Kenya's Climate Change Action Plan:

Mitigation

Executive Summary

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ECN
ASB Partnership for the Tropical Forest Margins
iisd International Institute for Sustainable Development / Institut international du développement durable

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Mitigation team:

Deborah Murphy, Seton Stiebert, Dave Sawyer, Jason Dion, Scott McFatridge, International Institute for Sustainable Development

Laura Würtenberger, Lachlan Cameron, Raouf Saidi, Xander van Tilburg, Energy Research Centre of the Netherlands

Peter A. Minang, ASB Partnership for the Tropical Forest Margins at the World Agroforestry Centre

Tom Owino, ClimateCare

Peterson Olum

The website for Kenya's Climate Change Action Plan can be accessed at: http://www.kccap.info

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For further information, please contact:

Deborah Murphy, IISD
Tel: +1-613-238-2296
Email: dmurphy@iisd.ca

Laura Würtenberger, ECN
Tel: +31 88 515 49 48
Email: wuertenberger@ecn.nl

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Abbreviations

CGE	computable general equilibrium modelling (CGE)
CO_2e	carbon dioxide
CO_2e	carbon dioxide equivalent
GDP	gross domestic product
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
LPG	liquefied petroleum gas
MEMR	Ministry of Environment and Mineral Resources
MPND	Ministry of State for Planning, National Development and Vision 2030
Mt	million tonnes
NAMA	nationally appropriate mitigation action
REDD+	reducing emissions from deforestation and forest degradation plus the role of conservation, sustainable management of forests and enhancement of forest carbon stocks
UNFCCC	United Nations Framework Convention on Climate Change

1. Introduction

This chapter provides a summary of the Mitigation analysis of Kenya's National Climate Change Action Plan (NCCAP), describing the low-carbon assessment undertaken in the six mitigation sectors: energy, transport, industry, agriculture, forestry and waste management.[1] This assessment – which includes a bottom-up assessment of mitigation opportunities and a top-down economy-wide economic, energy and emissions model – provides the evidence base for prioritising low-carbon development opportunities and, ultimately, developing investment proposals to attract international climate finance through nationally appropriate mitigation actions (NAMAs) and reducing emissions from deforestation and forest degradation plus the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+).

Vision 2030 – Kenya's long-term development blueprint – aims to transform Kenya into a newly industrializing middle-income country by 2030. As Kenya moves to achieve its development aspirations, greenhouse gas (GHG) emissions will rise. This mitigation assessment concludes that transitioning to a low-carbon development pathway would ensure that the country's contribution to global emissions remains low and, importantly, deliver other important benefits:

- **Sustainable development** – The ideal low-carbon development opportunities deliver multiple benefits, helping to address pressures related to a growing population, increasing resource use and other constraints on development. One such opportunity is the promotion of agroforestry, which increases the carbon stock on farmland, improves food security and climate resilience, and helps meet the government's goal of 10 per cent tree cover on farms.
- **International climate finance** – Nesting low-carbon development within Vision 2030 and Kenya's development planning process means that development partners can ensure their climate-related investments align with Government of Kenya priorities. International climate finance for low-carbon development options can potentially be obtained through bilateral and multilateral support, the Green Climate Fund, the emerging NAMA and REDD+ mechanisms or the carbon markets.
- **Demonstration of global leadership** – The implementation of a low-carbon development pathway demonstrates Kenya's leadership in the global fight against climate change.

A detailed technical analysis was undertaken to identify the main elements of a low-carbon development pathway, recognising that the pathway needs to emphasise sustainable development and climate resilience co-benefits. This view was supported by stakeholders and experts through an extensive consultation and validation process, which also confirmed that the low-carbon analysis is:

- A first step in a longer-term effort to identify feasible low-carbon development opportunities;
- Based on aggregated data from disparate sources, and as such represents new analysis previously unavailable for Kenya;
- A common base for those seeking to understand how to transition Kenya to a low-carbon development pathway;
- A major catalyst that has started a conversation on how to think about low-carbon development in the various sectors.

The analysis starts with the development of an inventory of historical GHG emissions and a projection of how these could change by 2030, forming the reference scenario. Low-carbon development opportunities are then examined, looking at their mitigation potential, costs and sustainable development benefits. The computable general equilibrium modelling (CGE)

approach informs investment choice and long-term development impacts, providing a wider view of the possible scale and scope of reductions available within the country. The analysis concludes with priority actions that can enable low-carbon development.

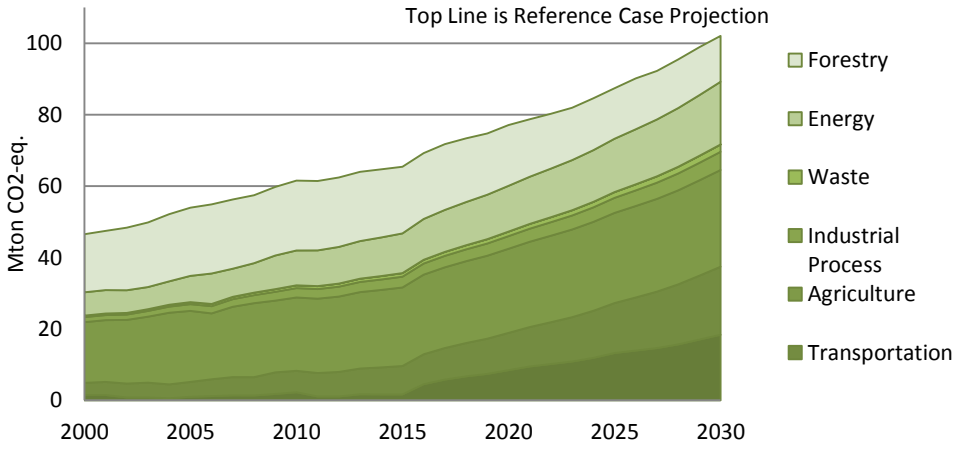
2. Key Findings

2.1 GHG emissions inventory and reference case

The last official GHG emissions inventory for Kenya was completed for the year 1994 for the First National Communication. Therefore, an essential first step in the low-carbon development assessment under the 2012 Action Plan analysis was to develop a comprehensive up-to-date GHG emissions inventory. Historical GHG emissions from 2000 to 2010 were calculated using the Intergovernmental Panel on Climate Change (IPCC) 2006 guidelines for GHG emissions inventories.[2] While the inventory provides a strong starting point for building a national inventory, additional work and consultation with sectors is required before it constitutes a complete national Kenyan inventory for reporting to the UNFCCC.[3]

Historical trends and expert assessments of sector and economic growth were used to project annual emissions up until 2030 (see Figure 1; Chapter 2 of the Mitigation report includes the detailed analysis). This reference case forms the baseline against which abatement potential is estimated for the six mitigation sectors.

Figure 1: Greenhouse gas emissions reference case: 2010 to 2030[4]



In most cases, the projections assume historical trends in key emission drivers (population, energy demand and economic growth) will continue at constant growth rates, with no major structural changes in the economy. In the case of energy and livestock (agriculture), expert opinion and data indicated future growth would vary from historical trends, and emission forecasts were adjusted accordingly. The ambitious goals set out in Vision 2030 and other policy documents are assumed to be aspirational and unlikely to be achieved without financing, technology transfer and capacity building beyond current levels. As such, the reference case forecast does not reflect all of Vision 2030's aspirations.

In the reference case, emissions increase up until 2030 in all sectors except forestry:

- **Electricity emissions grow the most,** increasing from 2.2 million tonnes of carbon dioxide equivalent ($MtCO_2e$) in 2010 to 18.5 $MtCO_2e$ in 2030. Much of this

increase is attributed to new coal and natural gas coming online to meet increasing demand.

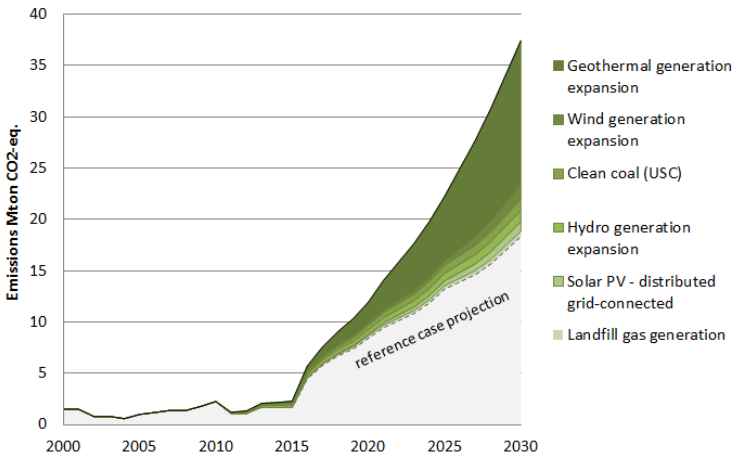
- **Forestry sector emissions are likely to decline after 2020** due to the reduced clearing of forests and increases in the number and size of trees, a result of tree-planting programmes and a reduced projection in wood harvesting.
- **Agriculture and forestry sectors are the largest emitters**, accounting for approximately 72 per cent of emissions in 2010 and 65 per cent in 2030, mainly due to emissions from livestock and deforestation.
- **Emissions in other sectors grow significantly,** with transport emissions increasing by about three times between 2010 and 2030, and emissions from the waste sector and energy demand doubling in the same time period.

