



Lesotho's Intended Nationally Determined Contributions (INDC)



MINISTRY OF ENERGY AND METEOROLOGY

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The Lima Call for Climate Action (Decision 1/CP.20)¹ reiterated the invitation to all Parties to develop and communicate Intended Nationally Determined Contributions (INDC) as their ‘contributions’ toward achieving the ultimate objective of Article 2 of the United Nations Convention on Climate Change (UNFCCC): “*to achieve... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.*” Recognizing concerns about the legal nature of INDCs, the decision also noted that arrangements for INDC preparation and submission were “*without prejudice to the legal nature and content of the intended nationally determined contributions of Parties or to the content of the protocol, another legal instrument or agreed outcome with legal force under the Convention applicable to all Parties*”. Further, the Twentieth Conference of the Parties (COP) in Lima agreed that special provisions would apply to Least Developed Countries (LDCs) and Small Islands Developing States (SIDS), i.e. that their INDCs “*may communicate information on strategies, plans and actions for low greenhouse gas emission development reflecting their special circumstances*”. This means that while the INDCs of developed countries are expected to include absolute or economy-wide emission reduction commitments, LDCs can draw on specific strategies, plans or projects to formulate their contributions, and specify the component of the contribution that would be conditional upon receiving international finance or other support.

It is against this backdrop of the foregoing that the Kingdom of Lesotho is herein submitting her Intended Nationally Developed Contributions. This report followed a series of intensive national consultations, on the nature of our development trajectory between 2020 and 2030 and the potential greenhouse gas emissions reductions. However, cognizant to the fact that Lesotho is highly vulnerable to the impacts of climate change, it has thus also reported on adaptation in line with the collective position of the Africa Group.

Thus, this report is a summary of our national mitigation and adaptation contributions.

¹ The Lima Call to Action – The UNFCCC’s 20th Conference of the Parties. December 2014.

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2 Acronyms

BAU	Business As Usual
CAREI	China Association of Rural Energy Industry
CBO	Community Based Organisations
CDM	Clean Development Mechanism
CFLs	Compact fluorescent Lamps
COP	Conference of the Parties
CSES	Centre of Sustainable Environmental Sanitation
DFID	Department for International Development
EE	Energy Efficiency
EEP	The Energy and Environment Partnership
FILLI	Forestry Initiative for Landscape and Livelihoods Improvement
GDP	Gross Domestic Product
GEF-SGP	Global Environment Facility - Small Grants Programme
GHG	Greenhouse Gases
GWh	Gigawatt Hour
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
LDCs	Least Developed Countries
LHDA	Lesotho Highlands
LMS	Lesotho Meteorological Services
LPG	Liquid Petroleum Gas
MDGs	Millennium Development Goals
MRV	Measurement, Reporting and Verification
NAPA	National Adaptation Programme of Action
NCCC	National Climate Change Committee
NGOs	Non-Governmental Organizations
NSDP	National Strategic Development Plan
PRS	Poverty Reduction Strategy
RE	Renewable Energy
REDD	Reducing Emissions from Deforestation and Forest Degradation
SADC	Southern African Development Community
SAPP	Southern African Power Pool
SIDS	Small Islands Developing States
SNC	Second National Communication
TED	Technologies for Economic Development
UNFCCC	United Nations Framework Convention on Climate Change
USTB	The University of Science and Technology Beijing

3 National Development Goals and Priorities, Climate Change Context

In the year 2000, Lesotho adopted a Vision 2020 statement to guide all development goals, objectives and aspirations in the medium and long term. The vision statement overlapped with Lesotho accession into the Millennium Development Goals (MDGs). Two key strategies were in particular aimed at fulfilling the Vision 2020 pronouncements. The first of these was the Poverty Reduction Strategy (PRS) 2005-2007 which sought to reduce poverty from 56.6% in the base year of 2003 to 29% at the end of the plan period. The second was the National Strategic Development Plan (NSDP):2012-2017 which embraced the key poverty targets of the PRS while seeking to, hence forth, consolidate all development goals with an associated Public Sector Investment Programme for the plan period.

In addition, a number of sector specific policies were adopted pursuant to the aspirations of the NSDP. The Lesotho Energy Policy 2015 envisions that energy shall be universally accessible and affordable in a sustainable manner, with minimal negative impact on the environment and sets goals to reduce in particular fuelwood usage in the national energy consumption including other fossil fuels. The policy further provides for mitigation of climate change, through energy efficiency and promotion of renewable energy. The Draft Strategic Plan for the Ministry of Energy and Meteorology (2015/16 to 2020/21) projects key strategic intentions in both climate change mitigation and adaptation including national energy initiatives. National Rangelands Management Policy 2013 seeks to guide range and natural resources management in the Kingdom. Lesotho has formally committed with support from the European Union, to a process of developing a new National Climate Change Policy and Sustainable Energy Policy.

