other actions in the waste sector to improve waste recovery, including Action 17	• Cost of developing a waste recovery centre	N	N
17	Organise annual public awareness-raising campaigns and incentives to increase household level waste segregation	• Reduction of waste ending up in landfill • Increased lifespan of waste disposal sites • Changed public perception towards waste as a resource	• Alignment with SDG 12 • Alignment with Kenya's National Solid Waste Management Strategy • Alignment with Nakuru County Waste Management Act of 2021 and Waste Management Regulation of 2006 • Alignment with other actions in the waste sector to improve waste recovery, including Action 16	• Need to change behavioural and cultural practices	N	N

#	ACTION	CO-BENEFITS	SYNERGIES WITH OTHER ACTIONS	TRADE-OFFS	ACTION ALSO AFFECTING ADAPTATION PILLAR [Y/N]	ACTION ALSO AFFECTING THE ACCESS TO ENERY PILLAR [Y/N]
SECTOR: WASTE … *continued*						
18	Increase briquette production from organic waste and faecal sludge to contribute to waste recovery	• Increased availability of briquettes as an alternative clean energy source • Increased revenue for utility	• Alignment with SDG 12 • Alignment with Nakuru County Waste Management Act of 2021 and Waste Management Regulation of 2006 • Alignment with other actions in the waste sector to improve waste recovery including Action 16	• Stigma relating to use of human waste for energy may reduce uptake	N	Y
19	Increase the extent of the sewer network and the capacity of the wastewater treatment infrastructure to service 60% of the population of Nakuru County	• Improved environmental health and reduced risk of waterborne diseases • Increased availability of recycled water, for example for irrigation and food production	• Alignment with SDGs 3, 6 and 9 • Alignment with Kenya's Water Act of 2016 • Alignment with Nakuru County Sanitation Policy and public health priorities • Alignment with other actions in the waste sector, including Action 18 to increase waste recovery and actions under the Adaptation pillar to improve sanitation	• Costs associated with upgrading wastewater treatment plants and expanding the sewer network	Y	N
20	Strengthen enforcement of existing laws and regulations on waste management in Nakuru County	• Improved environmental health and reduced health risks • Cleaner environment • Improved compliance and reduced number of convictions	• Alignment with SDG 3, 11 and 12 • Alignment with Kenya's EMCA of 1999 • Alignment with Nakuru County's Waste Management Act of 2021; Climate Change Act of 2021; and Water and Sanitation Act of 2021	• Public resistance to enforcement of regulations • Potential political resistance	Y	N

7. Prioritised actions

As per the GPC BASIC Methodology, and the requirements of the JRC Guidebook, the three sectors covered in the Bobo-Dioulasso BEI are stationary energy, transportation and waste. These are therefore the sectors for which targets were set, and thus are the prioritised sectors for mitigation actions. Section 4 describes the process used for the identification of mitigation actions and the criteria used to prioritise these actions.

Table 7 indicates which actions have been prioritised and also provides a rationale for their prioritisation. **Table 8** then provides the additional information on these prioritised actions as required by CoM SSA to support county planning in the future. Fourteen actions were highlighted by the county as priority for the Mitigation pillar.

Table 7: Priority actions to reduce GHG emissions in Bobo-Dioulasso

ACTION #	ACTION TITLE	RATIONALE FOR PRIORITISATION
SECTOR:	**STATIONARY ENERGY**	
3	Develop and enforce an Energy Act and regulations on energy efficiency within Nakuru County by 2027	These three actions were originally proposed and prioritised as one action to improve energy efficiency in Nakuru County. They have been split into three actions for ease of reporting. Improving energy efficiency is a cost-effective way to reduce GHG emissions with considerable co-benefits in terms of reducing energy costs. In many cases, energy efficiency can be improved without substantial upfront investment, and can be done at a small or large scale. Many energy-efficient technologies are also readily available. These actions can increase capacity for efficient energy use through the awareness-raising components.
4	Undertake regular energy audits on 2 000 buildings and facilities within the county	
5	Install energy-efficient lighting in commercial, institutional and residential buildings	
6	Develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector	Improving access to clean cooking and lighting at household level is well aligned with county-level, national and international priorities across sectors. This action can benefit most households in the county as there is a need to move away from traditional cooking methods that lead to bad air quality, high energy costs, degraded ecosystems and significant health risks. Biogas production in particular is aligned with circular economy and waste management priorities as well as energy access and climate change adaptation.
8	Create three energy centres to disseminate information and raise awareness on sustainable energy	This action is achievable and realistic, as it does not require large financial investments or new capacities and technologies. Improving community awareness of sustainable energy technologies and energy saving activities can influence uptake of several beneficial behavioural changes, including the use of clean cooking and energy-efficient technologies, renewable energy and the adoption of energy-efficient practices.

ACTION #	ACTION TITLE	RATIONALE FOR PRIORITISATION
SECTOR:	**TRANSPORTATION**	
9	Construct and/or upgrade 10 km of non-motorised transport routes in urban centres	Implementation of NMT corridor upgrades in Nakuru County have already been piloted and have been highly successful thus far, having multiple co-benefits. This action is realistic and achievable, and has many synergies with other priorities in the county.
10	Create green open spaces in the county's urban centres, including NMT corridors	Upgrading of urban green spaces, including along NMT corridors in Nakuru and Naivasha, has been ongoing over the last few years. It is well-aligned with the county priorities across several sectors and has significant co-benefits in terms of climate resilience. In addition, the implementation of this action is considered technically, financially and politically feasible.
11	Improve parking facilities on the edge of urban centres to reduce congestion	Decongesting the urban centres of Nakuru and Naivasha will contribute substantially to reducing GHG emissions in the transport sector, as well as realising multiple co-benefits, including improved air quality and reduced time spent in traffic. This action is well-aligned with other actions in the transport sector.
12	Expand the public transport system to include bus mass transport along major transit routes.	The inclusion of bus mass transport in the public transport system for the county will contribute to the climate-smart urban development of Nakuru as a city as well as for Naivasha. Along with the improvement of NMT corridors and decongestion of the city centres, the modal shift from single-occupancy vehicles, *matatus* and two- and three-wheelers will significantly improve the efficiency of passenger transport along major routes.

ACTION #	ACTION TITLE	RATIONALE FOR PRIORITISATION
SECTOR:	**WASTE**	
14	Upgrade three existing municipal waste disposal sites in Nakuru County by improving access roads, fencing and zoning of the tipping areas	Ongoing efforts to upgrade the Gioto waste disposal site have been effective in improving organisation and recovery of waste and reducing environmental pollution outside the disposal site. While this action has cost implications, it will be less capital intensive than investments in new landfill sites, as the land is existing and designated for waste management.
16	Establish a resource recovery centre in Nakuru County to increase waste recovery	These three actions were originally prioritised as a single action to improve waste recovery practices in Nakuru County. The actions have been separated for ease of detailing and reporting. Promoting circular economy practices, including resource recovery, is one of the most efficient ways to improve waste management at the local level. Involving all stakeholders along the value chain from households to businesses, industries, waste utilities and services providers is essential for developing an integrated and effective waste management system. By improving waste recovery, these actions will not only reduce GHG emissions from the waste sector, but also create economic opportunities and increase the lifespan of waste management facilities.
17	Organise annual public awareness-raising campaigns and incentives to increase household level waste segregation	
18	Increase briquette production from organic waste and faecal sludge to contribute to waste recovery	
19	Increase the extent of the sewer network and the capacity of the wastewater treatment infrastructure to service 60% of the population of Nakuru County	This action is aligned with existing targets and priorities in the sanitation and public health sectors in Nakuru County as well as climate change adaptation priorities. Increasing wastewater treatment coverage will not only reduce GHG emissions from the waste sector, but also reduce public health risks and enable the effective treatment and reuse of effluent.

The following tables indicate the details on the prioritised actions required by CoM SSA and provided by the participants of the workshops.

Table 8: Supporting information for mitigation actions as required by the SEACAP Guidebook and SEACAP Reporting Template[5]:

ACTION NUMBER	ACTION TITLE	AREA OF INTERVENTION	POLICY OR GOVERNANCE INSTRUMENT	ORIGINS OF ACTION	ORGANISATION RESPONSIBLE	PROPOSED IMPLEMENTATION TIMEFRAME (START – FINISH)	STATUS OF IMPLEMENTATION	COST OF IMPLEMENTATION
SECTOR:	**STATIONARY ENERGY**							
SECTOR TARGET:	**Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support.**							
3	Develop and enforce an Energy Act and regulations on energy efficiency within Nakuru County by 2027	Regulation, controls and sanctions	Regulation and planning	Local government	Nakuru County Department of Water, Environment, Energy and Natural Resources	2022–2027	Not started	*Not estimated*
4	Undertake regular energy audits on 2 000 buildings and facilities within the county	Energy management of local authority estate	Municipal governing of own facilities	Local government	Nakuru County Department of Water, Environment, Energy and Natural Resources	2022–2030	Not started	*Not estimated*
5	Install energy-efficient lighting in commercial, institutional and residential buildings	Energy management of local authority estate	Municipal governing of own facilities	Local government	Nakuru County Department of Water, Environment, Energy and Natural Resources	2022–2030	Not started	*Not estimated*

[5] **Note:** Each heading included in the table has a drop down list included in the SEACAP Reporting Template for responses.