2.2 Kenya's low-carbon development opportunities

Energy

The analysis of low-carbon development options in the energy sector considered two categories: 1) electricity supply; and 2) energy demand – including options such as energy efficiency and fuel switching.

Figure 2: Low-carbon development wedges for electricity supply



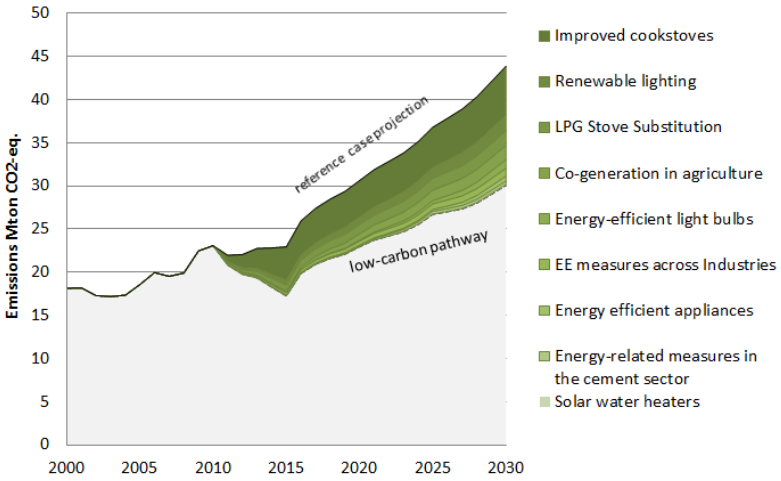
Note: The methodological approach for the electricity sector analysis deviates from a traditional analysis of climate mitigation options. Usually mitigation options are assumed to replace a business as usual alternative or reference mix. However, for this analysis, the ambitious electricity expansion plans needed to satisfy Vision 2030 were assumed to be supply constrained in the absence of external support. International climate finance for low-carbon development opportunities provides the funding for additional capacity expansion that would not be installed in the reference case.

In terms of **electricity supply**, the installed capacity in Kenya in 2011 was 1,411 megawatts. Generation was dominated by hydroelectricity, geothermal power and medium-speed diesel, which respectively accounted for 49, 29 and 21 per cent of electricity sent to the national grid.[5] Rapidly increasing demand for electricity and fluctuating hydroelectric output have led to an increase in diesel-based generation in recent years. In addition, there has been a strong focus on expanding geothermal power, which is considered a key enabler for Kenya's economic growth. Although geothermal is the most promising renewable energy source, Kenya also has excellent bioenergy, solar, wind and hydro resources for the supply of electricity.

The analysis of six low-carbon development options for electricity supply[6] (Figure 2, Chapter 5 of the Mitigation report includes the detailed analysis) shows that geothermal power has by far the largest abatement potential (14 $MtCO_2e$ per year) in 2030, with other technologies varying between 0.5 and 1.4 $MtCO_2e$. Increasing the share of renewable electricity can have benefits in terms of energy security (through decreased energy imports) and reduced costs of generation. In particular, geothermal power can provide low-cost base load generation, facilitating economic activity and development. It would also reduce the current reliance on hydropower thereby improving climate resilience.

Energy demand includes the final use of electricity and other sources of energy, such as biomass combustion. At present, roughly 25 per cent of the population is connected to the electricity grid. About 60 per cent of electricity is consumed by the commercial and industrial sectors, while households use approximately 25 per cent.[7] Direct fuel combustion of biomass from wood sources such as fuelwood and charcoal is the dominant fuel source in Kenya, accounting for almost 70 per cent of primary, non-electricity, non-transport energy demand.[8] This has placed the forests under pressure and has led to widespread scarcity of biomass. Direct fuel use in the industrial and commercial sectors is relatively low. Moreover, the energy sector may be an important transition point. The exploitation of indigenous coal resources is beginning and domestic oil resources were discovered in early 2012.[9]

Figure 3: Low-carbon development wedges for energy demand



Note: Assumes 35 per cent of unsustainable biomass

Electricity demand, particularly household demand, is expected to rise sharply with continued economic development and a growing share of the population gaining access to electricity. Even when using a conservative approach to estimate future energy demand,[10] energy-related GHG emissions are expected to increase from 10 $MtCO_2e$ in 2010 to 25 $MtCO_2e$ in 2030.

Nine low-carbon development options were analysed in the energy demand sector (Figure 3; Chapter 6 of the Mitigation report includes the detailed analysis). Improved cookstoves that reduce the volume of biomass required for cooking have the largest potential for GHG emission reductions, 5.6 Mt CO_2e a year in 2030.[11] Replacing kerosene lamps with renewable lighting technologies, using liquefied petroleum gas (LPG) instead of fuelwood for cooking, and cogeneration of heat and power in agriculture were also found to have significant abatement potentials of over 1.5 $MtCO_2e$ a year in 2030.

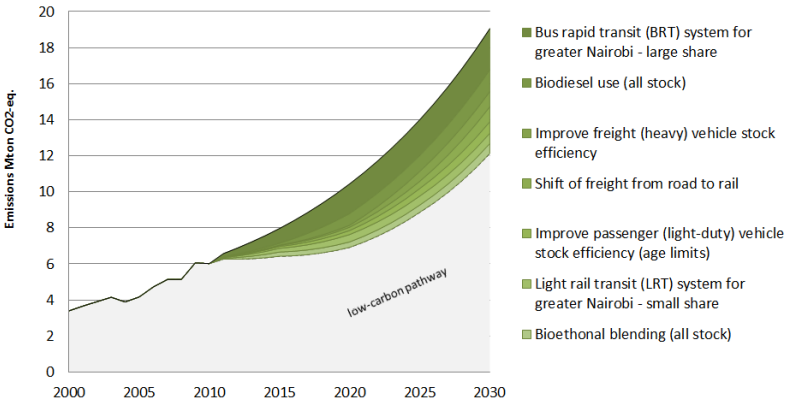
Sustainable development benefits associated with the use of improved fuelwood or charcoal-based and LPG-based cookstoves include significant health benefits as a result of reduced indoor air pollution. Health benefits are also expected with the replacement of kerosene lamps with distributed renewable energy (such as solar) lanterns. These technologies can also bring cost savings to consumers; depending on the price of alternatives. Improved cookstoves and the use of LPG for cooking contribute to increased climate resilience as they lower fuelwood demand and reduce pressure on forests.

Transport

Kenya's transport sector is dominated by road transport.[12] The total vehicle population (excluding motorcycles) is estimated to have doubled from 600,000 vehicles in 2000 to 1,200,000 vehicles in 2010. Public transport is relatively under-developed and is dominated by minibuses (matatus). The vast majority of freight transport, including transit freight headed to other countries, is served by trucks. At the same time, increasing urbanisation and the growth of major cities have put pressure on urban transport systems and infrastructure. In Nairobi and other major cities, severe traffic congestion, especially during the extended

peak hours, contributes to local air pollution and leads to significant economic losses in time and fuel. That said, the majority of individual trips in cities are still by foot because public transport services are comparatively expensive and private cars are out of the financial reach of the majority of Kenyans.

Figure 4: Low-carbon development wedges in the transport sector



Source: GoK CCAP Mitigation Analysis 2012

With the sector experiencing strong growth, GHG emissions from transport are projected to grow significantly from 6 $MtCO_2e$ in 2010 to almost 18 $MtCO_2e$ in 2030 (Figure 4: chapter 7 of the Mitigation report includes the detailed analysis). Improved traffic conditions and access to modern transport services are required, along with increased efficiency through improved technologies, alternative (including non-motorised) modes of transport and fuel substitution.

Seven low-carbon development options were analysed for the transport sector (Figure 4). The option with the largest mitigation potential is the development of an extensive mass transit system for greater Nairobi in the form of bus rapid transit (BRT) corridors, complemented by light rail transit (LRT) in very high thoroughfare corridors. This public transport system has an abatement potential of approximately 2.8 $MtCO_2e$ a year in total. The second largest mitigation potential is the introduction of biodiesel, with a 10 per cent blend requirement having a potential of approximately 1.2 $MtCO_2e$ a year in 2030. The abatement potentials for the other low-carbon development options vary between 0.5 and 0.8 $MtCO_2e$ a year in 2030.

Introducing large-scale bus rapid transit (potentially complemented with some light rail transit) has significant associated benefits in terms of reduced traffic congestion, improved local air quality and improved road safety. These options are in line with the priorities of the Government of Kenya, which has started to secure funding for these actions. A shift of freight transport from road to rail through modernising and extending the existing rail network would facilitate regional trade, as well as improve traffic safety and road infrastructure lifetimes. While the use of biofuels would lower GHG emissions and the need for fossil fuel imports, large-scale production of biofuels could compete for land with food production if poorly planned; any move towards commercial growing of biofuel crops should be pursued in a well-regulated manner.