4 Adaptation Contribution

4.1 Rationale and Process for Developing INDCs on Adaptation

Climate change is already impacting on Lesotho hence robust integrated policies and strategies are required to improve the adaptive capacity of Kingdom. Lesotho has a high exposure to climate variability and extremes which are expected to increase in frequency and intensity in the future. A sectoral vulnerability assessment to climate change was carried out on key sectors: agriculture, water resources, forestry, rangelands, and health. Subsequently a National Adaptation Programme of Action (NAPA) was developed in 2007 outlining future adaptation needs to address projected climatic changes.

4.2 Summary of Climate Change Trends

The trend analysis of temperature over most areas in Lesotho (Fig. 1) show increases in both annual maximum and minimum temperatures between 1968 and 2006 with minimum temperatures warming more than the maximum temperatures with the most rapid warming in the early 1980s.

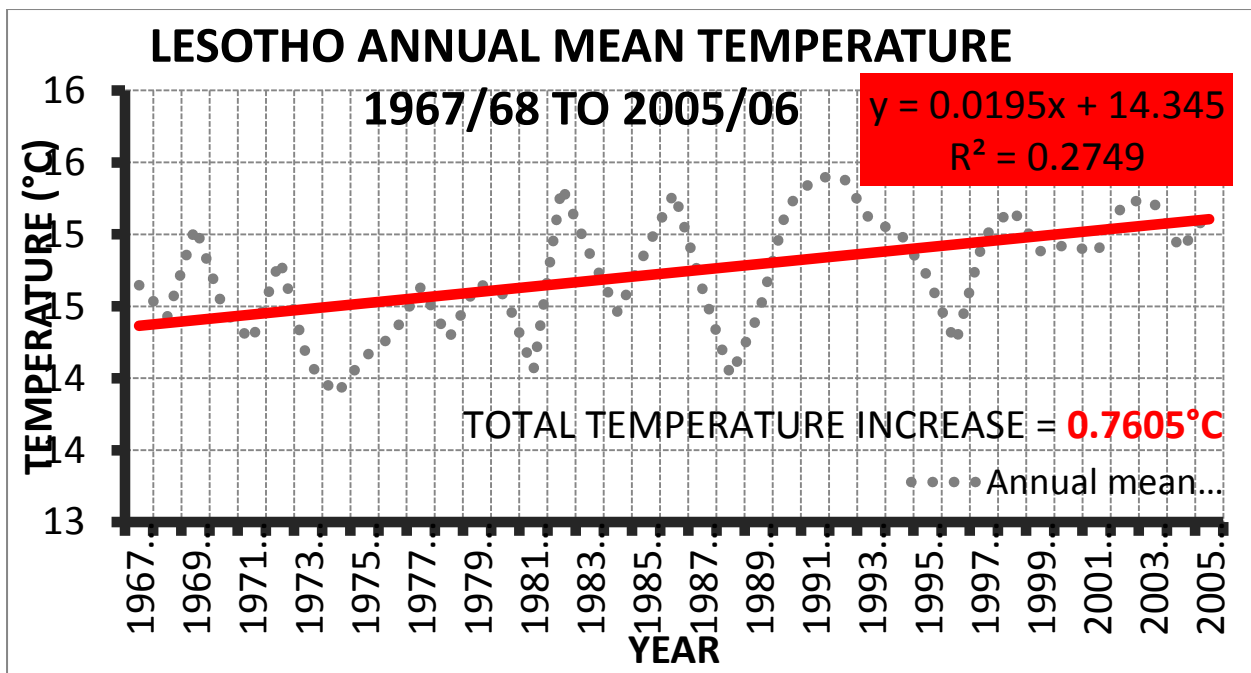


Fig.1. Mean annual temperature in Lesotho: 1967 – 2004.

In the 1997/98, GCM simulations of future (2030, 2050 and 2075 relative to 1961-1990) climate change scenarios were generated using an ensemble of six GCMs. More recent climate change simulations show temperatures increasing by about 1 °C by 2030, 1.5-2.0 °C by 2050, and by about 2.5-3.5 °C by the 2080s while winter rainfall shows strong decreases, with no change in summer and autumn rainfall, and gradually increasing spring rainfall (Dejene et al., 2011)². In summary the following climate change projections appear likely for Lesotho: an increase in annual mean temperature of approximately 1.0 °C (2030), 2.0 °C (2050) and 3.5 °C (2080) is likely; a moderate drying in late autumn/winter is expected and moderate increases in spring/summer rainfall, with stronger spring/summer wetting towards the end of the century.