ACTION NUMBER	ACTION TITLE	AREA OF INTERVENTION	POLICY OR GOVERNANCE INSTRUMENT	ORIGINS OF ACTION	ORGANISATION RESPONSIBLE	PROPOSED IMPLEMENTATION TIMEFRAME (START – FINISH)	STATUS OF IMPLEMENTATION	COST OF IMPLEMENTATION
SECTOR:	**STATIONARY ENERGY … *continued***							
SECTOR TARGET:	**Nakuru County seeks to reduce GHG emissions from the stationary energy sector by 57.5% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the stationary energy sector of at least 12% compared to the BAU scenario from domestic resources, while the remaining 45.5% is conditional on external support.**							
6	Develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector	Strategic energy planning to support local energy generation	Coordinating stakeholders and awareness building	Local government	Nakuru County Dept. of Water, Environment, Energy and Natural Resources; Dept. of Land, Housing and Physical Planning; Dept. of Agriculture, Livestock and Fisheries; Dept. of Health Services; Dept. of Youth, Gender, Culture, Sports and Social Services	2022–2030	35% of households in Nakuru County are using clean cooking technologies	KES 800 000 000
8	Create three energy centres to disseminate information and raise awareness on sustainable energy	Awareness raising/training	Coordinating stakeholders and awareness building	Local government	Nakuru County Dept. of Water, Environment, Energy and Natural Resources; Dept. of Roads, Transport and Public Works, Dept. of Education and ICT	2022–2030	Not started	KES 110 000 000

ACTION NUMBER	ACTION TITLE	AREA OF INTERVENTION	POLICY OR GOVERNANCE INSTRUMENT	ORIGINS OF ACTION	ORGANISATION RESPONSIBLE	PROPOSED IMPLEMENTATION TIMEFRAME (START – FINISH)	STATUS OF IMPLEMENTATION	COST OF IMPLEMENTATION
SECTOR:	**TRANSPORTATION**							
SECTOR TARGET:	**Nakuru County seeks to reduce GHG emissions from the transportation sector by 17.6% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the transportation sector of at least 2.7% compared to the BAU scenario from domestic resources, while the remaining 14.9% is conditional on external support.**							
9	Construct and/or upgrade 10 km of non-motorised transport routes in urban centres	Direct infrastructure investments for transport	Municipal governing of own facilities; regulation and planning	Local government	Nakuru County Dept. of Roads, Transport and Public Works; Dept. of Water, Energy, Environment and Natural Resources; Nakuru Municipality; Naivasha Municipality	2019–2030	Ongoing	Cost so far: KES 67 million in Naivasha Municipality KES 60 million in Nakuru Municipality Future cost not yet estimated
10	Create green open spaces in the county's urban centres, including NMT corridors	Other	Municipal governing of own facilities	Local government	Nakuru County Dept. of Water, Energy, Environment and Natural Resources; Nakuru Municipality;	2021–2030	Ongoing	*Not estimated*
11	Improve parking facilities on the edge of urban centres to reduce congestion	Direct infrastructure investments for transport	Municipal governing of own facilities; regulation and planning	Local government	Nakuru County Dept. of Roads, Transport and Public Works; Dept. of Water, Energy, Environment and Natural Resources; Dept. of Land, Housing and Physical Planning; Nakuru Municipality; Naivasha Municipality	2021–2030	Ongoing	*Not estimated*

ACTION NUMBER	ACTION TITLE	AREA OF INTERVENTION	POLICY OR GOVERNANCE INSTRUMENT	ORIGINS OF ACTION	ORGANISATION RESPONSIBLE	PROPOSED IMPLEMENTATION TIMEFRAME (START – FINISH)	STATUS OF IMPLEMENTATION	COST OF IMPLEMENTATION
SECTOR:	**TRANSPORTATION … *continued***							
SECTOR TARGET:	**Nakuru County seeks to reduce GHG emissions from the transportation sector by 17.6% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the transportation sector of at least 2.7% compared to the BAU scenario from domestic resources, while the remaining 14.9% is conditional on external support.**							
12	Expand the public transport system to include bus mass transport along major transit routes	Partnership with transport service providers	Coordinating stakeholders (public and private); regulation and planning	Local government	Nakuru County Dept. of Roads, Transport and Public Works; Dept. of Water, Energy, Environment and Natural Resources; Dept. of Economic Planning; Dept. of Land, Housing and Physical Planning; bus operators	2021–2030	Ongoing	*Not estimated*
13	Import and pilot the use of electric hybrid vehicles to support their uptake	Direct infrastructure investments for transport	Municipal governing of own facilities; Coordinating stakeholders (Public and Private)	Local government	Nakuru County Dept. of Roads, Transport and Public Works; Kenya Ministry of Transport; bus operators	2022–2030	Not started	*Not estimated*
SECTOR:	**WASTE**							
SECTOR TARGET:	**Nakuru County seeks to reduce GHG emissions from the waste sector by 16.4% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the waste sector of at least 2.2% compared to the BAU scenario from domestic resources, while the remaining 14.2% is conditional on external support.**							
14	Upgrade three existing municipal waste disposal sites in Nakuru County by improving access roads, fencing and zoning of the tipping areas	Waste and wastewater management	Municipal governing of own facilities	Local government	Nakuru County Dept. of Energy, Environment and Natural Resources; Kenya Urban Support Programme (KUSP)	2021–2030	Ongoing	*Not estimated*

ACTION NUMBER	ACTION TITLE	AREA OF INTERVENTION	POLICY OR GOVERNANCE INSTRUMENT	ORIGINS OF ACTION	ORGANISATION RESPONSIBLE	PROPOSED IMPLEMENTATION TIMEFRAME (START – FINISH)	STATUS OF IMPLEMENTATION	COST OF IMPLEMENTATION
SECTOR:	**WASTE … *continued***							
SECTOR TARGET:	**Nakuru County seeks to reduce GHG emissions from the waste sector by 16.4% by 2030 compared to the business-as-usual scenario. Nakuru County commits to achieving a reduction of GHG emissions from the waste sector of at least 2.2% compared to the BAU scenario from domestic resources, while the remaining 14.2% is conditional on external support.**							
16	Establish a resource recovery centre in Nakuru County to increase waste recovery	Waste and wastewater management	Municipal governing of own facilities	Local government	Nakuru County Dept. of Energy, Environment and Natural Resources; NASWAMA	2022–2030	Not started	*Not estimated*
17	Organise annual public awareness-raising campaigns and incentives to increase household level waste segregation	Awareness raising	Coordinating stakeholders and awareness building	Local government	Nakuru County Dept. of Energy, Environment and Natural Resources; NASWAMA; private sector waste stakeholders	2022–2030	Not started	*Not estimated*
18	Increase briquette production from organic waste and faecal sludge to contribute to waste recovery	Waste and wastewater management	Municipal governing of own facilities	Local government	Nakuru County Dept. of Energy, Environment and Natural Resources; NAWASSCO; NAWASSCOAL	2021–2030	Ongoing	*Not estimated*
19	Increase the extent of the sewer network and the capacity of the wastewater treatment infrastructure to service 60% of the population of Nakuru County	Waste and wastewater management	Municipal governing of own facilities	Local government	Nakuru County Dept. of Water; NAWASSCO	2022–2030	Not started	*Not estimated*

8. Action contributions to mitigation targets

Once identified and elaborated, the 20 actions presented in Section 5 were screened to identify which ones are expected to directly contribute to reducing future GHG emissions compared to a business-as-usual (BAU) scenario.

17 of the 20 actions are expected to contribute directly to reducing GHG emissions, while the remaining 3 actions will support further GHG emission reductions indirectly through awareness-raising and community engagement, as well as by creating a conducive institutional and regulatory environment in Nakuru County for a low-emission trajectory.

The 17 actions expected to directly reduce GHG emissions were then assessed to check whether the information available would allow for the emission reductions to be estimated. It was not possible to estimate emission reductions for 2 of the 17 actions (Actions 13 and 18), because of the limited available information relevant to the calculations. In the stationary energy sector, it was decided to estimate the impacts of Actions 3, 4 and 5 together, as they all address energy efficiency. Similarly, the impact of Action 10 under the transportation sector was included under Action 9, as both actions are expected to increase uptake of non-motorised transport. Emission reduction estimations were therefore performed for 12 actions. Details and results of each of these calculations are presented in Appendix II.

8.1 Overall contribution

Overall, it was conservatively estimated that the actions identified in this action plan will reduce GHG emissions by 239 782 tCO_2e compared to the BAU scenario. This is equivalent to an 8.8% reduction in emissions compared to the BAU scenario, with total emissions being limited to 2 478 902 tCO2e by 2030 (**Figure 11**).

This estimation indicates that Nakuru County is very likely to achieve its unconditional target of reducing emissions by 6% by 2030 if all the actions presented in this Mitigation Action Planning Report are implemented. However, further mitigation efforts will be needed for Nakuru County to achieve its overall target of reducing emissions by 33% by 2030. These additional efforts will need to be in collaboration with national and international partners and to address areas that are beyond the mandate of the County Government of Nakuru, including the national energy mix, and the management of the national highway and railway.

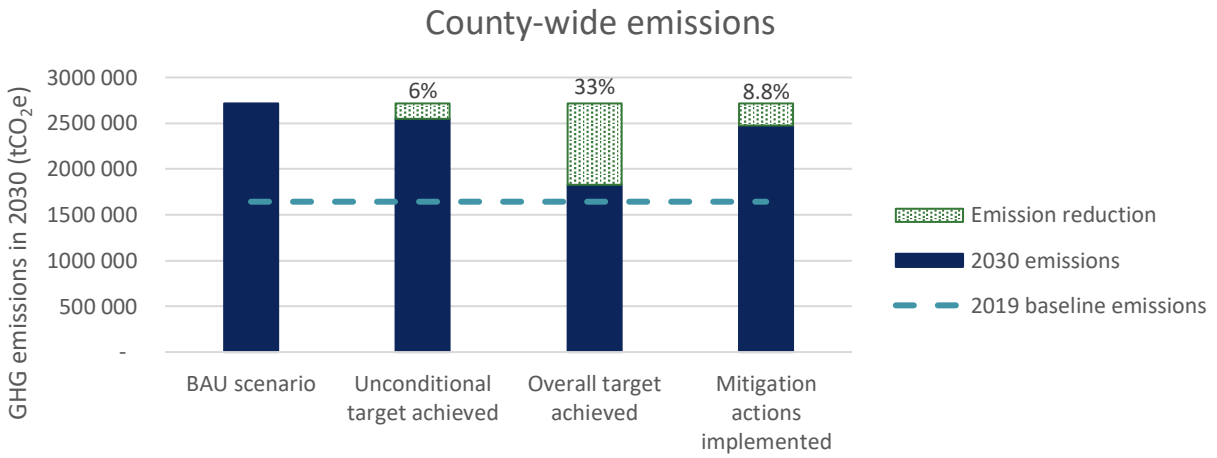

Figure 11: Comparison of county-wide emissions in 2030 under a BAU scenario, where the sector mitigation targets are achieved, or where the mitigation actions are implemented

It should be noted that the ex-ante emission reduction estimates presented here exclude: i) emissions and emission reductions from the AFOLU and IPPU sectors, for example by reducing reliance on firewood and charcoal for cooking; ii) reductions in biogenic CO_2 emissions; iii) reductions in GHG emissions resulting indirectly from the actions; and iv) Actions 13 and 18, for which the impact could not be estimated due to data limitations.

8.2 Stationary energy

Actions in the stationary energy sector are estimated to reduce GHG emissions by 104 571 tCO_2e compared to the BAU scenario by 2030. This is equivalent to a 9.9% reduction in emissions. Although this is slightly lower than the unconditional target of a 12% reduction compared to BAU (**Figure 12**), it is still a substantial and ambitious reduction. In addition to the actions listed here, at the time of writing, Nakuru County was engaged in a process to develop a County Energy Plan. This plan is likely to include additional actions with an impact on GHG emission reductions in the stationary energy sector. With the inclusion of these actions, it is likely that Nakuru County will achieve its unconditional target of reducing GHG emissions from the stationary energy sector by at least 12% by 2030 compared to BAU.