Industrial process emissions

The industrial sector is relatively small in Kenya, both in terms of its share of GDP and contribution to total GHG emissions (in terms of process emissions). Ninety-five per cent of industrial process emissions in Kenya are created by two industries: cement manufacturing (1.7 $MtCO_2e$ in 2010) and charcoal manufacturing (0.8 $MtCO_2e$ in 2010). The figures for charcoal production assume that the feedstock used is completely carbon neutral. If 35 per cent unsustainable biomass usage is assumed, emissions from charcoal production increase to 4.3 $MtCO_2e$.

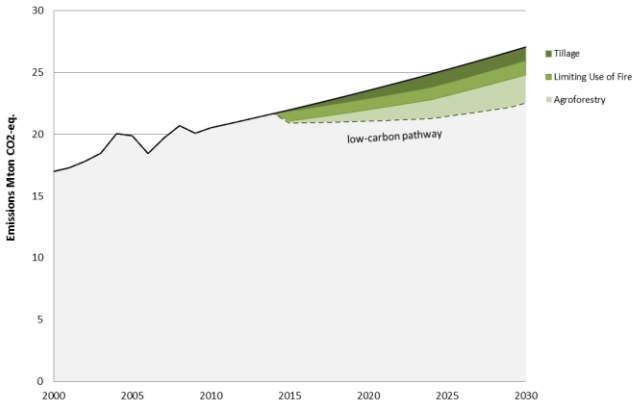
In the reference scenario, emissions from charcoal production are projected to remain relatively stable, while emissions from cement production increase to 4.4 $MtCO_2e$ in 2030. Process emissions from cement manufacturing can be reduced by replacing clinker in the cement mix with alternative materials. Although some Kenyan cement companies are

implementing this approach, this was not considered in this low-carbon analysis. The most significant low-carbon development opportunity is the introduction of more efficient kilns for charcoal production, with an abatement potential of 1.6 $MtCO_2e$ per year in 2030 (see Chapter 8 of the Mitigation report for the detailed analysis).[13] Sustainable development benefits include reduced fuelwood demand leading to lower levels of deforestation.

Agriculture

Agriculture is the largest source of GHG emissions; it was responsible for one-third of Kenya's total emissions in 2010. Agricultural emissions are likely to increase from 20 $MtCO_2e$ in 2010 to 27 $MtCO_2e$ in 2030 (Figure 5; Chapter 3 of the Mitigation report includes the detailed analysis), largely driven by livestock methane emissions, which account for 90 per cent of agriculture emissions and 30 per cent of overall national emissions. The sector also plays an important role in sequestering carbon in soil and trees on farms.

Figure 5: Low-carbon development wedges in the agriculture sector



Agricultural low-carbon development options have the potential to abate in the order of 6 $MtCO_2e$ per year in 2030 (Figure 6.5). The most significant reduction can be achieved through agroforestry, which has an abatement potential of 4 $MtCO_2e$ per year in 2030. Other low-carbon development options include conservation tillage and limiting the use of fire in range and cropland management, with abatement potentials of over 1.1 and 1.2 MtCO2e per year in 2030, respectively. These three options are elements of a climate smart agriculture approach, and a framework to encourage investment in climate smart agriculture will be an important action.

Low-carbon development actions in the agricultural sector have important sustainable development benefits, including improved retention of water and nutrients in the soil, and reduced soil erosion. These actions increase soil fertility and crop yields, improving food security and the livelihoods of farmers. Such efforts are important in arid and semi-arid lands where climate conditions are expected to become more extreme. Efforts to increase agroforestry will help meet Kenya's goal of increasing tree cover on farmland to 10 per cent as a means to preserving and maintaining the environment and combatting climate change.

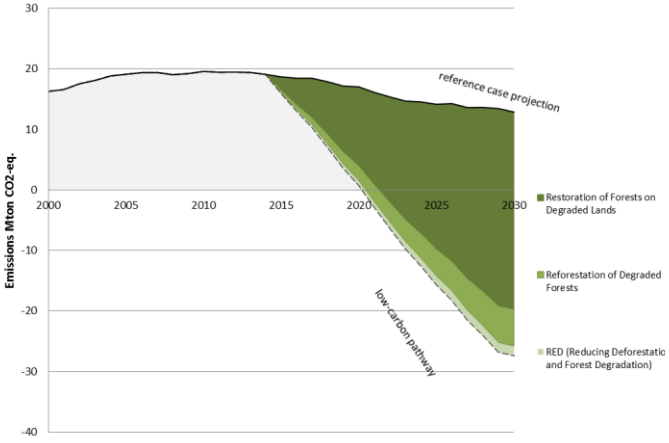
Livestock is not included as a priority low-carbon development option given that Kenyan experts did not identify viable options due to strong socio-economic barriers, including the cultural and economic importance of cattle, and resistance to change in rural communities. However, actions to help farmers and pastoralists adapt to climate change, as discussed in Chapter 5 of the Action Plan, should be undertaken in a manner that is as low-carbon as possible, complemented by awareness raising and education.

Forestry and other land use

Forestry and other land use related emissions accounted for 19.6 $MtCO_2e$ in 2010, or about 32 per cent of national emissions.[14] Emissions primarily originate from deforestation, where forests are cleared for fuelwood and charcoal production or to create agricultural land. The Government of Kenya is working to increase tree cover to 10 per cent of total land area – a goal stated in the 2010 constitution.

Emissions are expected to decline to 17 $MtCO_2e$ in 2020 and then to 13 $MtCO_2e$ by 2030, (Figure 6; Chapter 4 of the Mitigation report includes the detailed analysis). Reduced deforestation and increases in the carbon stock of trees contribute to the decline in emissions. On-going GoK REDD+ actions are taken into account in the reference case. Low-carbon development actions in the forestry sector have the potential to abate an additional 40 $MtCO_2e$ per year in 2030 compared to the baseline.

Figure 6: Low-carbon development wedges in the forestry sector



The most significant abatement potential can be achieved through Restoration of forests on degraded lands. Abatement potential of 32.6 $MtCO_2e$ per year by 2030 is likely available through conservation and sustainable forest management interventions. Restoration of degraded forests has an abatement potential of 6.1 $MtCO_2e$ per year by 2030, and reducing deforestation and forest degradation potentially can abate 1.6 $MtCO_2e$ per year by 2030.

Kenya's forest resources provide important environmental and ecosystem services, and contribute to economic development, rural livelihoods, water availability and climate resilience (adaptation benefits). Maintenance of and increased forest cover in water catchments is critical for sustaining water availability and the generation of hydropower.

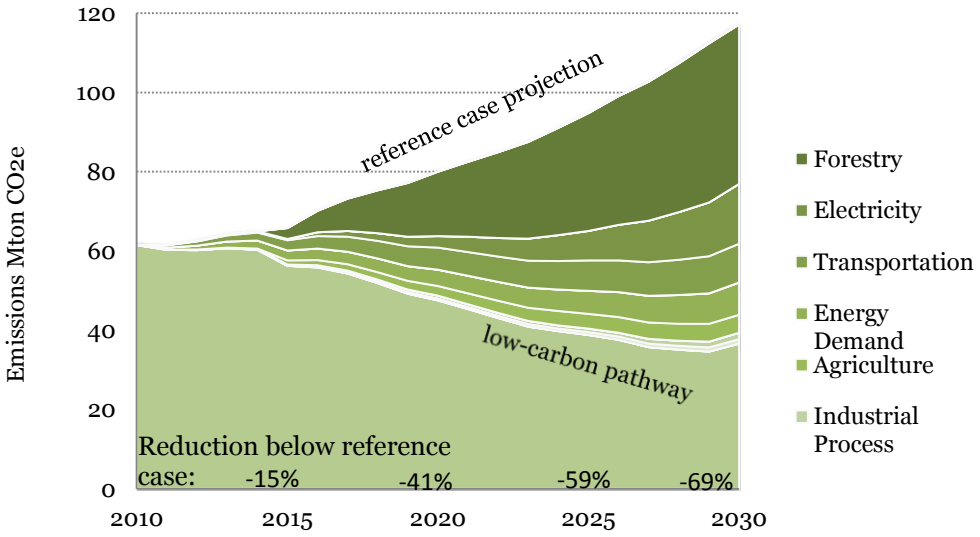
Waste

Landfills and sewage treatment plants generate GHG emissions through the production of methane. Waste management and access to sewerage systems have improved, yet comprehensive coverage is still lacking. The share of the waste sector in total GHG emissions is low and is expected to remain modest. Waste-related GHG emissions are expected to increase from 0.8 $MtCO_2e$ per year in 2010 to 2 $MtCO_2e$ in 2030. Landfill gas methane capture,[15] with an abatement potential of 1.1 $MtCO_2e$ in 2030, is the main low-carbon development opportunity (see Chapter 9 of the Mitigation report for the detailed analysis). Methane capture can go hand in hand with proper management of solid waste, thereby improving hygienic conditions; and methane capture can be combined with baseload electricity production, improving energy security.

Summary of bottom-up assessment of low-carbon development options

Figure 7 indicates the composite mitigation abatement potential of low-carbon development opportunities in six sectors.