4.3 Reporting on Long - and Near- Term Adaptation Visions, Goals and Targets

Climate change could well undermine national efforts to attain all goals encapsulated in the National Vision 2020 statement and erode achievements that have already been attained over the last few decades, and undermine poverty reduction efforts. Lesotho does not have an officially expressed medium to long term national adaptation plan to climate change. However, our aspirations are expressed explicitly or implicitly in all policy documents, and NSDP. The apparent national adaptation goal (s) towards 2030 embraces all tenets of the MDGs which seek to reduce and /or facilitate national resiliency against climate change shocks especially production decline leading to food insecurity; gender vulnerabilities to climate-change-related impacts especially natural resources e.g. declining quantity and quality of drinking water; environmental degradation; erosion of basic support systems for majority of livelihoods. These are implicit aspects of a long term national adaptation vision to be refined in the national adaptation plan in the pipeline.

The government of Lesotho has over the last 20 years invested heavily in tree planting and small woodlot reserves. Pursuant to this policy, the Forestry Act of 1998 was promulgated and a new National Forest Policy was launched in 2008 to pursue sustainable forest management; poverty reduction strategy through

² Dejene A., S. Midgley, M.V. Marake and S. Ramasamy. 2011. Strengthening Capacity for Climate Change Adaptation in Agriculture: Experience and Lessons from Lesotho. Food and Agriculture Organization of the United Nations. Blue Book Series.

social and economic dimensions of forestry development and enhancing people's participation in the on-going Land Rehabilitation Program of the Government of Lesotho.

4.4 Reporting on Current and Planned Adaptation Undertakings and Support

In the absence of an official national adaptation plan, the NAPA options remain the best indication of the nation intentions for adaptation (Table 1).

Priority Program areas	Estimated Cost
Improve Resilience of Livestock Production Systems Under Extreme Climatic Conditions in Various Livelihood Zones in Lesotho	3,980,000
Promoting Sustainable Crop Based Livelihood Systems in Foothills, Lowlands and Senqu River Valley	5,235,000
Capacity Building and Policy Reform to Integrate Climate Change in Sectoral Development	2,260,000
Improvement of Early Warning System Against Climate Induced Disasters and Hazards	1,920,000
Securing Village Water Supply for Communities in the Southern Lowlands	2,170,000
Management and Reclamation of Degraded and Eroded Land in the Flood Prone Areas	1,966,000
Conservation and Rehabilitation of Degraded Wetlands in the Mountain Areas of Lesotho	1,690,000
Improvement of Community Food Security Through the Promotion of Food Processing and Preservation Technologies	1,620,000

Since 2007, a number of efforts were undertaken by various roles players in the climate change adaptation field in Lesotho with support from government of Lesotho, development partners and NGOs /community based organizations currently at different implementations stages. These can be grouped into a few categories.

4.4.1 Crop Production and Cropping Systems

Project name	Implementation State	
	Complete / On-going	Planned
Developing capacity for climate change adaptation capacity in the agricultural sector	2009 – 2011	
Conservation agriculture: advocacy, extension / training, research integration into formal curricula	2005 to date	
Sorghum breeding for high yield and drought tolerance	1996 to date	
High efficiency irrigation systems: Gravity & Drip	1995 to date	
Lesotho Block Farming Initiatives	2005 to date	
Smallholder Agriculture Development Project – Cropping Systems	2011-2017	
Develop National Adaptation Plans		2015-2020
Develop Climate Change Policy and Strategy		
Integrate Climate Change into sectoral policy and strategies		
Develop mechanisms to improve access to climate change adaptation technologies		

4.4.2 Livestock production and Livestock Systems

Project name	Implementation State	
	Complete / On-going	Planned
Lesotho wool & mohair improvement project		2015 - 2022
Smallholder Agriculture Development Project – Livestock	2011-2017	

4.4.3 Forest and Land Rehabilitation Program

Land Rehabilitation Program		
Mechanism to Implement the Forestry Initiative for Landscape and Livelihood Improvement Program	2015-2016	
Forestry Initiative for Landscape and Livelihoods Improvement (FILLI) Program		✓

4.4.4 Wetlands and Watershed Management

Wetlands restoration and rehabilitation project	2010 -2014	
Lesotho Water Development Program	Lesotho Highland Water Development Project II	Planned
	Lesotho Lowlands Water Scheme I	2001 - 2003
	Lesotho Lowlands Water Scheme II	✓