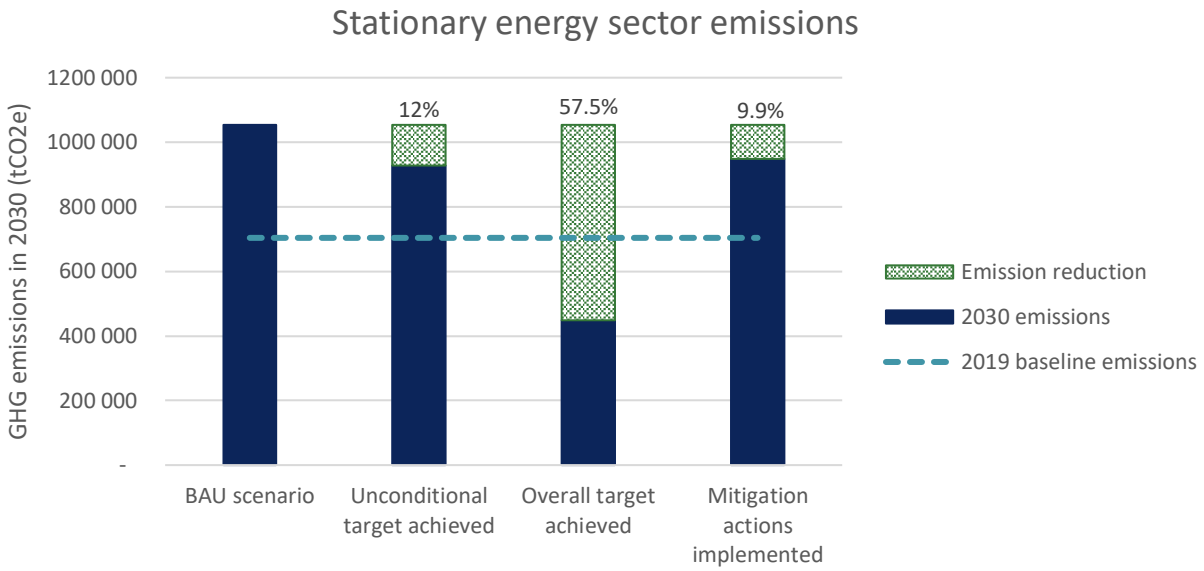

Figure 12: Comparison of GHG emissions from the stationary energy sector in 2030, under a BAU scenario, where the sector mitigation target is achieved, or where the mitigation actions are implemented

Action 6 under the stationary energy sector, to *"develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector"*, is not only expected to reduce GHG emissions by more than 100 000 tCO_2e per year by 2030, but also to substantially reduce biogenic CO_2 emissions. This action alone is expected to reduce CO_2(b) emissions by one million tonnes per year, which is equivalent to a 29% reduction compared to 2019 CO_2(b) emissions. It will also have co-benefits in terms of ecosystem health and resilience in Nakuru County and help to set the county on a resilient, low-emission trajectory.

8.3 Transportation

Actions in the transport sector are estimated to reduce GHG emissions by 3 195 tCO_2e by 2030 compared to the BAU scenario. This is equivalent to a 0.3% reduction in emissions. This is lower than both the unconditional target of a 2.7% reduction as well as the overall target of a 17.6% reduction (**Figure 13**). The approach taken to develop ex-ante estimates of GHG emission reductions from actions in the transport sector was deliberately conservative (i.e. likely to underestimate emission reductions). Due to a lack of high-resolution traffic flow data, and limited specificity in terms of the location of the actions (e.g. the location of the NMT corridors in Action 9, parking lots in Action 11 and bus routes in Action 12), there was a high level of uncertainty in the transport sector estimates. In addition, the impact of importing electric hybrid vehicles for use in the county vehicle fleet could not be estimated.

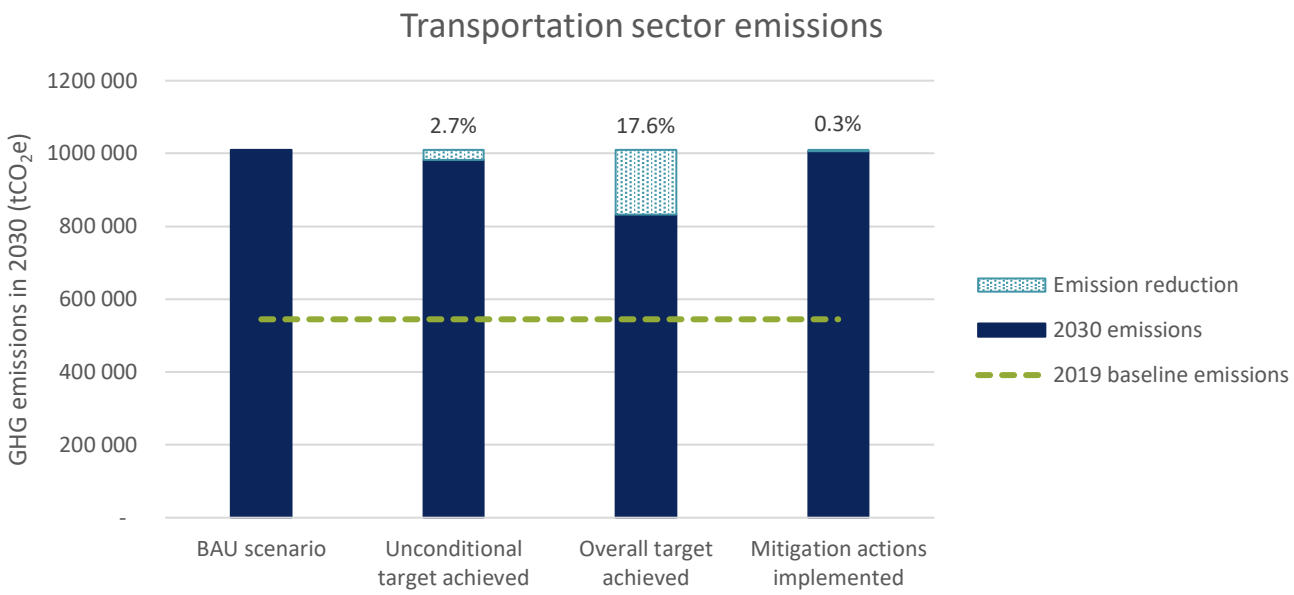

Figure 13: Comparison of GHG emissions from the transport sector in 2030, under a BAU scenario, where the sector mitigation target is achieved, or where the mitigation actions are implemented

It will be possible to more comprehensively assess whether the actions meet the transport sector targets, if adequate data collection and monitoring mechanisms are put in place later on in the planning and implementation process of the transport sector actions. Additional actions driven by national institutions to improve traffic flow on the national highway and develop railway infrastructure could also contribute to the achievement of Nakuru County's ambitious transport sector targets.

8.4 Waste

Actions in the waste sector are estimated to substantially reduce GHG emissions by 132 016 tCO_2e by 2030 compared to the BAU scenario[6]. This is equivalent to a 20.1% reduction in emissions. This estimated reduction is higher than both the unconditional and the overall emission reduction target for the waste sector (**Figure 14**), which means that Nakuru County is likely to achieve its emission reduction targets for the waste sector if all the actions outlined in this report are implemented. In addition, the impact of Action 18 to *"increase briquette production from organic waste and faecal sludge to contribute to waste recovery"* could not be estimated, although it is expected to contribute directly to reducing GHG emissions from the waste sector.

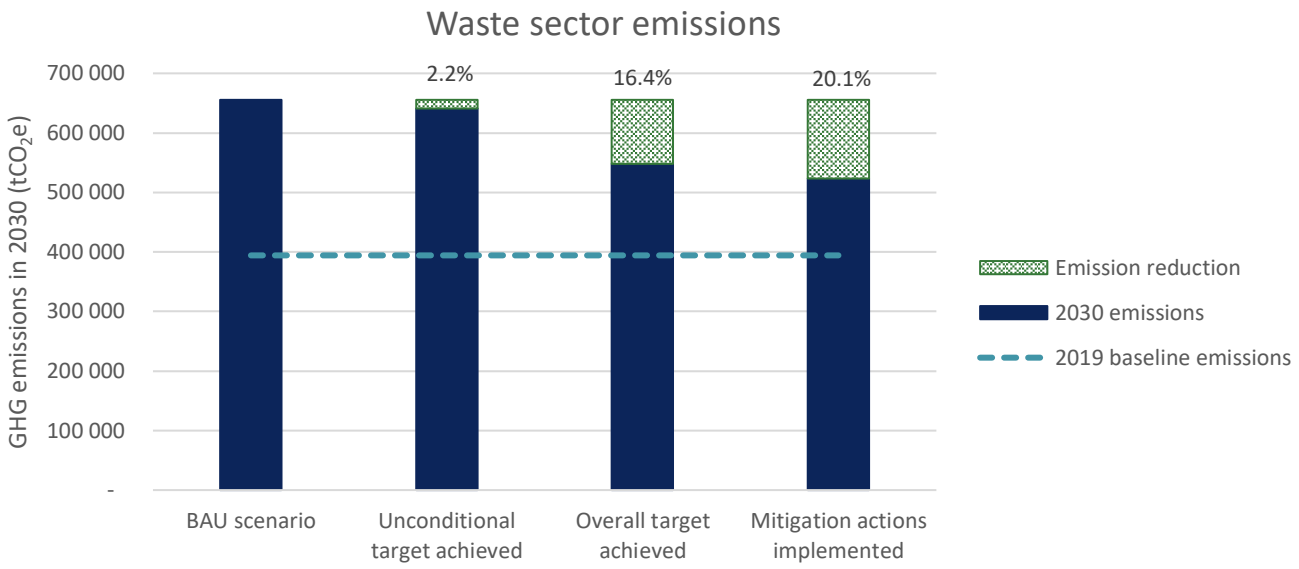

Figure 14: Comparison of GHG emissions from the waste sector in 2030, under a BAU scenario, where the sector mitigation target is achieved, or where the mitigation actions are implemented

[6] To address the interdependence of emission reductions from waste sector actions, a model was developed to estimate combined emission reductions of all actions relating to solid waste management. This model was used to estimate total emission reductions in the waste sector, whereas the emission reductions estimated for each action separately are presented in Table 5. Therefore, the sum of the emissions reduction from each action is different to the total emissions reduction presented here.

9. Conclusion

The Mitigation Action Planning Report for Nakuru County identifies 20 actions across three sectors – stationary energy, transportation and waste – to contribute to achieving the GHG emission reduction targets set through the mitigation target setting process. This report forms part of the Mitigation pillar of the Sustainable Energy Access and Climate Action Plan (SEACAP) for Nakuru County. From amongst the 20 identified actions, 14 have been selected as priorities for implementation to place Nakuru County on a lower emission pathway by 2030.

The actions are intended to meet Nakuru County's GHG emission reduction targets by 2030. In addition, they are expected to provide many additional co-benefits to the county, including reducing traffic congestion, improving road safety, improving air quality and reducing water and noise pollution, creating employment opportunities in the energy, transport and waste sectors, reducing energy costs, and supporting healthier ecosystems. The mitigation actions outlined in this report are also synergistic with the objectives of the Adaptation and Access to Energy pillars of the SEACAP, as well as the County Integrated Development Plan (CIDP).