Figure 7: Composite abatement potential for all sectors (technical potential)



2.3 Economy-wide top-down assessment of low-carbon opportunities

The low-carbon analysis also included economy-wide economic, energy and emission modelling. A CGE modelling approach was used to inform climate investment choices and long-term development impacts in Kenya. The top-down CGE modelling also incorporated the bottom-up low-carbon development options and emission forecasts described above. The resulting analysis provides a wider view of the possible scale and scope of reductions available. Figure 8 identifies the mitigation potential that is available at different carbon offsets prices ranging from between US$15 and US$50 per tonne. Costs are not the only factor affecting prospects for implementation; barriers to implementation and potential policy measures are discussed for each low-carbon development opportunity in Chapters 3 to 9 of the detailed low-carbon development analysis.

Figure 8: Economy-wide abatement potential for all sectors (US$/tonne)

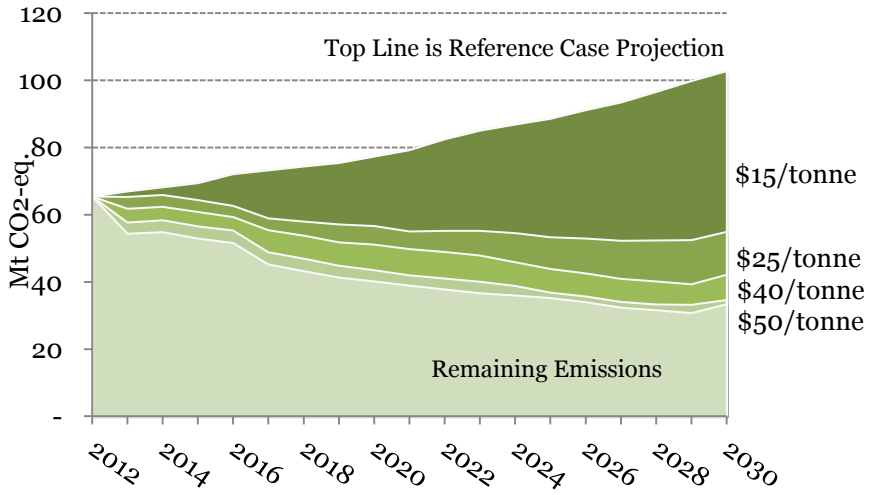


Figure 9 provides an overview of the emissions reduction potentials by sector at two carbon offset prices: US$15 and US$40. At these prices, a wide range of reduction opportunities are available within the Kenyan economy; but opportunities in forestry, the electricity sector and

cookstoves dominate. Commercial buildings also represent an opportunity (but were not assessed in detail in the bottom-up and more technically detailed analysis). A more disaggregated view of reductions relative to the UNFCCC six sectors is provided to reveal a wider range of low-carbon development opportunities.

Figure 9: Sector reduction potentials at US$15 and US$40 in 2030

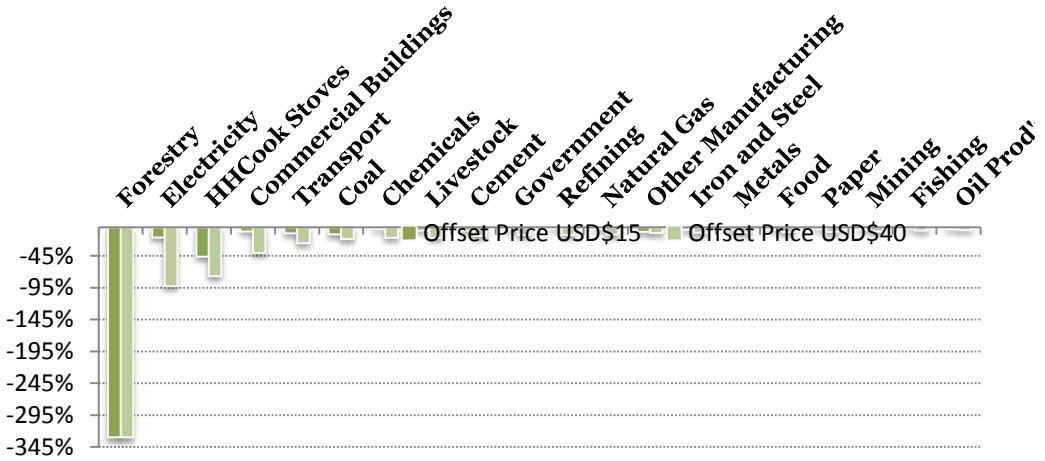


Table 1 provides a summary of the impact of international climate finance that targets economy-wide offsets at US$15 per tonne based on the results of the CGE modelling. At an offset supply price of US$15 per tonne, offsets supply rises steadily throughout the simulation, primarily as a result of forestry reductions which account for over 90 per cent of all offsets supply up until 2030. The total climate investment to deliver the reductions climbs from US$12 million in 2015 (US$2,011 at a 10 per cent discount rate) to on average about US$40 million annually out to 2030. With an international demand for Kenyan offsets, the increased spending to supply offsets increases economic activity in Kenya, thereby increasing Kenyan GDP throughout the entire period.

Table 1: Summary of climate finance impacts: US$15 offset supply

	2015	2020	2025	2030
GHGs offsets supply (Mt)	3.0	16.5	30.1	40.8
Climate finance (millions US$ 2011 @10% discount rate)	$12.8	$43.8	$49.5	$41.7
GDP (% change from reference case)	0.18%	0.17%	0.19%	0.17%

3. Recommended Actions

Based on the detailed bottom-up assessment, six proposed priority areas for low-carbon development are described in Table 2. These six priority areas cover about three-quarters of total abatement potentials found in this study. Their full deployment would almost halve GHG emissions by 2030 compared to the reference case scenario (cross-sectoral interactions not taken into account). Investment costs would vary, but significant reductions can be obtained at marginal costs of less than US$15 per tonne of carbon. Some of these options also deliver fuel savings, which may result in overall social cost savings relative to high emitting options.

Significant investments will be required and a series of barriers will need to be addressed before the low-carbon opportunities can be realised. Implementing the six priority low-

carbon actions would require investments of Ksh 1,371 – 1,773 billion (US$ 16.12 – 20.84 billion) until 2030 (equivalent to a Net Present Value of Ksh 600 – 770 billion at a real discount rate of 10 per cent). Out of these investment costs, it is estimated that Ksh 839 – 1,110 billion would have to be borne by the public sector, with the remaining costs covered by private sector and household investments. A large challenge is financing the higher upfront costs of low-carbon investments. Kenya sees clear potential to make effective use of bilateral and multilateral funding, as well as international climate finance mechanisms – such as the Green Climate Fund and emerging NAMAs and REDD+ mechanisms – in moving forward on the Action Plan, in addition to systematic domestic support.

Important enabling actions are needed to achieve this potential. These actions include updating of the GHG inventory and improvement of emissions data. To realize the significant potential in the forestry and land-use sector, capacity building is needed to improve measurement of, reporting on and monitoring of forestry and land-use emissions and sinks. Finally, the low-carbon development opportunities need to be mainstreamed into planning processes.

Table 2: Suggested priority low-carbon development opportunities up to 2030

Low-carbon option	Government planning sector	Lead Agency	Investment costs for implementation to 2030 (Ksh and US$, 2011)	Estimated split between public, private sector and household investments	NPV of investment at a 10% real discount rate (Ksh and US$, 2011)	Abatement potential and sustainable development impacts
Restoration of forests on degraded lands	Environment, Water and Sanitation (Forestry)	Kenya Forest Service	Ksh 186 – 290 billion, (US$ 2.2 – 3.4 billion)	100% public	Ksh 69 – 108 billion (US$ 0.81 – 1.3 billion)	- Abatement potential to 2030 of 32.6 $MtCO_2e$ - Contributes to constitution's goal of 10% tree cover - Biodiversity benefits - Sustainable forest products contribute to improved livelihoods - *Conservation may remove access to forests for communities*
Geothermal	Infrastructure	Ministry of Energy, working with GDC	Ksh 877 – 1,115 billion (US$ 10.3 – 13.1 billion)	About 45% public / 55% private sector investment assuming current electricity market structure	Ksh 399 – 507 billion (US$ $4.7 – 6.0 billion)	- Abatement potential to 2030 of 14.1 $MtCO_2e$ - Energy security, economic growth - *May require relocation of communities/villages*
Reforestation of degraded forests	Environment, Water and Sanitation (Forestry)	Kenya Forest Service	Ksh 48 – 61 billion (US$ 0.56 – 0.71 billion)	100% public	Ksh 18 – 22 billion (US$ 0.21 –0.26 billion)	- Abatement potential to 2030 of 6.1 $MtCO_2e$ - Sustained water availability (generation of hydropower) - Contributes to constitution's goal of 10% tree cover - Biodiversity benefits - Sustainable forest products contribute to improved livelihoods