4.4.5 Climate Change Adaptation Projects

Africa Adaptation Project	2009-2012	
Improvement of Early Warning System to Reduce Impacts of Climate Change and Capacity Building to Integrate Climate Change into Development Plans – Vulnerability Mapping	2013-2015	
Improvement of Early Warning System to Reduce Impacts of Climate Change – Phase II		2016 - 2020
Improvement of Capabilities to Cope with Natural Disasters caused by Climate Change	2011 - 2014	
Eco-system based climate change adaptation in southern Lesotho	2015-2021	
Increasing Capacity for Climate Change Adaptation in the Agriculture Sector – I	2008-2011	
Increasing Capacity for Climate Change Adaptation in the Agriculture Sector – II	2015-2019	
Climate Change Policy Project		2016-2017
Lesotho Climate Change Adaptation of Small-Scale Agricultural Production		✓
Develop National Adaptation Plans		2015-2020
Develop Climate Change Policy and Strategy		
Integrate Climate Change into sectoral policy and strategies		
Develop mechanisms to improve access to climate change adaptation technologies		

Most of the climate change adaptation activities are implemented through capital projects with a larger portion of the budget sourced from development partners but the distribution shows that government of Lesotho pays its equitable share of adaptation costs (Table 2). The government co-financing of donor funded projects is mainly through in-kind contribution.

Table 2. Climate Change Adaptation projects implemented in Lesotho since 2012/13 – 2016/17

Name of Project	Government Contribution (\$US x 10 ⁶)	Development Partner Contribution (\$US '000)	Development Partner (s)
Agriculture and Food security	28.76	N/A	
Watershed Management	68 800	N/A	
Framework for strengthening capacity for climate change adaptation in Agriculture	3 600	N/A	

Climate change investment program (MDP)		N/A	
Public sector investment program (MDP)		N/A	
Forestry Poverty Alleviation Programme	49	N/A	
Source: PSIP 2012-2017			
Projects with External Support			
Name of Project	Government Contribution (\$US x 10 ³)	Development Partner Contribution (\$US x 10 ³)	Development Partner (s)
Development of climate change policy and strategy	N/A	848	EU
Improvement of Early Warning System to Reduce Impacts of climate change and hazards	318	1,735	GEF
Small Holder Agricultural Development	973	7,773	GEF
Reducing Vulnerability from climate change in the Foothills, Lowlands and the Lower Senqu River Basin	26,000	8,400	GEF
Improvement of Early Warning System to Reduce Impacts of Climate Change and Capacity Building to Integrate Climate Change into Development Plans	1,600	1,800	GEF
Strengthening Capacity for climate change adaptation through support to integrated watershed management programme in Lesotho	7,800	3,600	GEF
Adaptation of Small-scale Agriculture Production	13,000	4,300	GEF
Wool and Mohair Promotion Project	7,000	29,000	IFAD,OPEC, ASAP
Smallholder Agricultural Development	999.7	6557	IFAD
<i>Source: Ministry of Energy and Meteorology, August 2015</i>			

In addition, a number of adaptation projects are undertaken at household and community levels by NGOs and CBOs (Table 3).

Table 3. Number of GEF-SGP in Lesotho accessed by non-governmental organizations (NGO), community based organizations (CBO) and the private sector for climate change adaptation.				
Grantee Types	Number of GEF-SGP Projects	Grant Amount	Co-financing (Cash)	Co-financing(in- Kind)
		Funding Amounts (in '000 USD)		
NGO	29	965	216 865	959
CBO	18	560	157	467
Other	1	50	0	126
<i>Source: Ministry of Energy and Meteorology, August 2015</i>				

4.5 Gaps and Barriers

To achieve national resiliency to climate change, the NSDP has outlined the following strategies: i) Integrating of climate change into sectoral plans and programmes; ii) Climate proofing investments by upgrading standards for infrastructure development; iii) Improving access to climate change adaptation

technology and use; iv) Improving environmental and climate change governance through undertaking vulnerability assessments and utilising them for medium to long-term forecasting, policy and planning. Despite these noble aspirations, the country currently does not have a long term national adaptation plan. Thus there is an urgent need for financial support to complement the on-going processes of policy development by taking the process further to the development of an adaptation plan and research.

Specific barriers to adaptation in Lesotho are:

- Technological: Lack of tools and techniques may hinder adaptation to climate change. National research capacity to build basic dataset and technical analysis /publication is a critical component of the technology /capacity barriers in Lesotho;
- Economic and financial: The urgency of adaptation is felt by rural low income subsistence farming households and communities. In Lesotho, this is expressed by lack of financial capital to finance adaptation technologies such as improved crop varieties and diversification of livelihoods.
- Institutional: In Lesotho, commons institutions restrict the choice of livelihood strategies by favouring some groups over others such as those who own livestock and those who do not.