In the stationary energy sector, the priority actions are intended to: increase energy efficiency by introducing new regulations, undertaking energy audits and installing more efficient lighting; facilitate the uptake of biogas as a clean cooking fuel through the development of small-scale biogas production facilities; and increase awareness and engagement around clean energy through the creation of three energy centres. In the transportation sector, the priority actions aim to: increase walking and cycling by upgrading and greening non-motorised transport routes in urban centres; reduce congestion in the urban centres by improving parking facilities on the urban edge; and expand the public transport system to include bus mass transport. Finally, in the waste sector, the priority actions are focused on: upgrading existing municipal waste disposal sites; increasing waste recovery by establishing a resource recovery centre, raising awareness about household-level waste segregation and increasing briquette production from waste materials; and increasing the extent of the sewer network and capacity of wastewater treatment infrastructure.

The implementation of these mitigation actions will set Nakuru County on a low emissions pathway and contribute to the achievement of Kenya's national climate change mitigation goals included in the NDC, while also delivering economic, social and environmental co-benefits that are aligned with the county's sustainable development priorities.

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APPENDIX I: Feasibility scoring for mitigation actions

As part of the participatory action planning workshop in Nakuru County, participants were asked to score each identified mitigation action according to three feasibility criteria. These scores, along with an assessment of the co-benefits, synergies and trade-offs of each action, were used to prioritise the actions. The three feasibility criteria used are as follows:

- **Technical feasibility:** whether the necessary skills and practices are available to implement the action
- **Political feasibility:** whether the action has political and public support at national and county level and is aligned with existing priorities
- **Financial feasibility:** whether the action is affordable or funding is available to implement it

Each of the above was scored from 1 (not very feasible) to 3 (very feasible), and a total (out of 9) was given by adding up the three scores. Table A.1 below shows the feasibility scores for each of the identified actions. Where actions were originally grouped and evaluated as one action (and split during the subsequent evaluation) only one set of feasibility scores is provided for the grouped action.

Table A.1. Feasibility scores for mitigation actions in Nakuru County

Action #	Title	Technical feasibility (1 to 3)	Political feasibility (1 to 3)	Financial feasibility (1 to 3)	Total score (out of 9)
Stationary energy sector					
1	Install solar photovoltaic (PV) systems on 25 county government facilities	2	2	1	5
2	Create incentives to promote the uptake of renewable energy technologies by businesses, households and communities in Nakuru County				
3	Develop and enforce an Energy Act and regulations on energy efficiency within Nakuru County by 2027	3	2	3	8
4	Undertake regular energy audits on 2 000 buildings and facilities within the county				
5	Install energy-efficient lighting in commercial, institutional and residential buildings				
6	Develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector	2	2	2	6
7	Develop policies and guidelines on green buildings to encourage the use of green building technologies	2	2	2	6
8	Create three energy centres to disseminate information and raise awareness on sustainable energy	3	3	3	9
Transportation sector					
9	Construct and/or upgrade 10 km of non-motorised transport routes in urban centres	3	2	2	7
10	Create green open spaces in the county's urban centres, including NMT corridors	3	3	3	9
11	Improve parking facilities on the edge of urban centres to reduce congestion	2	1	2	5
12	Expand the public transport system to include bus mass transport along major transit routes.	1	1	2	4
13	Import and pilot the use of electric hybrid vehicles in the county fleet	1	2	1	4

Action #	Title	Technical feasibility (1 to 3)	Political feasibility (1 to 3)	Financial feasibility (1 to 3)	Total score (out of 9
Waste sector					
14	Upgrade three existing waste disposal sites in Nakuru County by improving access roads, fencing and zoning of the tipping areas	3	3	3	9
15	Develop a sanitary landfill and waste recovery facility at Gilgil	3	2	2	7
16	Establish a resource recovery centre in Nakuru County to increase waste recovery	3	3	2	8
17	Organise annual public awareness-raising campaigns and incentives to increase household level waste segregation				
18	Increase briquette production from organic waste and faecal sludge to contribute to waste recovery				
19	Increase the extent of the sewer network and the capacity of the wastewater treatment infrastructure to service 60% of the population of Nakuru County	2	3	2	7
20	Strengthen enforcement of existing laws and regulations on waste management in Nakuru County	3	2	1	6

APPENDIX II: Methodology for ex-ante GHG emission reductions estimations

This appendix provides details of the methodology and calculations employed in developing ex-ante estimations of the GHG emission reduction potential of the mitigation actions identified in Nakuru County. These estimations are undertaken in compliance with the CoM SSA SEACAP reporting framework.

It should be noted that for many of the actions, limited detail regarding where and how they will be implemented and an absence of contextual data constrained the development of detailed and highly accurate ex-ante GHG emission reduction calculations. Rather, a simplified approach is used, acknowledging the high levels of uncertainty. To address this uncertainty, we have tried to make reasonable and conservative assumptions about the actions and context to avoid overestimating their impact. The results of these calculations should therefore be treated as the best available approximations of the impact of the actions. Where more detailed and rigorous estimations are needed, further calculations should be done for individual actions during the feasibility assessment stage.

A.1. Stationary energy

Ex-ante GHG emission reduction calculations are performed for 6 of the 8 actions in the stationary energy sector, which are expected to have direct GHG emission reduction impacts. Of these 6, emission reductions for the three actions relating to energy efficiency (Actions 3, 4 and 5) are calculated together.

A.1.1. Action 1

i. Action background

Action #:	1
Title:	Install solar photovoltaic (PV) systems on 25 county government facilities
Description:	Under this action, the County Government of Nakuru (CGN) plans to install solar photovoltaic (PV) systems to generate renewable energy on at least 25 of its buildings and facilities. The solar PV systems will supply electricity to these buildings and facilities, complementing or replacing existing electricity sources with sustainable and reliable renewable energy. In this way, the CGN will encourage uptake of solar PV in the county and reduce GHG emissions from other less sustainable energy sources in its buildings and facilities.

Action scenario: Solar panels are installed on 25 county government buildings or facilities, replacing all grid-supplied electricity use, as well as diesel and fuel oil use in those buildings.	**Baseline scenario:** Continued use of grid-supplied electricity, and diesel and residual fuel oil generators in 25 county government buildings or facilities.

ii. Assumptions

- Average installed capacity on each county government building is 5 kW solar PV
- All electricity generated is used in the building and replaces existing energy sources in the following proportions: 60% grid-supplied electricity, 15% diesel, 15% fuel oil, 10% increase in electricity use as a result of availability
- Emission factor for solar PV: 8 gCO_2e per kWh
- Emission factors for electricity use, diesel and residual fuel oil are the same as those used in the Nakuru County BEI

iii. Emission reduction calculation

The annual electricity production is calculated as follows:

$$Electricity\ production\ (kWh) = Total\ solar\ PV\ capacity * annual\ solar\ output$$

Total solar output for Nakuru County is estimated at 1 720 kWh per kW_p (World Bank, 2022b). The GHG emission reductions are calculated per fuel type by multiplying the energy savings (activity data) by the emission factor for the fuel. Emissions generated in the action scenario are subtracted from those in the baseline scenario to give the total emission reductions.

Fuel type	Activity data (energy use)	Emission factor	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)
Solar PV on 25 county government buildings				
Solar PV electricity	215 000 kWh	0.000008 tCO_2e/kWh	–	1.72
Grid-supplied electricity	129 000 kWh	0.00008422 tCO_2e/kWh	10.86	–
Diesel	0.1161 TJ	74.496 tCO_2e/TJ	8.65	–
Residual fuel oil	0.1161 TJ	77.796 tCO_2e/TJ	9.03	–
Total emissions per scenario			28.55	1.72
Emission savings from action				**26.83**

A.1.2. Action 2

i. Action background

Action #:	2
Title:	Create incentives to promote the uptake of renewable energy technologies by businesses, households and communities in Nakuru County
Description:	This action aims to promote uptake of renewable energy technologies by businesses, households and communities within the county, with a focus on solar PV and bio-energy. This action will include: • Developing a standard to require that new buildings make use of renewable energy, like rooftop PV, linked to Action 7 relating to the promotion of green buildings; • Streamlining the licensing process for renewable energy sources; and • Providing incentives to private sector suppliers of distributed renewable energy (DRE) technologies to supply these to underserved communities. The action aims to drive the transitions to widespread uptake of DRE in Nakuru County, building on the increased use of solar PV at county government facilities. This will include encouraging the substitution of at least 1 200 diesel generators with solar PV as a back-up electricity sources for businesses and households, as well as encouraging the uptake of bio-energy for businesses and households. The action will also link to the creation of sensitisation and awareness forums for community members, in synergy with other stationary energy sector actions.

Action scenario:	**Baseline scenario:**
1 200 diesel generators being used as back-up electricity sources for businesses and households are replaced by solar PV as an electricity source.	1 200 diesel generators continue to be used as a back-up electricity source for businesses and households.

ii. Assumptions

- Average installed capacity on each building is 3 kW solar PV.
- All electricity generated is used in the building and replaces the equivalent amount of electricity generated by diesel generators.
- Emission factor for lifecycle emissions of solar PV is used: 8 gCO_2e per kWh.
- Emission factor for diesel is the same as those used in the Nakuru County BEI.

iii. Emission reduction calculation

The annual electricity production is calculated as follows:

$$Electricity\ production\ (kWh) = Total\ solar\ PV\ capacity * annual\ solar\ output$$

Total solar output for Nakuru County is estimated at 1 720 kWh per kW_p (World Bank, 2022b). The GHG emission reductions are calculated per fuel type by multiplying the energy savings (activity data) by the emission factor for the fuel. Emissions generated in the action scenario are subtracted from those in the baseline scenario to give the total emission reductions.