Low-carbon option	Government planning sector	Lead Agency	Investment costs for implementation to 2030 (Ksh and US$, 2011)	Estimated split between public, private sector and household investments	NPV of investment at a 10% real discount rate (Ksh and US$, 2011)	Abatement potential and sustainable development impacts
Improved cookstoves and LPG cookstoves	Population, Urbanisation and Housing	Ministry of Energy	Ksh 20 billion (US$ 0.24 billion) Improved cookstoves: Ksh 9 billion (US$ 0.11 billion) LPG stoves: Ksh 11 billion (US$ 0.13 billion)	Improved cookstoves: about 75% consumer costs and 25% public support costs LPG stoves: about 85% consumer cost and 15% public support	Ksh 10 billion (US$ 0.12 billion) Improved cookstoves: Ksh 4.5 billion (US$ 0.053 billion) LPG stoves: Ksh 5.3 billion (US$ 0.062 billion	- Abatement potential to 2030 of 5.6 + 1.7 $MtCO_2e$ - Health benefits from reduced indoor air pollution - Lower fuelwood demand and deforestation - Potential cost savings to households
Agroforestry	Agriculture	Ministry of Agriculture	Ksh 70 – 117 billion (US$0.82 – 1.37 billion)	100% public	Ksh 26 – 43 billion (US$$0.31 – 0.51 billion)	- Abatement potential to 2030 of 4.1 $MtCO_2e$ - Increased soil fertility and crop yields, improving livelihoods of farmers and food security - Improved climate resilience - Contributes to goal of 10% tree over on farms
Bus rapid transit (BRT) with light rail transit (LRT) corridors	Infrastructure	Ministry of Transport	Ksh 170 billion (US$ 2 billion) BRT: Ksh 21 billion (US$0.25 billion) LRT: Ksh 149 billion (US$1.75 billion	About 75-85% public investment cost for infrastructure and 15-25% private costs for vehicle stock	Ksh 79 billion (US$ 0.93 billion) BRT: Ksh 10 billion (US$0.116 billion) LRT: Ksh 69 billion (US$0.81 billion)	- Abatement potential to 2030 of 2.8 $MtCO_2e$ - Reduced traffic congestion - Improved local air quality - Improved road safety

4. Summary of Actions

Table 3 below provides the summary of recommended mitigation actions, including enabling actions.

Table 3: Summary of actions

Number	Action
MITI-1	**Restoration of Forests on Degraded Lands** Undertake a programme of work to restore forests on 960,000 hectares up to 2030. This programme of work could include, *inter alia*: dryland forest restoration activities; awareness raising, consultation and demonstration; capacity building; development, testing and application of compensation and benefits-sharing mechanisms; measuring, monitoring and reporting; and research.
MITI-2	**Geothermal** Develop an additional 2,275 MW of geothermal capacity by 2030 through a support programme aimed at encouraging private sector investment. The programme could include: additional grants for the early phases of geothermal development, access to loans for latter stage development, risk mitigation instruments, capacity building programmes, and harmonization and improvement of the regulatory framework.
MITI-3	**Reforestation of Degraded Forests** Undertake a programme of work to replant forests on 240,000 hectares of land that were previously forests. This could include, *inter alia*: tree planting activities; awareness raising, consultation and demonstration; policy development; capacity building; measuring, monitoring and reporting; and research.
MITI 4	**Improved Cookstoves and LPG Cookstoves** Undertake a programme to support the use of improved cookstoves and of LPG cookstoves, including increasing awareness of improved cooking practices, undertaking pilot initiatives which promote the use of LPG, increasing awareness of stove quality, increasing access to soft loans, building capacity of stove producers, and improving access to testing facilities.
MITI-5	**Agroforestry** Convert 281,000 hectares of existing arable cropland and grazing land that have medium or high agricultural potential to agroforestry by 2030 through a programme of work that includes: research to identify appropriate agroforestry practices; technological development; extension services and training of extension workers; capacity building and education for farmers; pilot projects; research to determine potential in more marginal lands; and measuring, monitoring and reporting.
MITI-6	**Bus Rapid Transit and Light Rail Corridors** Implement an extensive Mass Transit System for greater Nairobi, based predominantly on Bus Rapid Transit corridors complemented by a few Light Rail Transit corridors.
MITI-7	**Development of GHG inventory and improvement of emissions data** Develop Kenya's GHG inventory, building on the SC4 analysis of GHG emissions; develop Kenya-specific emissions factors, especially in the agricultural sector; improve overall data; and build capacity to develop, use and monitor data and impacts.
MITI-8	**Measuring, reporting on and monitoring forestry emissions and sinks** Develop a national forest inventory, forest reference scenario, and a monitoring and reporting system that allows for transparent accounting of emissions and removals.
MITI-9	**Mainstreaming of low-carbon development options into planning processes** Undertake low-carbon assessments of current and new flagship projects; mainstream low-carbon screening and planning in the county planning process and sectoral development plans. Build capacity on the use of the tools to update the low-carbon scenario assessment.

Annex 1: Action Sheets

Action #1: RESTORATION OF FORESTS ON DEGRADED LANDS	**Action Reference Number:** MITI-1

Action summary

Restore forests on 960,000 hectares of degraded lands by 2030 to abate 32.6 $MtCO_2e$.

Building on Kenya's on-going work to develop a National REDD+ strategy, the forestry low-carbon scenario assessment, and a concept paper for dryland forest conservation developed under SC4, a programme of work should be undertaken to restore forests on 960,000 hectares up to 2030. This programme of work could include, *inter alia*: dryland forest restoration activities; awareness raising, consultation and demonstration; capacity building for communities and the Kenya Forest Service (KFS), development, testing and application of compensation and benefits-sharing mechanisms; measuring, monitoring and reporting; and research.

Rationale: REDD+ is potentially an important mechanism to help Kenya meet its forest-related goals, including the goal of 10 per cent forest cover stated in the constitution. Actions to restore forests on degraded lands could potentially be funded as REDD+ activities.

Impact: Funding and implementation of actions to restore forests on degraded lands will eventually lead to reduced deforestation and improved forest management and associated co-benefits, such as improved water availability, hydropower generation, reduced flooding and landslides, and sustainable use of forest products such as fuelwood, charcoal and medicines. Many of the areas to be restored will be used for grazing animals and actions could have significant impacts on pastoralists and forest-dependent communities. Free, prior and informed consent will be needed from these communities, and actions will need to consider these trade-offs – for example, how to compensate for lost access to grazing land and how to avoid grazing in the protected areas.

Areas of relevance

Sectors: Environment, Water and Sanitation; 2.2 Forestry

Adaptation √, Mitigation √ Development √ - REDD+ actions can have strong adaptation benefits if properly designed.

Current status

The Government of Kenya has not submitted REDD+ proposals to potential funders or to the UNFCCC.

Lead Agency to take this Action forward

The KFS is requested to lead the work to restore forests on degraded lands. The MEMR could provide assistance to present funding proposals to the UNFCCC.

Stakeholder support required to take the action forward

The KFS could engage the National REDD+ Steering Committee to provide oversight and advice on the development of the project. Stakeholders include Community Forest Associations, forestland owners, and pastoralists and local communities impacted by the REDD+ actions.

Indicative timeframe - Quick win opportunity ☐

Launch timeframe: By 2015

Duration of the Action: 15 years, beginning in 2015

Cost associated with the Action in Kenyan Shillings

The cost of achieving the full mitigation potential in estimated to be KSh 186 – 290 billion.

Short-term costs include Ksh 21 million for the development of a full REDD+ proposal that is fundable and implementable, building on the REDD+ concept paper.

Immediate next steps

1. Submission to UNFCCC to seek support for preparation of proposal building on the REDD+ concept paper, and discussions with potential funders – January to June 2013
2. Proposal development for REDD+ activities to restore forests on degraded lands (either with outside consultants, or through capacity building process) – July 2013 to December 2013
3. Submission of activity proposal to UNFCCC, and discussions with potential funders – January 2014 to June 2014
4. Finalization of activity design and financial arrangements, and activity start-up – July 2014 to December 2014

Action #2: GEOTHERMAL	**Action Reference Number:** MITI-2

Action summary

Development of an additional 2,275 MW of geothermal capacity by 2030 to abate 14.1 $MtCO_2e$ by 2030 (in addition to the 2,734 MW of geothermal capacity in 2030 assumed in the baseline). Additional support for the development of geothermal electricity generation will be required to achieve the ambitious goals of capacity expansion. A programme providing such support should be based on existing initiatives, complementing them where required and addressing barriers to deployment which are not yet targeted. Given the large investment requirements and the inherent limits to public funding, the support program should aim at encouraging private sector investment. Potential elements of a such programme could include the provision of: additional grants for the early phases of geothermal development, access to loans for latter stage development, risk mitigation instruments, capacity building programmes to ensure adequate technical capacity to undertake planned expansion of the sector, and harmonization and improvement of the regulatory framework. Support programmes will have to be adjusted regularly given that geothermal development has long lead-times and the energy sector in Kenya is expected to stay dynamic in the coming years.

Rationale: Surface studies suggest that 5,000 to 10,000 MW of electricity could be generated through geothermal. The initial high cost and risk of resource exploration have slowed down the development of geothermal power despite its cost competitiveness on a life-cycle basis. The development of geothermal electricity generation has been identified as priority in Kenya's Updated Least Cost Power Development Plan and other Government of Kenya planning documents.