4.6 Summary of Needs

For Lesotho to adaptation there is urgent need for provision of finance, capacity building and technology. These also underscore the need for research support in climate change adaptation. Sectorally, there is an inadequate adaptation capabilities in the sectors such as Energy, Agriculture, Land Use, Land Use Changes and Forestry, Health, Water and in the aspects of data collection, processing and provision by the sectors. Consequently, there is need to:

- build capacity of experts and stakeholders in the preparation, data collection to enhance information management, ownership, information exchange, dissemination and information sharing within and across sectors;
- create systemic enabling working environment for the implementation of climate change activities in relation to institutional arrangements, performance management and reporting to ascertain roles and responsibilities, political will, ownership and empowerment, decision making and service delivery;
- Develop a database for reporting raw data which will take into consideration IPCC requirements by carrying out new studies to upgrade the datasets and then make use of remotely sensed data and training on GIS.
- Obtain data from satellite/remote sensing e.g. land cover data and then design consistent reporting formats of the reports.
- coordinate data pools to establish data archiving and sharing protocols;
- Support research in climate change.

4.7 Monitoring and Evaluation

Lesotho's climate change adaptation process will be monitored using the following indicators: Change in the level of vulnerability; Number of people benefiting from adaptation activities; Degree of integration of climate change adaptation into sectoral policies and plans; Resources spent on adaptation to reveal the climate relevant share of the total public expenditure over time. However, proper implementation of the monitoring and evaluation commitment is conditional on enabling finance.

4.8 Gender Imperatives of Climate Change Adaptation³

Women have a unique relationship with natural resources which render them more vulnerable to climate change. They are responsible for food security of families through food collection, crop production, meal preparation, and often through cultivation techniques. One of Lesotho's unique features is women's dominance in piggery and poultry farming, and this role creates an added vulnerability to climate change, due to their economic dependence on these industries. With responsibilities within the household, such as child-rearing, domestic management and meal preparation, women often work longer hours and any added challenges such as those imposed by climate change, will increase their vulnerability and workload. Therefore, climate change adaptation interventions need to include measures to reduce women's workload.

In Lesotho the formative years of the boy child are occupied by herding of livestock to the detriment of their education. Climate change will particularly affect them negatively as good grazing land is gradually pushed further away from the village by its compounding negative effects on natural resources. In addition, extreme weather events like heavy snow will increase their risk of life in the remote cattle posts more than any other group in society.

5 Mitigation Contribution

5.1 Timeframe

The timeframe for mitigation contribution goal is 2030.

5.2 Type of Contribution by Sector

Lesotho's GHG emissions are minimal due to its predominant dependence on hydropower with a grid emission factor is 0.0038 tCO₂/GWh. The proportional contribution of three key sectors is agriculture (63%), energy (31%) and waste management (6%). This reflect a picture of Lesotho's socio-economic circumstances: an economy dependent on natural resources, a low but growing energy sector and industrial sector that is still in its infancy.

5.2.1 The Energy Sector

Emissions from energy sector make a total of 1,079.43 Gg CO₂eq mostly from residential fuel combustion (51%) followed by combustion of liquid fossil fuels in the transport subsector (29%). Residential emissions emanate from the use of biomass, coal, Liquid Petroleum Gas (LPG) and paraffin. CO₂ is the major contributor, making about 75% of total sectoral emissions. Energy sector emissions showed a consistently increasing trend reaching 30% between 1994 and 2000.

5.2.2 The Agriculture Sector

Emissions from the agriculture sector make a total of 2,230.43Gg CO₂e (Fig. 3). Nitrous Oxide (N₂O) emissions are the largest GHG (61.6%) of the total emissions. Other emissions are Methane (CH₄) from enteric fermentation of domestic livestock and manure management from domestic livestock (37%). Crop production is expected to increase between 2014 (114, 804 Mg) and 2030 (250,000 Mg) primarily due increased intensive crop production systems and increased use of inorganic fertilizers. In 2012, Lesotho

³ Excerpts from Talafre J., M.V. Marake, ***** and S. Tomlow. 2013. Lesotho Adaptation of Small Scale Agricultural Production. IFAD-Ministry of Agriculture and Food Security. Project Design Report. Maseru. Lesotho.

imported more than 9,000 Mg of nitrogen-based chemical fertilizers, and used an estimated 9,807 Mg of organic fertilizers (96% Kraal manure).