Fuel type	Activity data (energy use)	Emission factor	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)
Replacement of 1 200 diesel generators with solar PV				
Solar PV electricity	6 192 000 kWh	0.000008 tCO_2e/kWh	–	49.54
Diesel	22.29 TJ	74.496 tCO_2e/TJ	1 660.61	–
Total emissions per scenario			1 660.61	49.54
Emission savings from action				**1 611.07**

A.1.3. Action 5 (incl. Actions 3 &4)

i. Action background

Action #:	5
Title:	Install energy-efficient lighting in commercial, institutional and residential buildings
Description:	Under this action, Nakuru County aims to promote the uptake of energy-efficient LED lights and other energy-efficient technologies. This will be done through the replacement of conventional lightbulbs with energy-saving LEDs in CGN buildings and facilities to reduce resources spent on energy bills. In addition to this and the previous actions, the targets of improving energy efficiency by 20% in institutional and commercial buildings and facilities and by 15% in households will be further pursued through awareness-raising and educational activities, including community meetings, exhibitions, and awareness-raising materials. This will be supported through the creation of the energy centres under Action 8. *This calculation includes the associated impacts of the following two actions:* *Action 3: Develop and enforce an Energy Act and regulations on energy efficiency within Nakuru County by 2027* *Action 4: Undertake regular energy audits on 2000 buildings and facilities within the county*

Action scenario:	**Baseline scenario:**
Energy-efficiency technologies are adopted in 50% of residential buildings that have access to electricity in the county. The use of more efficient lighting technologies and other strategies to improve energy efficiency reduces household electricity use by 15% in the households that adopt the technologies. Similarly, a 20% reduction in electricity usage is experienced in 75% of commercial and institutional facilities due to the use of energy-efficient technologies and behaviours.	There is a baseline adoption rate of energy-efficient technologies of 10% of electrified households and 20% in commercial and institutional facilities, reducing electricity usage by 10% on average in these buildings.

ii. Assumptions

- Electricity consumption per household and facility remains constant until 2030.
- Electrification rate remains constant until 2030.
- Electricity use is distributed across commercial and institutional buildings and facilities such that 75% of facilities consume approximately 75% of the electricity. Similarly, in households, it is assumed that 50% of households use 50% of residential electricity.
- The action will result in both the adoption of energy efficient technologies *and* a change in behaviour towards more efficient use of electricity, resulting in an overall reduction in electricity use by 15% in households and 20% in commercial and institutional buildings and facilities.
- The action will result in 50% of electrified households and 75% of electrified commercial and institutional facilities improving their energy efficiency.
- Improved energy efficiency as a result of the action will not result in a rebound effect increase in electricity use.
- Uptake of energy efficient technologies and practices will continue at a lower rate in the absence of mitigation action. It is assumed that 10% of households and 20% of commercial and institutional buildings will improve energy efficiency by 10% in the baseline scenario.
- The same emission factor for grid-supplied electricity is used as in the BEI for Nakuru County.

iii. Emission reduction calculation

The annual electricity savings for households are calculated as follows:

$$Electricity\ savings\ (kWh) = Electricity\ use\ per\ hh\ (kWh) * adoption\ rate(\%) * energy\ efficiency\ increase\ (\%) * number\ of\ hh$$

The annual electricity savings for commercial and institutional buildings and facilities are calculated as follows:

$$Electricity\ savings\ (kWh) = Total\ electricity\ use\ for\ subsector\ (kWh) * adoption\ rate(\%) * energy\ efficiency\ increase\ (\%)$$

The GHG emission reductions are calculated for electricity savings in the baseline and action scenario by multiplying the electricity savings by the emission factor. Total emission reductions were calculated by subtracting emission reductions in the baseline scenario from those in the action scenario.

Subsector	Baseline scenario electricity savings (MWh)	Action scenario electricity savings (MWh)	Emission factor (tCO_2e/MWh)	Baseline scenario emission reductions (tCO_2e)	Action scenario emission reductions (tCO_2e)
Households	1 766.59	13 249.43	0.08422	148.78	1 115.84
Commercial and institutional buildings	4 680.6	35 104.5	0.08422	394.19	2 956.43
Total emissions per scenario				542.97	4 072.27
Emission savings from action					**3 529.30**

A.1.4. Action 6

i. Action background

Action #:	6
Title:	Develop small-scale biogas production facilities to promote clean cooking in Nakuru County in partnership with the private sector
Description:	Under this action, the county aims to increase use of clean energy for cooking and lighting to 75% of all households in the county by 2030. This includes promoting the uptake of liquid petroleum gas (LPG), biogas and ethanol as cooking fuels. To achieve this, the county government will support the development of small-scale biogas production facilities to encourage uptake in 25% of households in the county, with a focus on low-income households in rural areas, like Rongai and Kiambogo. This will be done through partnerships with the private sector to make biogas generation equipment more accessible, and through the development of innovative mechanisms to provide finance to households and consumers to use these clean energy technologies. In this way, the action aims to improve the affordability and access to clean cooking and lighting for households. The uptake of biogas production and its use as a cooking fuel will be promoted through public awareness-raising and community engagement undertaken through the energy centres under Action 8. In addition to reducing GHG emissions and contributing to the achievement of the stationary energy sector mitigation target, this action will contribute substantially to the reducing of biogenic CO_2 emissions, reducing them by more than one million tonnes per year. *Because of the significant expected impacts of this action of biogenic CO_2 emissions, an ex-ante estimation of the impact on those emissions is also given.*

Action scenario: 25% of households in Nakuru County adopt biogas as their primary cooking fuel in place of wood and charcoal. This results in a reduction in reliance on wood and charcoal for cooking in households as well as a reduction in charcoal production.	**Baseline scenario:** Low-income and rural households continue to rely on wood and charcoal as their primary cooking fuels in Nakuru County. Charcoal production continues.

ii. Assumptions

Replacing wood and charcoal use in household cooking practices with biogas reduces GHG emissions from several sources. In this calculation, emission reductions from the combustion of biogas instead of the combustion of wood and charcoal, as well as emission reductions from the production of charcoal, are considered. Emission reductions from the diversion of organic waste from landfill and from reducing deforestation are not considered in this calculation due to limited availability of data.

- The adoption of biogas as the primary cooking fuel by 25% of households will result in the complete replacement of charcoal and wood with biogas in those households.
- If 25% of households adopt biogas as a cooking fuel, this will reduce wood fuel consumption by 25%, charcoal consumption by 25% and charcoal production by 25% in the county.
- Average annual consumption of biogas per household will be equivalent to average annual consumption of LPG per household in 2019.
- Average annual consumption of LPG per household in 2019 was 77.25 kg per year (Kenya National Bureau of Statistics, 2019).
- The emission factors for charcoal, firewood and charcoal production are the same as those in the BEI of Nakuru County, including the emission factors for CO_2(b).
- The emission factors for biogas are 0.136 tCO_2e/TJ and 54.6 tCO_2(b)/TJ (Intergovernmental Panel on Climate Change, 2006).

iii. Emission reduction calculation

For the baseline scenario, the annual emissions are calculated for the proportion of each fuel relevant to the action as follows:

$$GHG\ emission\ reduction\ for\ fuel = Total\ residential\ fuel\ use * \%\ reduction * emission\ factor$$

For emissions from charcoal production, reductions were calculated as follows:

$$GHG\ emission\ reductions = Total\ emissions\ from\ charcoal\ use * \%\ reduction$$

For the action scenario, emissions from the increased use of biogas were calculated as follows:

$$GHG\ emissions\ from\ biogas\ use = \%\ increase * total\ \#\ hh * amount\ of\ biogas\ used\ per\ hh * emission\ factor$$

This approach was used for both total GHG emissions and for biogenic CO_2 emissions as noted above. Emissions generated in the action scenario are subtracted from those in the baseline scenario to give the total emission reductions.

Fuel type	Activity data (energy use in TJ)	GHG emissions			Biogenic CO2 emissions		
		Emission factor (tCO_2e/TJ)	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)	Emission factor (tCO2(b)/TJ)	Baseline scenario emissions (tCO2(b))	Action scenario emissions (tCO2(b))
Consumption of cooking fuel							
Biogas	241.95	0.136	–	32.91	54.6	–	13 210.47
Wood	7 208.98	7.54	54 355.72	–	112	807 405.88	
Charcoal	1 364.55	4.51	6 154.14	–	112	152 830.0	
Charcoal production							
Emissions from charcoal production			40 538.25	–		73 062.75	
Total emissions per scenario			101 048.11	32.91		1 033 298.63	13 210.25
Emission savings from action				**101 015.2**			1 020 088.38

A.2 Transportation

Ex-ante GHG emission reduction calculations are performed for 4 of the 5 actions in the transportation sector, which are expected to have direct GHG emission reduction impacts. Of these 4, emission reductions for the two actions relating to non-motorised transport (Actions 9 and 10) are calculated together.

For these ex-ante calculations in the transportation sector, it was assumed that the actions would lead to a modal shift from private vehicle use to non-motorised or public transport options. It was assumed that the people shifting transport modes currently use motorcycles, cars, large vehicles (including vans, minibuses and pickup trucks) and *tuk-tuks* in the same proportions as the ownership of those vehicles in the county. Data on vehicle ownership come from the 2019 Population and Housing Census (Kenya National Bureau of Statistics, 2019). To estimate the fuel economy of each vehicle type in Nakuru County, data from Nairobi were used (Mbandi, et al., 2019) and multiplied by 0.67, based on the assumption that vehicles in Nairobi use approximately a third more fuel than those in Nakuru County due to the significantly higher traffic volumes in Nairobi. It was assumed that cars, motorcycles and *tuk-tuks* predominantly use petrol, while buses, minibuses, pick-up trucks and vans predominantly use diesel (based on the Nakuru County BEI).

A.2.1. Action 9 (incl. Action 10)

i. Action background

Action #:	9
Title:	Construct and/or upgrade 10 km of non-motorised transport routes in urban centres
Description:	Over the last three years, the County Government of Nakuru has upgraded several non-motorised transport (NMT) corridors in the county to improve facilities for pedestrians and cyclists. This includes the corridor between the A104 (Old Nairobi Road) and Oginga Odinga Avenue to the east of the Nakuru city centre. Under this action, the county aims to expand uptake of NMT by constructing/upgrading an additional 10 km of NMT pathways in major urban centres in the county. These upgraded pathways will improve access for pedestrians and cyclists, making it safer and easier for people to move around the urban centres without requiring motorised transport. By making walking and cycling safer, this action will reduce congestion and road accidents in the urban centres, in addition to reducing GHG emissions from the transport sector. In addition to physically upgrading the NMT corridors, the action will improve the integration of NMT into transport sector development plans for the county to facilitate continued improvement of NMT facilities. *This calculation includes the associated impacts of Action 10: Create green open spaces in the county's urban centres, including NMT corridors, which is assumed to increase the attractiveness of NMT.*

Action scenario:	**Baseline scenario:**
Improved park-and-ride facilities will facilitate a modal shift in the urban centres of Nakuru and Naivasha. People will park their private vehicles in the parking facilities and use improved non-motorised transport routes and public transport (e.g. matatus) to access the urban centres. This will decrease the number of vehicles in the urban centre, thus reducing congestion and increasing the efficiency of travel in urban centres.	People will continue to drive their private vehicles into the urban centres of Nakuru and Naivasha, continuing to cause congestion and reduce the efficiency of travel in the urban centres.

ii. Assumptions

- The upgrade and/or construction of 10 km on NMT corridors facilitates 25 additional return trips walking or cycling over each stretch of the corridor per day, six days per week.
- These trips would otherwise be done through motorised private transport, in the same modal proportions as vehicle ownership in Nakuru County.
- Fuel use per km in Nakuru County is approximately two thirds of that in Nairobi for all vehicles.

iii. Emission reduction calculation

The annual travel increase or reduction per mode is calculated as follows (where cars can be replaced by any mode):

$$Change\ in\ distance\ for\ car\ travel\ (km) = 20\ km * 25\ trips * 312\ days * \frac{\#\ cars\ in\ County}{total\ \#\ vehicles\ in\ County}$$

To calculate the change in GHG emissions per transport mode, the following equation was used (where cars can be replaced by any mode):

$$Change\ in\ GHG\ emissions\ from\ cars = change\ in\ distance\ travelled\ (km) * fuel\ economy\ (l\ per\ km) * emission\ factor\ for\ fuel\ (tCO_2e\ per\ l)$$

The change in GHG emissions for all modes were summed to calculate baseline scenario emissions. For this action, action scenario emissions were zero because NMT does not emit GHGs.