Impact: Increasing the share of geothermal electricity can improve energy security (through decreased energy imports) and reduce costs of generation. Geothermal power can provide low-cost base load electricity generation, facilitating economic activity and development. It also reduces the current reliance on hydropower thereby improving climate resilience.

Areas of relevance

Sectors:; 3. Physical Infrastructure Sector
Adaptation ☐ Mitigation √ Development √

Current status

A number of activities have been started to support geothermal development including the formation of the Geothermal Development Corporation (GDC) by GoK, the formulation of the Scaling up Renewable Energy Programme (SREP) and a number of bilateral initiatives supporting different stages of the geothermal development chain.

Lead Agency to take this Action forward

The Ministry of Energy is requested to lead the work on geothermal. The MEMR could provide assistance to present funding proposals to the UNFCCC.

Stakeholder support required to take the action forward

The Ministry of Energy would need to engage the GDC, Kenya Power and Lighting Company, Energy Regulatory Commission, independent power producers and others.

Indicative timeframe - Quick win opportunity ☐
Launch timeframe: can be started immediately
Duration of the Action: 15 years

Cost associated with the Action in Kenyan Shillings

The cost of achieving the full mitigation potential to 2030 is estimated to be Ksh 877– 1,115 billion. Short-term costs include Ksh 21 million for the barriers and needs analysis, and development of a full NAMA proposal that is fundable and implementable.

Immediate next steps

1. Undertake a detailed analysis of remaining barriers to geothermal deployment in Kenya and identify gaps in current initiatives supporting geothermal development – October 2012 to March 2013
2. Prepare detailed proposal for a support programme, potentially in the form of a proposal for a supported NAMA – April 2013 to October 2013
3. Submit NAMA proposal to UNFCCC, and hold discussions with potential funders – August 2013to December 2013
4. Start implementation of NAMA – January 2014

Action #3: REFORESTATION OF DEGRADED FORESTS	**Action Reference Number:** MITI-3

Action summary

Reforest 240,000 hectares of degraded forests by 2030 to abate 6.06 $MtCO_2e$.

A programme of work can be undertaken to replant forests on 240,000 hectares of land that were previously forests. This could include, *inter alia*: tree planting activities; awareness raising, consultation and demonstration; policy development; capacity building for communities, county governments, Community Forest Associations and the KFS; measuring, monitoring and reporting; and research.

Rationale: Extensive reforestation is need to help Kenya meet its forest-related goals, including the goal of 10 per cent forest cover stated in the constitution. The tree cover is significantly diminished in many areas and natural regeneration inhibited, requiring tree planting activities.

Impact: Funding and implementation of actions to reforest degraded forests will eventually lead to improved forest management and associated co-benefits, such as improved water availability, hydropower generation, reduced flooding and landslides, and sustainable use of forest products such as fuelwood, charcoal and medicines. Reforestation has strong adaptation co-benefits and can help to increase climate resilience. Clear policies are needed on the tree species to be used for reforestation, considering the trade offs between fast-growing exotic tree species that could meet fuelwood demand and the more comprehensive ecosystem services of natural forests.

Areas of relevance

Sectors: Environment, Water and Sanitation; 2.2 Forestry
Adaptation √, Mitigation √ Development √ - Forestry actions can have strong adaptation benefits.

Current status

The MEMR has a flagship project to rehabilitate, reforest and protect indigenous forests in the five water towers. The Green Belt Movement spearheads three CDM initiatives: Aberdare Range/Mt. Kenya Small Scale Reforestation Initiatives (located in Kirimara-Kithithina, Kamae-Kipipiri, and the Kibaranyeki areas respectively); the Clean Air Action Corporation is implementing five International Small Group and Tree Planting Programs in the Central, Rift Valley, and Eastern Provinces; and Eco2librium is implementing one CDM project, Forest Again Kakamega project. The government engages in annual tree planting campaigns. Despite ongoing efforts to encourage tree planting, there is no national data as to the extent of the area of reforestation per year.

Lead Agency to take this Action forward

The KFS is requested to lead the work to reforest degraded forests. The MEMR could provide assistance to present funding proposals to the UNFCCC.

Stakeholder support required to take the action forward

KEFRI, Community Forest Associations, county governments, forestland owners, forest communities and civil society organizations involved in tree planting campaigns

Indicative timeframe - Quick win opportunity ☐
Launch timeframe: By 2015
Duration of the Action: 15 years, beginning in 2015

Cost associated with the Action in Kenyan Shillings

The cost of achieving the full mitigation potential in estimated to be Ksh 48 – 61 billion.

Short-term costs include Ksh 21 million for the development of a full NAMA proposal that is fundable and implementable.

Immediate next steps

1. Submission to UNFCCC to seek NAMA support for preparation of proposal, and discussions with potential funders – January to June 2013
2. Development of a NAMA proposal to restore forests on degraded lands (either with outside consultants, or through capacity building process) – July 2013 to December 2013
3. Submission of NAMA proposal to UNFCCC, and discussions with potential funders – January 2014 to June 2014
4. Finalization of NAMA design and financial arrangements, and activity start-up – July 2014 to December 2014

Action#4: IMPROVED COOKSTOVES AND LPG COOKSTOVES	**Action Reference Number:** MITI-4

Action summary: Programme to support the use of improved cookstoves and of LPG cookstoves to abate 7.3 $MtCO_2e$ by 2030.

A detailed list of potential intervention options to support improved cookstoves (especially in rural areas where penetration of improved stoves is lower than in urban areas) and LPG cookstoves (especially in urban areas) has been developed by the "Global Alliance for Clean Cookstoves".[16] Potential interventions can happen on three levels: improving the enabling environment, strengthening demand and enhancing supply. Interventions could include increasing awareness of improved cooking practices, undertaking pilot initiatives which promote the use of LPG, increasing awareness of stove quality, increasing access to soft loans, capacity building for stove producers, and improving access to testing facilities.

Rationale: The overreliance on fuelwood is specifically mentioned in Vision 2030 as a challenge in increasing efficiency in energy consumption. The 2012 draft Energy policy aims at encouraging the use of LPG by reducing overreliance on fuelwood and kerosene in households.

Impact: Improved cookstoves can better the lives of individual, particularly women, in rural and urban areas – both by reducing time to collect fuelwood and reducing indoor air pollution. The actions may also present cost savings to consumers, depending on the price of alternatives. Increased climate resilience through lower fuelwood demand and reduced deforestation.

Areas of relevance
Sectors: 1. Agriculture and Rural Development; 2. Environment, Water and Sanitation; 3. Physical Infrastructure Sector; and 4. Tourism Trade and Industry.
Adaptation ☐ Mitigation √ Development √- including building climate resilience where applicable

Current status
A number of initiatives on clean cookstoves are ongoing in Kenya undertaken by NGOs and development organizations and by carbon credit companies.

Lead Agency to take this Action forward
The Ministry of Energy is requested to lead the work on geothermal. The MEMR could provide assistance to present funding proposals to the UNFCCC.

Stakeholder support required to take the action forward
Consumers, local and international cookstoves manufacturers, other local entrepreneurs in retail and distribution, CSOs, development organizations, gas companies, commercial banks, microfinance institutions

Indicative timeframe
Launch timeframe: Short-term – within one year
Duration of the Action: 5 years

Cost associated with the Action in Kenyan Shillings
The cost of achieving the full mitigation potential in estimated to be Ksh 20 billion.

Short-term costs include Ksh 21 million for the development of a full NAMA proposal that is fundable and implementable.

Immediate next steps
1. Based on existing studies on potential interventions in the cookstove market in Kenya, develop a detailed proposal for a support programme in the form of a proposal for a supported NAMA – January to June 2013
2. Submit NAMA proposal to UNFCCC, and hold discussions with potential funders – July to November 2013
3. Start implementation of NAMA – December 2013

Action #5: AGROFORESTRY	**Action Reference Number:** MITI-5

Action summary

Convert 281,000 hectares of existing arable cropland and grazing land that have medium or high agricultural potential to agroforestry by 2030 to abate 4.16 $MtCO_2e$.

A programme of work can be undertaken to encourage land use practices in which trees and other woody perennials are spatially or temporally integrated with crops and livestock on a given unit of land. This could include, *inter alia*: research to identify appropriate agroforestry practices; technological development; extension services and training of extension workers; capacity building and education for farmers; pilot projects; research to determine potential in more marginal lands; and measuring, monitoring and reporting.

Rationale: Agroforestry is a combination of agricultural and forestry techniques that aims to build more robust, productive, resilient and diverse agro-ecological systems. The Agriculture (Farm Forestry) Rules 2009, introduced under the Agriculture Act, aim to promote and maintain farm forest cover of at least 10 per cent of every agricultural land holding.

Impact: Funding and implementation of agroforestry actions will improve foods security, livelihoods, and climate resilience, in addition to sequestering carbon.

Areas of relevance

Sectors: Agriculture

Adaptation √, Mitigation √ Development √ - Agroforestry actions have strong adaptation benefits if properly designed.