5.2.3 The Waste Sector

The waste sector in Lesotho is divided into two distinct sectors; the solid waste management (CH₄ emissions) and waste water handling (CH₄ and N₂O emissions). The sector was assessed for emissions from domestic, commercial and industrial waste. The total emissions from this sector are 199.63 Gg CO₂eq over 80% of the CO₂eq emissions is methane. The bulk of these emissions are from industrial waste water handling. Overall, GHG emissions in this sector have doubled since 1994. The sector emissions are driven by the increasing per capita solid waste generation among population especially in the urban areas. Deposal of solid waste to land with relatively deeper and sanitary landfill sites is becoming common practice in urban waste management.

5.3 Mitigation Policy /Programs and Targets

5.3.1 Energy Sector Mitigation Potentials

The major assumption under the mitigation scenario in the energy sector is the implementation of Lesotho Energy Policy 2015 and Draft Lesotho Renewable Energy Policy 2013 which seek to increase energy efficiency significantly and shift the energy supply to more climate friendly technologies. The energy sector will require additional investment of about USD 15 million in 2020 and USD 20 million in 2030. These investments will be needed in energy-efficient equipment, grid extension; rural electrification projects (off-grids and mini-grids) that are ultimately expected to reduce emissions significantly. However, Lesotho cannot afford these levels of investment without financial support.

Energy Sector Mitigation Policy /Program and Targets	
Mitigation Policy /Programs	Targets & Assumptions
<ul style="list-style-type: none"> ➤ Continued development of hydropower resources, particularly in terms of advancing technical design and sourcing funding for development of identified sites 	<ul style="list-style-type: none"> ➤ Improving energy efficiency by 20% by 2020, ➤ Increasing electricity coverage /access to 35% of households in 2015, 50% in 2020 and 80% by 2030; ➤ With increase in rural electrification, paraffin consumption is expected to come down from 30, 434 kilolitres (2014) to 25,000 kilolitres in 2020, with a GHG saving of 12 Gg CO₂e and 20,000 kilolitres in 2030 with a GHG saving 24 Gg CO₂e in the BAU. ➤ Potential reduction of transmission and distribution losses from 2015 until 2030 by 0.5% per annum (total of 7.5.0%) ➤ Increase renewable energy sources by 200 MW by 2020: 40MW from Solar (2017/2018); 35 MW from wind (2017); 125 MW from hydropower (2025).
<ul style="list-style-type: none"> ➤ Design and implementation of demand-side management techniques to encourage better use of existing distribution infrastructure, and Reduce peak demand. 	
<ul style="list-style-type: none"> ➤ Promotion of renewable energy 	
<ul style="list-style-type: none"> ➤ Improving distribution efficiency of the power system through measures to reduce transmission and distribution losses 	
<ul style="list-style-type: none"> ➤ Continuing to develop and promote uptake of renewable sources of energy, particularly wind and solar (where feasible). 	
<ul style="list-style-type: none"> ➤ Develop low energy investment plan 	

Furthermore energy efficiency has large mitigation potential in the residential sector. Households commonly use incandescent electric bulbs for lighting. Replacement of these bulbs with Compact Fluorescent Lamps (CFLs) can save as much as 80% of electricity used for lighting. If 40,000 households are using electricity for lighting, and each installs two (2) CFLs replacing incandescent bulbs, the reduction potential in a CFL programme would be about 3,700 tCO₂e per year based on an average saving of 50 kWh per bulb per year (*using the SAPP grid emission factor of 0.92*). However, all this efforts are conditional to financial support.

Buildings (Residential, Commercial and Institutional) Sector Mitigation Options & Targets	
Mitigation Policy /Program	Targets & Assumptions

➤ Promoting energy efficiency in buildings through targeted awareness-raising programs that seek to reduce demand in industrial, business, government and residential buildings	➤ To disseminate efficient stoves to reach a penetration rate of 30% in 2030;
➤ Phasing out of incandescent light bulbs	➤ To reduce progressively the use of wood for heating in order to reach 10% by 2030;
➤ Installation of motion-sensor lights	➤ Replacement of fuel-wood with LPG at the rate of 10% a year from 2020 to 2030
➤ Introduction of more energy-efficient stoves within households	➤ Potential reduction of electricity demand in industrial sector from the year 2020 until 2030 by 0.8% per annum (<i>total of 8.0%</i>);
➤ Implementing incentives for retro-fitting of existing buildings with more energy-efficient appliances	➤ Potential reduction of final energy demand (electricity + petroleum products) in industrial sector by 1.0% per annum from 2020 until 2030 (<i>total of 10.0%</i>)
➤ Designing and implementing guidelines and/or standards and regulations for design of new buildings	➤ Potential reduction of electricity demand in commercial sector from the year 2020 until 2030 by 0.8 % per annum (<i>total of 8.0%</i>)
➤ Use of passive design and low carbon materials in building construction	