Vehicle type	Activity data (distance travelled in km)	Fuel economy (fuel type)	Emission factor (tCO_2e / TJ[7])	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)
	Solar PV on 25 county government buildings				
Non-motorised transport	156 000 km	0 (no fuel)	0 tCO_2e/TJ	–	0
Car	57 093 km	0.1467 l per km (petrol)	71.1468 tCO_2e/TJ	20.76	–
Motorcycle	87 649 km	0.0307 l per km (petrol)	71.1468 tCO_2e/TJ	6.66	–
Large vehicle	8 041 km	0.1467 l per km (diesel)	75.3909 tCO_2e/TJ	3.42	–
Tuk-tuk	3 216 km	0.0580 l per km (petrol)	71.1468 tCO_2e/TJ	0.46	
	Total emissions per scenario			31.30	0
	Emission savings from action				**31.30**

[7] Conversion factors for fuel volume (litres) to energy (TJ) conversions from the CIRIS tool were used in this calculation)

A.2.2. Action 11

i. Action background

Action #:	11
Title:	Improve parking facilities on the edge of urban centres to reduce congestion
Description:	As a component of developing a low carbon and efficient transport system, this action aims to reduce congestion caused by private vehicles in the urban centres. Four park-and-ride facilities will be developed on the edge of the urban centres, from which drivers can access the centre through walking, cycling or non-motorised transport. These facilities would be strategically located to link to public transport and NMT routes to effectively reduce congestion in urban centres. Possible locations include Mai Mai Hill, Naivasha or the Barnabas Centre, Nakuru. This action would create the opportunity to further develop the park-and-ride facilities into green hubs by partnering with Nakuru and Naivasha municipalities and businesses to facilitate bicycle hire in the urban centres, for example. The improved parking facilities will be accompanied by financial incentives to reduce private vehicle use in the urban centres.

Action scenario:	**Baseline scenario:**
New parking facilities are created on the edge of Nakuru and Naivasha. These facilities enable 100 vehicles per day in Nakuru and 50 vehicles per day in Naivasha to be parked outside of the urban centre. The drivers use NMT or 14-seater (mini-bus) *matatus* to travel into the city centre. This reduces the number of journeys that private vehicles make into central Nakuru and Naivasha each day. In addition, the reduction in vehicles travelling into urban centres reduces congestion for all other vehicles, thereby improving fuel economy for vehicles travelling through the urban centres.	Private vehicles are unable to easily park on the urban edge and continue to drive into urban centres, causing congestion and emitting GHGs.

ii. Assumptions

- Park-and-ride facilities on the urban edge of Nakuru will host 100 private vehicles per day, six days per week.
- Park-and-ride facilities on the urban edge of Naivasha will host 50 private vehicles per day, six days per week.
- As a result of the parking facilities, each vehicle does one less return journey into the urban centre each day, a distance of 30 km (return) for Nakuru and 10 km (return) for Naivasha.
- Instead of travelling by private vehicle, 50% of vehicle occupants travel by walking or cycling (NMT) and the remaining 50% travel the same distance by *matatu*.
- Matatus consistently carry 14 passengers.
- Vehicle types will be parked in the park-and-ride facilities in the same proportions that they are owned in the county.
- Fuel use per km in Nakuru County is approximately two thirds of that in Nairobi for all vehicles.
- Use of park-and-ride facilities decreases congestion in the urban centres, increasing efficiency of travel for other vehicle users.
- 15% of vehicles in Nakuru County travel 15 km twice a week in areas that are less congested as a result of these actions.
- These vehicles reduce their fuel consumption by 10% over this distance as a result.

iii. Emission reduction calculation

The annual travel increase or reduction per mode is calculated for Nakuru as follows (where cars can be replaced by any mode):

$$Change\ in\ distance\ for\ car\ travel\ in\ Nakuru\ (km) = 100\ vehicles * 30\ km * 312\ days * \frac{\#\ cars\ in\ county}{total\ \#\ vehicles\ in\ county}$$

And for Naivasha as follows (where cars can be replaced by any mode):

$$Change\ in\ distance\ for\ car\ travel\ in\ Naivasha\ (km) = 50\ vehicles * 10\ km * 312\ days * \frac{\#\ cars\ in\ county}{total\ \#\ vehicles\ in\ county}$$

The number of km for each mode is then summed to calculate the total change in distance travelled. The increase in number of journeys travelled by *matatu* is calculated as follows:

$$Change\ in\ distance\ travelled\ by\ matatu\ (km) = \frac{(50\ vehicles * 10\ km + 100\ vehicles * 30\ km) * 312\ days * 0.5}{\#\ passengers\ per\ matatu}$$

To calculate the change in GHG emissions per transport mode, the following equation was used (where cars can be replaced by any mode):

$$Change\ in\ GHG\ emissions\ from\ cars = change\ in\ distance\ travelled\ (km) * fuel\ economy\ (l\ per\ km) * emission\ factor\ for\ fuel\ (tCO_2e\ per\ l)$$

The change in GHG emissions for all modes were summed to calculate baseline scenario emissions. For the action scenario emissions, only those emissions from the matatus were considered, as NMT does not emit GHGs.

For the reduced congestion, the change in fuel consumption was multiplied by the emission factor for the relevant fuel. For each mode, the change in fuel consumption was calculated as follows (where cars can be replaced by any mode):

$$Change\ in\ fuel\ consumption\ for\ cars\ (l) = \#\ cars\ in\ county * 15\% * 15\ km * 104\ trips * fuel\ economy\ for\ cars\ (l\ per\ km) * 10\%$$

Vehicle type	Activity data (distance travelled in km)	Fuel economy in litres per km (fuel type)	Emission factor (tCO_2e / TJ[8])	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)
Modal shift from private vehicle to NMT and public transport					
Car	399 649	0.1467 (petrol)	71.1468	145.29	–
Motorcycle	613 546	0.0307 (petrol)	71.1468	46.64	–
Large vehicle	56 289	0.1467 (diesel)	75.3909	23.96	–
Tuk-tuk	22 515	0.0580 (petrol)	71.1468	3.24	
Non-motorised transport	546 000	0 (no fuel)	–	–	0
Matatu	39 000	0.1533 (diesel)	75.3909	–	17.35
Fuel savings from reduced congestion					
Vehicle type	Reduction in fuel use (litres)	Fuel type	Emission factor (tCO_2e / TJ)	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)
Car	150 133	Petrol	71.1468	372.09	
Motorcycle	48 186	Petrol	71.1468	199.44	
Large vehicle	21 143	Diesel	75.3909	61.36	
Tuk-tuk	3 344	Petrol	71.1468	8.29	
	Total emissions per scenario			780.30	17.35
	Emission savings from action				**762.95**

A.2.3. Action 12

i. Action background

Action #:	12
Title:	Expand the public transport system to include bus mass transport along major transit routes
Description:	This action aims to increase the capacity and efficiency of public transport systems by introducing large buses along major routes. Large 30-seater buses will be integrated into the transport system to service the busiest routes, connecting with additional routes serviced by *matatus* (minibuses), *tuk-tuks* (three-wheelers), and *boda bodas* (motorcycles). The large buses will increase the efficiency of transport along these major routes, thereby reducing congestion. The introduction of these buses would be informed by lessons from the bus rapid transit system in Nairobi. It would include the engagement of current transport service providers, including for example *tuk-tuk* drivers, to ensure no one is left behind. Possible routes for bus mass transport are: • Between Nakuru city centre and Bahati • Between Naivasha and the university • Along Moi Avenue and Kenyatta Avenue, Naivasha
Action scenario: Three new bus routes of 20 km each are established in Nakuru County for bus mass transport. Each route is serviced by two 30-seater buses that travel the route 12 times a day (6 in each direction), 6 days a week.	**Baseline scenario:** People continue to commute along the bus routes by private vehicle. Vehicle use is in the same proportion to vehicle ownership in the county.

ii. Assumptions

[8] Conversion factors for fuel volume (litres) to energy (TJ) conversions from the CIRIS tool were used in this calculation)

- The creation of three new bus mass transport routes facilitates a modal shift from private vehicle use to 30-seater buses along the same routes.
- These trips would otherwise be done through motorised private transport, in the same modal proportions as vehicle ownership in Nakuru County.
- Fuel use per km in Nakuru County is approximately two thirds of that in Nairobi for all vehicles.
- Two 30-seater buses service each of the three 20 km routes, with each bus travelling the route six time per day in each direction (240 km per day), six days a week.
- The buses are consistently full.

iii. Emission reduction calculation

The annual reduction in distance travelled per mode is calculated as follows (where cars can be replaced by any mode):

$$\begin{aligned} &Change\ in\ distance\ for\ car\ travel\ (km) \\ &\quad = 240\ km * 6\ buses * 312\ days * 30\ passengers \\ &\quad * \frac{\#\ cars\ in\ county}{total\ \#\ vehicles\ in\ county} \end{aligned}$$

To calculate the change in GHG emissions per transport mode, the following equation was used (where cars can be replaced by any mode):

$$\begin{aligned} &Change\ in\ GHG\ emissions\ from\ cars \\ &\quad = change\ in\ distance\ travelled\ (km) \\ &\quad * fuel\ economy\ (l\ per\ km) \\ &\quad * emission\ factor\ for\ fuel\ (tCO_2e\ per\ l) \end{aligned}$$

The change in GHG emissions for all modes were summed to calculate baseline scenario emissions. For the action scenario, the following equation was used to calculate emissions from the buses.

$$\begin{aligned} &GHG\ emissions\ from\ buses \\ &\quad = 240\ km * 6\ buses * 312\ days * fuel\ econmy\ (l\ per\ km) \\ &\quad * emission\ factor\ for\ fuel\ (tCO_2e\ per\ l) \end{aligned}$$

Vehicle type	Activity data (distance travelled in km)	Fuel economy (fuel type)	Emission factor (tCO_2e / TJ[9])	Baseline scenario emissions (tCO_2e)	Action scenario emissions (tCO_2e)
Bus mass transport	449 280 km	0 (no fuel)	0 tCO_2e/TJ	–	304.22
Car	4 932 816 km	0.1467 l per km (petrol)	71.1468 tCO_2e/TJ	1 793.31	–
Motorcycle	7 572 915 km	0.0307 l per km (petrol)	71.1468 tCO_2e/TJ	575.65	–
Large vehicle	694 763 km	0.1467 l per km (diesel)	75.3909 tCO_2e/TJ	295.71	–
Tuk-tuk	277 905 km	0.0580 l per km (petrol)	71.1468 tCO_2e/TJ	39.95	
	Total emissions per scenario			2 704.63	304.22
	Emission savings from action				**2 400.40**

[9] Conversion factors for fuel volume (litres) to energy (TJ) conversions from the CIRIS tool were used in this calculation)

A.3 Waste

Ex-ante GHG emission reduction calculations are performed for 5 of the 7 actions in the waste sector, which are expected to have direct GHG emission reduction impacts.