Current status

The current extent of tree cover on agricultural land is not known, and the extent to which agroforestry practices are employed overall on Kenyan farms is uncertain, since evidence of its deployment is anecdotal. Project work to promote and spread agroforestry practices is underway in Kenya. The SCC-Vi Agroforestry project in Kisumu promotes agroforestry practices in the target region by providing outreach services to farmer groups through trained community facilitators[17]. Input at the county consultations indicated that several agroforestry projects are ongoing including in Kisii, Nyamira, Nyeri, Embu, Kisumu, Siaya, Garissa, Kakamega, Uasin Gishu, Kitale, Kericho, Bomet. In arid and semi-arid regions, such as Garissa County where pastoralism dominates, agroforestry is gradually being introduced as a coping strategy against drought and hunger shocks.

Lead Agency to take this Action forward

The Ministry of Agriculture is requested to lead the work to promote agroforestry. The MEMR could provide assistance to present NAMA proposals to the UNFCCC.

Stakeholder support required to take the action forward

KARI, extension workers, county governments, farmers, agroforestry project developers and civil society organizations involved in tree planting campaigns

Indicative timeframe - Quick win opportunity ☐

Launch timeframe: By 2015

Duration of the Action: 15 years, beginning in 2015

Cost associated with the Action in Kenyan Shillings

The cost of achieving the full mitigation potential in estimated to be KSh 70 – 117 billion.

Short-term costs include Ksh 21 million for the development of a full NAMA proposal that is fundable and implementable.

Immediate next steps

1. Submission to UNFCCC to seek NAMA support for preparation of proposal, and discussions with potential funders – January to June 2013
2. Development of a NAMA proposal to promote agroforestry (either with outside consultants, or through capacity building process) – July 2013 to December 2013
3. Submission of NAMA proposal to UNFCCC, and discussions with potential funders – January 2014 to June 2014
4. Finalization of NAMA design and financial arrangements, and activity start-up – July 2014 to December 2014

Action#6: BUS RAPID TRANSIT WITH LIGHT RAIL TRANSIT CORRIDORS	**Action Reference Number:** MITI-6

Action summary

Implement an extensive Mass Transit System for greater Nairobi, based predominantly on Bus Rapid Transit Corridors complemented by a few Light Rail Transit Corridors to abate 2.8 $MtCO_2e$ by 2030. A recent feasibility study[18] for an even more extensive public transport system for Nairobi has estimated that such a system could serve about 3.2 and 4.5 million passengers by 2030, depending on growth rates and city planning. Implementing a Mass Transit System requires significant investments into the public transport infrastructure (e.g. for constructing dedicated bus lanes, purchasing buses and setting-up fare collection systems), integration the Mass Transit System into city planning and getting buy-in from stakeholders in the public transport sector.

Rationale: The transport sector is a critical enable in achieving Vision 2030, and mass rapid transit systems are a key component of the pending Nairobi Metro 2030 plan.

Impact: An improved mass transit system for Nairobi is a priority for relieving current traffic congestion and meeting the expected growth in future transportation demands. Bus rapid transit systems are increasingly being implemented in developing cities across the world. They can change the trend of modal shifts to private vehicles towards public transportation, thereby bringing about a range of development benefits. If designed well, a BRT system can deliver metro-quality service at a significantly lower capital cost. An improved mass transit system can also improve local air quality, improve road safety, increase Nairobi's attractiveness in terms of ease of doing business and quality of living. In addition, an affordable high-quality mass rapid transit has the potential to help improve social equality and reduce poverty.

Areas of relevance

Sectors: Physical Infrastructure Sector;
Adaptation ☐ Mitigation √ Development √

Current status

Feasibility studies for a Mass Transit System in Nairobi have been undertaken and some plans for Mass Rapid Transit corridors have already been announced, such as the light rail system stretching from the Nairobi station to the international airport.

Lead Agency to take this Action forward

The Ministry of Transport is requested to lead the work to promote agroforestry. The MEMR could provide assistance to present NAMA proposals to the UNFCCC.

Stakeholder support required to take the action forward

Ministry of Roads, Kenya Urban Roads Authority, public transport operators, development banks

Indicative timeframe - Quick win opportunity
Launch timeframe: Short-term – within one year
Duration of the Action: 18 years until the full public transport system has been realized

Cost associated with the Action in Kenyan Shillings

The cost of achieving the full mitigation potential in estimated to be Ksh 170 billion.

Short-term costs include Ksh 21 million for the development of a full NAMA proposal that is fundable and implementable.

Immediate next steps

1. Submission to UNFCCC to seek support for preparation of proposal for a public transport NAMA January to June 2013
2. Development of a proposal for a public transport NAMA – July 2013 to December 2013
3. Submission of activity proposal to UNFCCC, and discussions with potential funders – January 2014 to June 2014
4. Finalization of activity design and financial arrangements, and activity start-up – July 2014 to December 2014

Action #7: DEVELOPMENT OF GHG INVENTORY, IMPROVEMENT OF EMISSIONS DATA AND ANALYSIS OF MITIGATION OPTIONS (ENABLING ACTION)	**Action Reference Number:** MITI-7

Action summary

Develop Kenya's GHG inventory, building on the information developed in the SC4 reference case of GHG emissions, and build capacity to develop, use and monitor data and impacts.
Kenya would benefit from a centralized government agency with continued funding and support to collect inventory data and prepare and complete rigorous emission inventories in accordance with IPCC guidelines. The work would include capacity building, developing a planning process for preparing and reporting, identifying a strategy and priority areas for improvement in data and methodologies, establishing a reliable mechanisms to ensure appropriate documentation, quality control and completeness, and integration with other government planning processes. The work would also include capacity building for making emission projections and assessing low-carbon development options to enable the updating of the SC4 low-carbon analysis over time; and capacity building for monitoring the impacts of policies and programmes.

Rationale: SC4 used the best available data to generate historical emissions data up to 2010, which provides a substantive base for Kenya's GHG inventory. But this is not a substitute for reporting to the UNFCCC, which would require substantially more effort, quality assurance and sensitivity analysis.

Impact: Robust and reliable inventory that meets UNFCCC reporting requirements; improved low-carbon policy development, improved assessment of needed emission reduction actions and impacts of these actions – all contributing to improved planning decisions regarding climate change, investment and sustainability. The improved understanding of GHG emissions could help Kenya to leverage climate financing.

Areas of relevance
Sectors: Sectors: 1. Agriculture and Rural Development; 2. Environment, Water and Sanitation; 3. Physical Infrastructure Sector; and 4. Tourism Trade and Industry.
Adaptation Mitigation √ Development

Current status
The Government of Kenya submitted a GHG inventory to the UNFCCC in 1994. The MEMR received capacity building on inventory development in June 2012.

Lead Agency to take this Action forward
The MEMR is requested to develop the GHG inventory. Relevant ministries, such as the Ministries of Agriculture, Transport and Roads should be involved in specific actions to improve data availability and build capacity to interpret data in their sectors.

Stakeholder support required to take the action forward
The MEMR will engage stakeholder groups in the six sectors to validate information; the MEMR will also draw on information from the Bureau of Statistics and relevant ministries.

Indicative timeframe - Quick win opportunity ☐
Launch timeframe: Short-term – within one year to develop 2010 GHG inventory
Duration of the Action: beginning August 2012, and on-going to meet UNFCCC reporting requirements and to develop Kenya-specific emissions factors.

Cost associated with the Action in Kenyan Shillings
The cost associated with developing a 2010 inventory is Ksh 21 million (to build on the SC4 development of the 2010 inventory), plus Ksh 21 million for a two-year capacity building process to fill data gaps, build capacity for future inventory development and undertake longer-term research to develop processes and fill data gaps.

Immediate next steps
1. MEMR to identify approach for development of 2010 inventory: August 2012
2. Capacity building on use of IPCC methodologies and additional information gathering through consultations with required departments and stakeholder consultations: September-December 2012
3. Finalization of 2010 GHG inventory: January to April 2013
4. Submission of GHG inventory to UNFCCC: May 2013
5. Research and study to fill emission data gaps, develop UNFCCC reporting processes, and develop Kenya-specific emission factors: January 2013 to January 2015 (two-year process)

Action #8: CAPACITY BUILDING FOR MEASURING, REPORTING ON AND MONITORING FORESTRY EMISSIONS AND SINKS	**Action Reference Number:** MITI-8

Action summary

Develop a national forest inventory, forest reference scenario, and a monitoring and reporting system that allows for transparent accounting of emissions and removals in the forestry and land-use sectors. Developing these measurement and monitoring tools requires increased capacity for carbon stock assessment, remote imagery interpretation, community monitoring, applying IPCC methodologies, economic analysis and information management systems.
Rationale: The development and implementation of an effective REDD+ strategy requires accurate and rigorous information. Of importance, and identified in the REDD+ Readiness Preparation Proposal, are: i) an updated national forest inventory: ii) the development of a reference scenario that projects emissions and removals of CO_2 into the future in the absence of REDD+ incentives, and iii) a monitoring and reporting system that allows for transparent accounting of emissions and removals. Estimates of Kenya's current forest cover and associated GHG emissions from the sector are uncertain, incomplete and out of date. The most recent forest assessment was conducted between 1990 and 1994 for the Kenya Forest Master Plan (1994), and current estimates of emissions from the forestry sector are based on a simple tier estimation approach. Updated information is needed regarding the state of Kenya's forests. Support is needed to measure, monitor and report on changes in forest cover, including the development of a forest reference scenario. The GoK recognized the need for improved information on the country's forest resources in its Technology Needs Assessment, National Climate Change Response Strategy and Medium Term Plan (2008-2012).
Impact: Improved capacity to measure, monitor and report on (including reporting to the UNFCCC) on the forestry sector, which will enable improved policy and program development in the sector.