We also have significant albeit conditional emission reduction potential in the road transport sector. Road transport emissions increased by approximately 2.5% per year between 2000 and 2009. Consumption of petrol and diesel by road transport produced a total of 0.28 MtCO₂eq in 2009. The main contributors were freight transport at 0.18 MtCO₂eq (64%) and passengers transport at 0.10MtCO₂eq (36%). In 2000 road transport contributed 29% to total energy emissions and 8.99% of the total GHG emissions. In 2014, Lesotho imported 225.3 million litres of refined oil products (diesel, petrol and paraffin). Emissions from combustion of 225 million litres of diesel (or petrol) are about 90,000 tCO₂e/year.

The most promising transport mitigation options are vehicle efficiency, modal shift from private to public transportation, investments in fuel-efficient vehicles. These measures will need to be driven by policies and must be enforced. In this scenario, the subsector will require additional investment to the tune of USD 1.5 million in 2020 and USD 2.0 million in 2030. Limited transport planning and management has resulted in inadequate investment in infrastructure for non-motorized transport and pedestrian traffic.

5.3.2 Waste Management Sector Mitigation Potentials

The national dependence on agricultural wastes for energy is cause for concern significant health and GHG emissions. There are approximately 310,000 households in Lesotho dependent on small-scale farming. If 20% of these rural households (*approximately 60,000 households*) had the sufficient number of livestock (*3-5 cattle*) for installing a domestic biogas digester to generate gas for cooking, the traditional use of firewood could be reduced (*the dung from two cows typically suffices to meet the cooking requirements of a household*, Bajgain & Shakya (2005)). By using the suppressed demand method for this potential emissions reduction calculation, and assuming a daily use of 0.5 litres of paraffin for cooking, the potential reduction would be 60,000 households * 0.5 litres* 2.6 kgCO₂/litre* 365 days/1000 = 29,200 tCO₂/year. Construction of a 6 m³ bio-digester cost USD 1.800. Construction of 60,000 bio-digesters will cost USD 108 million.

Waste Sector Mitigation Options and Targets	
Mitigation Policy/ Program	Targets & Assumptions
Developing targeted programs to raise awareness of importance of, and opportunities for, reducing waste at source and recycling	➤ Introducing targets for waste reduction (e.g. % of waste sent to landfill) and recycling
Promoting commercial and household waste recycling through: Development of infrastructure (e.g. collection systems, depots, and processing plants, etc.) to support recycling activities Design of incentives to promote recycling activities	
Construction of proper landfill sites in all 10 districts of Lesotho with methane recovery facilities	

<ul style="list-style-type: none"> ➤ Development of a national Waste Management Programme including e-Waste ➤ Development of a well-integrated country Waste Management Plan 	
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5.3.3 Forestry Sector Mitigation Potentials

Tree planting in degraded forest lands present a significant potential for climate change mitigation in Lesotho. According to the latest mapping inventory from 2012, the forested area of Lesotho is estimated to be 49,485 ha, which translates to approximately 1.6% of the country's area. Lesotho's forests contain 2 million metric tons of carbon in living forest biomass. One of the key objectives of the National Forestry Policy (2008) is to increase tree cover from around 1% to at least 5% (152,000 ha) by the year 2020. However, deforestation rate of 0.50% per year lead to loss of 200 ha between 1990 and 2010. If this trend is reversed, it could potentially produce nearly 38,902 tCO₂ of emission reductions for each area of 200 ha of tree cover. These calculations are based on an estimation of the amount of carbon stored in the country's forests per year to 5tC/ha, and a conversion factor of 1 ton of biomass carbon to an equivalent of 3.67tCO₂.

Given, that biomass consumption remains the main source of domestic energy, and energy in small-scale commercial sectors, it will take a radical substitution of household fuel supply. Such a fit would also require significant financial support to Lesotho towards to subsidize fuel-efficient cook stoves, and alternative fuels and techniques for cooking, which altogether might have a significant impact on GHG emissions. The cost of reforestation option would amount to USD 24 million between 2015 and 2030 for the 120,000 ha of land to be reforested with an initial establishment cost of USD 200/ha. Therefore, the mitigation scenarios advanced for the forestry sector are conditional on financial support.

5.4 Target Level

The main opportunities for mitigation consist of energy efficiency and demand management, coupled with increasing investment in a renewable energy programme in the electricity, Buildings (Residential, Commercial and Institutional) and Waste sectors. Lesotho is committed to reduce unconditionally 10% of its GHG emissions by 2030 compared to a Business-as-usual (BAU) scenario. The conditional target is 35% by 2030.