Emission reductions for actions relating to solid waste management (Actions 14, 15, 16 and 17) were calculated by developing a specific business-as-usual (BAU) scenario for waste generation and treatment in 2030. The impact of the actions in terms of GHG emissions was then calculated in comparison to the BAU scenario. It should be noted that the impacts of solid waste actions were calculated in two ways. First, the emission reductions of the individual actions were calculated in comparison to the BAU scenario, to provide estimated GHG emission reduction potentials for each action. Second, the combined GHG emission reduction impact of all actions was calculated to assess the potential of the actions to meet the emission reduction targets for Nakuru County. This takes into consideration that mitigation actions in the waste sector interact significantly in terms of how they affect the flow of waste management and generation of GHG emissions.

Emission reductions from Action 19, which relates to wastewater management, were calculated by comparing a baseline scenario to the action scenario, as for actions in the stationary energy and transportation sectors.

A.3.1. Business-as-usual scenario for solid waste disposal

The business-as-usual scenario for municipal solid waste generation and disposal was based on data from the Nakuru County Baseline Emissions Inventory as well as Kenya's Second National Communication to the UNFCCC (Republic of Kenya, 2015). The following assumptions were employed in the development of the solid waste BAU scenario:

- Municipal solid waste generation in Nakuru County will increase by the same proportion as municipal solid waste generation in Kenya over the period of 2019–2030. The Second National Communication predicts an 81.855% increase in municipal solid waste generation nationally over this period.
- The proportion of municipal solid waste disposed through each method will remain constant from 2019 to 2030.
- The emission factor (tCO_2e of GHGs generated per tonne of waste) remains constant for each waste disposal method from 2019 to 2030.

The table below shows details of the 2019 baseline and the 2030 BAU scenario for solid waste management in Nakuru County.

Waste disposal method	2019 baseline		2030 BAU scenario		Proportion of total waste	Emission factor (tCO_2e per t waste)
	Mass of waste (t)	GHG emissions (tCO_2e)	Mass of waste (t)	GHG emissions (tCO_2e)		
Sanitary landfill	3 861	3 532	7 021	6 423	0.56%	0.9148
Controlled landfill	60 678	49 333	110 346	89 715	8.77%	0.8130
Unspecified landfill	165 763	101 077	301 448	183 814	23.95%	0.6098
Open dumping	68 881	28 001	125 264	50 921	9.95%	0.4065
Incineration	41 330	24 922	75 161	45 322	5.97%	0.6030
Open burning	271 605	77 868	493 927	141 607	39.25%	0.2867
Biological treatment (composting)	24 544	3 888	44 634 (25 469)	7 071	3.55%	0.1584
Recycling	55 362	–	100 678	–	8%	–
Total	**692 024**	**288 621**	**1 258 480**	**524 871**		

A.3.2. Action 14

i. Action background

Action #:	14
Title:	Upgrade three existing waste disposal sites in Nakuru County by improving access roads, fencing and zoning of the tipping areas
Description:	This action aims to improve the effectiveness of waste management in Nakuru County by improving facilities and the organisation of three waste disposal sites in the county. The targeted waste disposal sites are Gioto (to the northwest of Nakuru city centre), Naivasha, and Mai Mahiu. The upgrades will include: i. Improving access roads into the waste disposal sites, to enable waste deliveries and recycling collectors to more easily access tipping areas and prevent disorganised dumping; ii. Fencing the waste disposal sites to reduce movement of waste into the surrounding environment, and therefore reduce pollution; and iii. Zoning tipping areas to enable more effective waste sorting and recovery as well as zoned management of the disposal sites. By improving organisation of the disposal sites, this action will enable better management and more effective waste recovery, thereby reducing emissions from the waste sector. The upgrade of Gioto waste disposal site near the centre of Nakuru city is already underway, including improved access roads, fencing and tipping zones.
Action scenario: Upgrading the waste disposal sites enables more effective recovery and recycling of the waste that arrives at the disposal sites. As a result, less waste is burned or degrades in the waste disposal sites, reducing the GHG emissions produced in this way.	

ii. Assumptions

- The waste disposal sites included in this action are categorised as “unspecified landfill” for the purpose of GHG calculations (Nakuru County BEI).
- Upgrading the waste disposal sites will create a further opportunity for waste from those sites to be recovered and recycled.
- 60% of the total waste that ends up in “unspecified landfill” in Nakuru County, is at the three sites targeted by this action.
- In the baseline scenario, of the waste at these sites, 60% decomposes (“unspecified landfill”), 35% is burned (“open burning”), and 5% is recovered (“recycled”)
- In the action scenario, the proportion of waste at the sites that is recovered increases to 15%.
- The remaining waste is burned (31%) and decomposes (54%) in the same proportions as the baseline scenario.
- The total amount of solid waste generated in Nakuru County is not affected by this action.

iii. Emission reduction calculation

The assumptions listed above were used to calculate waste tonnage inputs for the CIRIS tool (given in the table below). Based on these inputs, the CIRIS tool generated GHG emissions for each solid waste treatment method in the action scenario, as well as overall GHG emissions for solid waste. The GHG emission reduction from this action was calculated by subtracting GHG emissions in the action scenario from GHG emissions in the BAU scenario for solid waste (see Section A.3.1).

Solid waste treatment method	Amount of waste (t)	Proportion of total waste (%)	GHG emissions (tCO_2e)
Sanitary landfill	7 021	0.6%	6 450
Controlled landfill	110 346	8.8%	90 108
Unspecified landfill	282 409	22.4%	172 960
Open dumping	125 264	10.0%	51 145
Biological treatment	44 634	3.5%	4 031
Incineration	75 161	6.0%	40 948
Open burning	482 821	38.4%	135 156
Recycling	130 823	10.4%	–
Total (action scenario)	1 258 480	100.0%	500 798
Emissions in BAU scenario			524 872
Emission savings from action			**24 074**

A.3.3. Action 15

i. Action background

Action #:	15
Title:	Develop a sanitary landfill and waste recovery facility at Gilgil
Description:	Under this action, the County Government of Nakuru aims to establish the county's first sanitary landfill site in Gilgil, a town between Nakuru and Naivasha. The county will aim to mobilise resources for the development of the landfill and waste recovery site in partnership with the private sector and national government. The sound environmental management of waste through a sanitary landfill will reduce GHG emissions and the production of Unintentionally Produced Persistent Organic Pollutants (UPOPs) from the waste sector by reducing open burning and dumping of waste and enabling waste recovery and methane capture. In addition, centralising waste management at the landfill site will enable the creation of economic opportunities related to the recovery, recycling and reuse of materials.
Action scenario: A new sanitary landfill is developed and commissioned at Gilgil. The landfill is able to receive up to 300 000 tonnes of waste per year. The waste sent to the sanitary landfill is diverted from other waste treatment methods in proportion to their baseline use. Methane generated in the landfill by the decomposing waste is captured and combusted to reduce GHG emissions.	

ii. Assumptions

- 300 000 tonnes of solid waste are disposed of in the sanitary landfill per year.
- Landfill gas collection efficiency is 60%. The collected gas is not used as an energy source.
- Waste sent to the sanitary landfill is diverted from other waste treatment methods in proportion to their current use in the county, excluding recycling and biological treatment.
- The total amount of solid waste generated in Nakuru County is not affected by this action.

iii. Emission reduction calculation

The assumptions listed above were used to calculate waste tonnage inputs for the CIRIS tool (given in the table below). Based on these inputs, the CIRIS tool generated GHG emissions for each solid waste treatment method in the action scenario, as well as overall GHG emissions for solid waste. The GHG emission reduction from this action was calculated by subtracting GHG emissions in the action scenario from GHG emissions in the BAU scenario for solid waste (see Section A.3.1).

Solid waste treatment method	Amount of waste (t)	Proportion of total waste (%)	GHG emissions (tCO_2e)
Sanitary landfill	307 021	24.4%	131 624
Controlled landfill	80 419	6.4%	65 670
Unspecified landfill	219 692	17.5%	134 549
Open dumping	91 291	7.2%	37 274
Biological treatment	44 634	3.5%	4 031
Incineration	54 776	4.4%	29 843
Open burning	359 968	28.6%	100 766
Recycling	100 678	8.0%	–
Total (action scenario)	1 258 480	100.0%	503 757
Emissions in BAU scenario			524 872
Emission savings from action			**21 115**

A.3.4. Action 16

i. Action background

Action #:	16
Title:	Establish a resource recovery centre in Nakuru County to increase waste recovery
Description:	The aim of this action is to reduce the amount of solid waste ending up in disposal sites or subject to open burning by increasing waste recovery. This action will involve empowering Nakuru Solid Waste Management Association (NASWAMA) by establishing and equipping a resource recovery centre within the county. The resource recovery centre will be integrated into the county's solid waste management system, including the collection of solid waste and existing disposal sites or the new sanitary landfill. In synergy with the other actions in the waste sector, this action will aim to reduce emissions from the waste sector by reducing the amount of waste burned, dumped and sent to landfill.
Action scenario: A new waste recovery centre is developed in Nakuru County where solid waste that has been collected can be sorted and recyclables retrieved and recovered. As a result, less waste is disposed of in landfills and dumps or burned.	

ii. Assumptions

- The waste recovery centre primarily serves to increase recycling of collected solid waste.
- Through the waste recovery centre, a further 10% of the waste that is disposed of (i.e. excluding the proportions already recycled or composted) is recycled.
- As a result of the recycling, there is a proportionate decrease in waste disposed through all other methods except biological treatment.
- The total amount of solid waste generated in Nakuru County is not affected by this action.

iii. Emission reduction calculation

The assumptions listed above were used to calculate waste tonnage inputs for the CIRIS tool (given in the table below). Based on these inputs, the CIRIS tool generated GHG emissions for each solid waste treatment method in the action scenario, as well as overall GHG emissions for solid waste. The GHG emission reduction from this action was calculated by subtracting GHG emissions in the action scenario from GHG emissions in the BAU scenario for solid waste (see Section A.3.1).