Areas of relevance

Sectors: 2. Environment, Water and Sanitation; 2.2 Forestry; 1. Agriculture and Rural Development
Adaptation √ Mitigation √ Development √ - REDD+ actions if well designed have climate resilience benefits

Current status

The KFS is undertaking a forest mapping exercise funded by the Government of Japan, but has not developed a National Forest Inventory. The UNDP supports aerial surveys under its Forestry Recovery Strategies and Policies project. The World Bank's Natural Resource Management project includes a national forest resource assessment component, and the Government of Australia is supporting the Clinton Initiative to deliver regional activities on national carbon monitoring systems. The Government of Finland has provided institutional support for REDD+ readiness activities.

Lead Agency to take this Action forward

The KFS will lead the national forest inventory & the development of a monitoring and reporting system in the forestry sector.

Stakeholder support required to take the action forward

The KFS could engage the National REDD+ Steering Committee to provide oversight and advice the national forest inventory, forest reference scenario, and monitoring and reporting initiatives.

Indicative timeframe - Quick win opportunity ☐
Launch timeframe: Short-term – within one year
Duration of the Action: Three years, beginning January 2013

Cost associated with the Action in Kenyan Shillings

The establishment of a national forest inventory is capital-intensive, requiring technical and institutional capacity building and training. Based on costs of developing national forest inventories in other countries, an estimated cost is Ksh 438 million (US$5.15 million). The development of the reference scenario and monitoring system is estimated to cost Ksh 186 million (US$ 2.186 million), for a total cost of Ksh 624 million.

Immediate next steps

1. KFS to develop proposals and seek funding for the National Forest Inventory, and a monitoring and reporting system, building on the forest mapping exercise: by June 2013
2. Funding approved and project start-up: December 2013
3. Development of forest inventory, reference scenarios, measurement and monitoring; including capacity building for KFS officials, CFAs and other stakeholders: January 2014 to January 2016

Action#9: MAINSTREAMING OF LOW-CARBON DEVELOPMENT OPPORTUNITIES INTO PLANNING PROCESSES	**Action Reference Number:** MITI-9

Action summary

Develop a process to mainstream low-carbon development opportunities into the Government of Kenya planning process. The action would include identification of potential intervention points, assessment of the climate impacts of policy decisions and informing the policy process. All domains of planning, policy and regulation should consider low-carbon development opportunities – including removing barriers to implementation. This could include spatial planning to support mass transit, planning of waste landfills so that they are well managed and compatible with methane capture, assessment of current policies (such as the feed-in tariff), assessment of impacts of renewable energy development, land-use planning to support forest restoration, and assessment of impact of agricultural extension services. The work could also include a low-carbon assessment of current and new flagship projects.

The mainstreaming process would include capacity building on the use of the tools developed in the low-carbon scenario assessment, and how to use the information generated by the tools to inform policies and programmes. The low-carbon scenario analysis should be viewed as an iterative process that is updated on a regular basis to take advantage of new and improved information. This was a recommendation of TWG4.

Rationale: Many of the low-carbon development opportunities will only gain traction if they are recognized and taken up in the formal Government of Kenya planning process. The MPND is involved in the Action Plan process and taken steps under SC1 to mainstream climate change considerations in the MTP2. It will be important to extend this mainstreaming process to other aspects of national planning, including the county and sectoral plans. Capacity building is needed to allow Government of Kenya officials to maintain the low-carbon scenario analysis over time, and to take up and effectively use the tools to inform the policy process.

Impact: Climate change and low-carbon considerations embedded across the planning process, including the MTP2, county plans and sectoral plans. This would differentiate Kenya's action plan process from that of many other countries, where the action plan remains marginalized because it is not owned or acted upon by relevant departments. Improved ability of the Government of Kenya to identify intervention points to mainstream low-carbon development actions, and to raise external funds to support these actions.

Areas of relevance

Sectors: 1. Agriculture and Rural Development; 2. Environment, Water and Sanitation; 3. Physical Infrastructure Sector; and 4. Tourism Trade and Industry

Adaptation √ Mitigation √ Development √

Current status

The MPND and MEMR have initiated a process under SC1 to mainstream low-carbon and climate resilience considerations into the Second Medium Term Plan.

Lead Agency to take this Action forward

The MPND is requested to lead the mainstreaming of low-carbon development options in the planning process, with support from MEMR and other ministries as required.

Stakeholder support required to take the action forward

County and line ministry officials will be engaged in the county and sectoral plans, as will Kenyan experts from civil society and the private sector.

Indicative timeframe - Quick win opportunity ☐

Launch timeframe: Short-term – within one year

Duration of the Action: December 2012 to December 2013

Cost associated with the Action in Kenyan Shillings

The cost of a capacity building program that builds on the SC1 process to expand capacity building on the low-carbon development tools, and to mainstream low-carbon considerations in flagship project, county plans and sectoral plans is estimate to be Ksh 21 million (US$250,000).

Immediate next steps

1. MPND and MEMR to develop proposal and seek funding for mainstreaming low-carbon development in the planning process: by September 2012
2. Funding approved and project start-up: December 2012
3. Capacity building and tool development: January 2013 to December 2013

Endnotes

[1] As set out in Article 4.1 of the United Nations Framework Convention on Climate Change (UNFCCC).
[2] IPCC Inter-governmental Panel on Climate Change. 2006. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Volume 4 Agriculture, Forestry and Other Land Use. Geneva: IPCC.
[3] The calculations could be used as a starting point for developing Kenya's GHG emissions inventory. The analysis provides a draft inventory for 2010, developed using IPCC methodologies. See Chapter 2 of the SC4-Mitigation report.
[4] All figures and tables are elaborated in the ten technical chapters of the Mitigation analysis of the NCCAP.
[5] Ministry of Energy. 2011. *Updated Least Cost Power Development Plan*. Nairobi: Ministry of Energy.
[6] The methodological approach for the electricity sector analysis deviates from a traditional analysis of climate mitigation options. Usually mitigation options are assumed to replace a business as usual alternative or reference mix. However, for this analysis, the ambitious electricity expansion plans needed to satisfy Vision 2030 were assumed to be supply constrained in the absence of external support. International climate finance for low-carbon development opportunities provides the funding for additional capacity expansion that would not be installed in the reference case.
[7] Bellanger, M. 2010. *Technical Assistance to the Ministry of Energy*. Nairobi: French Development Agency.
[8] Kenya Institute for Public Policy Research and Analysis. 2010. *A Comprehensive Study and Analysis on Energy Consumption Patterns in Kenya: A Synopsis of the Draft Final Report*. Nairobi: Kenya Institute for Public Policy Research and Analysis.
[9] The recent developments in coal and oil were not included in this low-carbon analysis because of a lack of concrete data.
[10] Although growth is modelled until 2030, it does not account for an expected structural shift in energy use with increased industrialization.
[11] Assuming 35 per cent of unsustainable biomass.
[12] Apart from road transport, the sector includes some limited water transport along the coast and on inland lakes, a rail network in need of rejuvenation and national air transport. Emissions from these sub-sectors are included in the reference case, but the low-carbon development options focus on road transport.
[13] This number assumes a share of 35 per cent unsustainable biomass in the woodfuel mix.
[14] The low-carbon analysis in the forestry and other land use sector considers natural forestlands, as well as other types of vegetarian such as grasslands and bush lands, The forestry and land-use change sector is referred to as the forestry sector in this analysis because transitions in forests, through clearing of forested lands for agriculture, urban development or settlement, as well as wood harvesting, account for most GHG emissions of carbon dioxide in the sector.
[15] In this calculation, only the GHG mitigation impact of methane emission prevention was taken into account. Emissions mitigation through the use of methane gas for electricity production was taken into account in the calculations for the electricity sector.
[16] Global Alliance for Clean Cookstoves, 2012. *Kenya Market Assessment – Intervention Options*. Available at http://www.cleancookstoves.org/resources_files/kenya-market-assessment.pdf
[17] SCC-Vi Agroforestry. n.d. *Economics of climate change adaptation for Kenya: A case study of SCC-Vi Agroforestry project in Kisumu*. Nairobi: SCC-Vi Agroforestry.
[18] Consulting Engineering Services and APEC Limited Consulting Engineers. 2011. *Consultancy services for feasibility study and technical assistance for mass rapid transit system for the Nairobi metropolitan region*, Consulting Engineering Services Pvt. Ltd. and APEC Ltd. Consulting Engineers, Government of Kenya, Ministry of Transport.