Solid waste treatment method	Amount of waste (t)	Proportion of total waste (%)	GHG emissions (tCO_2e)
Sanitary landfill	6 319	0.5%	5 806
Controlled landfill	99 311	7.9%	81 097
Unspecified landfill	271 304	21.6%	166 158
Open dumping	112 737	9.0%	46 030
Biological treatment	44 634	3.5%	4 031
Incineration	67 645	5.4%	36 854
Open burning	444 535	35.3%	124 439
Recycling	211 995	16.8%	–
Total (action scenario)	1 258 480	100.0%	464 415
Emissions in BAU scenario			524 872
Emission savings from action			**60 457**

A.3.5. Action 17

i. Action background

Action #:	17
Title:	Organise annual public awareness-raising campaigns and incentives to increase household-level waste segregation
Description:	Increased waste segregation at household level is an important component of increasing waste segregation in Nakuru County. In partnership with private waste collection services and other waste sector stakeholders, this action aims to increase awareness of the benefits of waste segregation at household level and provide incentives (for example reduced costs for waste collection) for households to separate their waste. Annual awareness-raising campaigns will be undertaken in the county through local media channels to provide information on the benefits of waste segregation and how to do it.
Action scenario: Annual awareness-raising campaigns and incentives for household-level waste sorting result in behaviour change at household level to increase composting and recycling of solid waste. As a result, the amount of waste disposed of in landfills and dumps, and burned, decreases.	

ii. Assumptions

- The awareness-raising and incentives include sorting waste, recycling what can be recycled and composting organic waste (biological treatment).
- As a result of the campaign, 5% of the waste that was unrecovered (i.e. all waste except that which was already being recycled or composted) is recycled, and 5% is composted.
- As a result of the increased recycling and composting, there is a proportionate decrease is waste disposed through all other methods.
- The total amount of solid waste generated in Nakuru County is not affected by this action.

iii. Emission reduction calculation

The assumptions listed above were used to calculate waste tonnage inputs for the CIRIS tool (given in the table below). Based on these inputs, the CIRIS tool generated GHG emissions for each solid waste treatment method in the action scenario, as well as overall GHG emissions for solid waste. The GHG emission reduction from this action was calculated by subtracting GHG emissions in the action scenario from GHG emissions in the BAU scenario for solid waste (see Section A.3.1).

Solid waste treatment method	Amount of waste (t)	Proportion of total waste (%)	GHG emissions (tCO_2e)
Sanitary landfill	6 319	0.5%	5 806
Controlled landfill	99 311	7.9%	81 097
Unspecified landfill	271 304	21.6%	166 158
Open dumping	112 737	9.0%	46 030
Biological treatment	100 293	8.0%	9 057
Incineration	67 645	5.4%	36 854
Open burning	444 535	35.3%	124 439
Recycling	156 337	12.4%	–
Total (action scenario)	1 258 480	100.0%	469 441
Emissions in BAU scenario			524 872
Emission savings from action			**55 431**

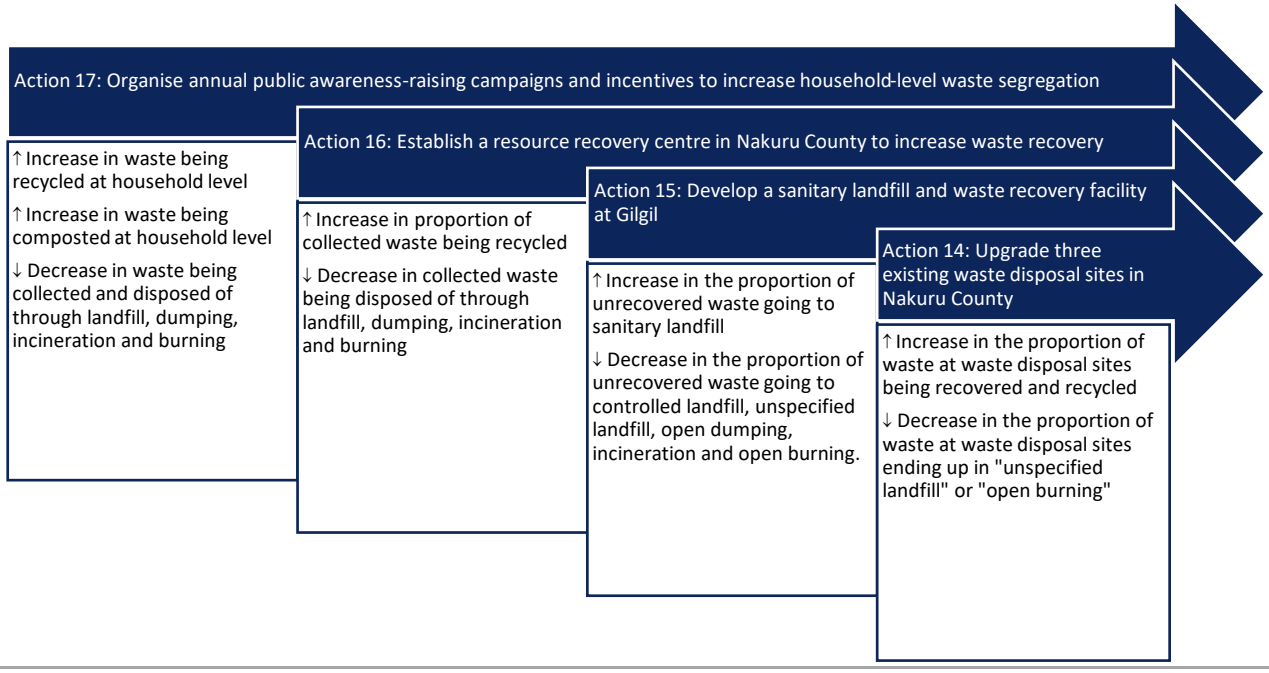
A.3.5. Combined solid waste action scenario

i. Background

Action #:	14, 15, 16 and 17

Action scenario:

This scenario combines the four actions described above to estimate GHG emission reductions if all four actions are implemented. The scenario acknowledges that the impacts of the actions are interacting, and the overall impact is not equivalent to the sum of the impacts of each individual action. The diagram below indicates how the actions are expected to combine.



ii. Assumptions

- Waste that is recycled under the BAU scenario is still recycled under the action scenarios and is not subject to changes as a result of the actions, with the exception of waste recovered and recycled from the waste disposal sites (6.8% of total waste).
- Organic waste that is composted under the BAU scenario is still composted under the action scenarios and is not subject to changes as a result of the actions (3.5% of total waste).
- Under Action 17, 5% of the remaining waste (89.7% of total waste) is diverted to recycling and 5% to composting as a result of household-level waste separation and recovery. The remaining 80.7% of total solid waste is influenced by the other actions.
- Under Action 16, 10% of the remaining waste is diverted to recycling. The remaining 72.6% of total solid waste is influenced by the other actions.
- Under Action 15, 300 000 tonnes of waste are sent to sanitary landfill. The remaining 48.8% of total solid waste is subject to the final action.
- The efficiency of gas capture at the sanitary landfill is 60%. None of the captured gas is used as an energy source.
- Under Action 14, 10% more of the waste that ends up in the waste disposal sites is recovered for recycling.
- The total amount of solid waste generated is not changed by these actions.

iii. Emission reduction calculation

The assumptions listed above were used to calculate waste tonnage inputs for the CIRIS tool (given in the table below). Based on these inputs, the CIRIS tool generated GHG emissions for each solid waste treatment method in the action scenario, as well as overall GHG emissions for solid waste. The GHG emission reduction from this action was calculated by subtracting GHG emissions in the action scenario from GHG emissions in the BAU scenario for solid waste (see Section A.3.1).

Solid waste treatment method	Amount of waste (t)	Proportion of total waste (%)	GHG emissions (tCO_2e)
Sanitary landfill	303 820	24.1%	130 251
Controlled landfill	60 039	4.8%	49 028
Unspecified landfill	153 659	12.2%	94 108
Open dumping	68 156	5.4%	27 828
Biological treatment	101 046	8.0%	9 125
Incineration	40 895	3.3%	22 280
Open burning	262 703	20.9%	73 538
Recycling	268 162	21.3%	–
Total (action scenario)	1 258 480	100.0%	406 158
Emissions in BAU scenario			524 872
Emission savings from actions			**118 714**

A.3.7. Action 19

i. Action background

Action #:	19
Title:	Increase the extent of the sewer network and the capacity of the wastewater treatment infrastructure to service 60% of the population of Nakuru County
Description:	Coverage of the sewer network and centralised wastewater treatment in Nakuru County is currently estimated at 27% (NAWASSCO, 2021). This action aims to increase coverage to 60% of the population by increasing the capacity of the wastewater treatment plants as well as the sewerage network. The Njoro Sewerage Treatment Plant (to the west of the Nakuru City Centre) currently has a capacity of 9 600 m^3 per day, which is ~45% utilised. The sewer network extends approximately 200 km across Nakuru town. Increasing the extent of the sewer network and capacity of the sewerage treatment plant would reduce GHG emissions from untreated wastewater and increase the efficiency of Nakuru's wastewater treatment system.

Action scenario:	**Baseline scenario:**
The proportion of the population served by the sewer system and wastewater treatment increases from 7.8% of the population to 15.6% of the population. The households newly served by the sewer system now use this instead of septic tanks or private pit latrines.	Emissions from wastewater treatment grow in proportion to population growth. The split of wastewater treatment methods remains the same as the Nakuru County BEI, as does the per capita waste generation rate.

ii. Assumptions

- In the baseline scenario, wastewater treatment methods and per person waste generation rates in 2030 remain the same as in 2019 (Nakuru County BEI).
- Fraction of the population in each income group and urban/rural remains the same in 2030 as in 2019 (Nakuru County BEI).
- In the action scenario, the population serviced by the sewer system increases from 7.8% to 15.6% of the total population.
- As a result, there is a 3.9% decrease in use of septic tanks, and a 3.9% decrease in use of private pit latrines.
- Total amount of sewage generated is not affected by the action.

iii. Emission reduction calculation

The assumptions listed above were used to calculate total wastewater generated and the proportion of wastewater treated through each method as inputs for the CIRIS tool in both the action and the baseline scenarios (given in the table below). Based on these inputs, the CIRIS tool generated GHG emissions for the action scenario and the baseline scenario for wastewater. The GHG emission reduction from this action was calculated by subtracting GHG emissions in the action scenario from GHG emissions in the baseline scenario.

Wastewater treatment method	Baseline scenario proportion of total (%)	Action scenario proportion of total (%)
Not treated	0.8%	0.8%
Flowing sewer	7.8%	15.6%
Septic system	10.1%	6.2%
Dry climate private latrine	71.0%	67.1%
Dry climate shared latrine	10.1%	10.1%
Anaerobic digestion	0.1%	0.1%
Total	100%	100%
Total waste generated (t)	45 117	45 117
GHG emissions (tCO_2e)	130 572	117 270
Emission savings from action		**13 302**