5.5 Means of Implementation

5.5.1 Domestically Financed Contributions

In the period 2015-2030, additional investments (relative to BAU scenario) needed for realization of the mitigation scenario are estimated at USD 1.2 billion, while for realization of the higher ambition mitigation scenario are estimated at USD1.8 billion.

Project Title	Estimated Cost (US\$)
Rehabilitation of 2 MW Mantšonyane Hydropower plant	1 million
Implementing energy efficiency measures, including the removal of institutional barriers to energy efficiency improvements;	10 million
Promotion of new and renewable energy technologies in mitigating climate change	351.46 million
Rehabilitation, modernization, re-equipment of Semonkong mini-hydro power plant and enhancing generation capacity up to 1 MW	2 million
Enhanced forest sinks: Planting of 120,000 ha of forests to meet the public demand for fuel wood used for heating and cooking	10 million
Capacity building in sustainable forest management	500,000
Rural electrification using stand-alone systems and mini-grids	10 million
Dissemination of efficient biomass cook-stoves and efficient biomass space heating stoves	2 million

5.5.2 Internationally Supported Contributions

Lesotho has already undertaken several actions to support a low carbon development trajectory including extensive investigation into its hydro and wind power potential, embarking on rural electrification and afforestation projects. However, Lesotho’s potential to contribute to global mitigation efforts will not be realized without greater support from the international community. This includes not only financial support, but also technology transfer and help with capacity-building initiatives. The table below summarizes the key mitigation initiatives that would greatly enhance Lesotho’s capacity in this regard.

Project Title	Estimated cost (US\$)
Expansion of Renewable Energy Capacity: Promote electricity generation from renewable energy sources to increase the share of renewables to 10–20 per cent by 2030;	351.46 million
Establishment of a specialized national institution responsible for measurement, reporting and verification (MRV), and the development of a national MRV system to: document greenhouse gas (GHG) emissions from agriculture	350 million
Development and construction of an estimated 1200 MW Pumped Storage Power Plant at either Kobong or Monontša under the auspices of LHDP Phase II.	1.8 billion
Development of Small Hydropower (SHP): A potential of up to 40 MW for SHP exists in perennial rivers (Hydropower generation master plan)	600 million
Capacity-building for the use of tools to enable accurate and full GHG accounting;	4050 million
Construction of wind farms on potentially productive territories: Letšeng-la-Terai approximately 35 kw, Quthing etc.	4 million
Enhancing power generation capacity of <i>Muela Hydropower Station</i> up to 125 MW	2 million
Construction of municipal solid waste incineration plants in urban areas	1 million
Landfill gas recovery and flaring clean development mechanism (CDM) Project	500,000
Determining local emission factors and minimum data sets for model verification in the Agriculture, Water Resources, Energy, Forestry and Other Land-Use, Industrial Processes and Waste Management Sectors	5 million
Development of appropriate agricultural technologies for mitigating and adapting to climate change in different agro-ecological zones of Lesotho:	1 million

Finally, international support is critical to enable Lesotho to implement the actions enshrined in its National Energy Policy, Second National Communication (SNC), National Strategic Development Plan and other sectoral policies and plans.

5.5.3 Non-governmental Organizations

Some NGOs are also investing in GHG mitigation projects. These include: i) Initiatives on carbon trading promoted by SMARDT; ii) Save80 Stove funded by Atmosfair and DHL in the private sector; iii) The Energy and Environment Partnership (EEP) funded project – Piloting Implementation of Prefabricated Biogas Plants in Rural Areas in Lesotho under Technologies for Economic Development (TED) Lesotho; iv) Energy Efficient ISILIE project by TED under GEF-SGP funded projects – The goal is to develop adaptation interventions to address the impacts of climate change and enhance the resilience of livelihoods and ecosystems in the highlands of Lesotho.

EEP promotes renewable energy (RE), energy efficiency (EE), and clean technology investments. Jointly funded with €207, 900.00 by the Governments of Finland, Austria and by the UK's Department for International Development (DFID), EEP projects aim to provide sustainable energy services to the poor and combat climate change, demonstrate high innovation in delivering energy services, facilitating technology transfer, and encouraging cooperation and local stakeholders’ participation.

Technology for Economic Development (TED) takes the institutional project lead with international, national and local contacts and skills, supported by the Department of Energy (Ministry of Energy, Meteorology and Water Affairs), and the Department of Environmental Health (Ministry of Health).

The University of Science and Technology Beijing (USTB), China, through the Centre of Sustainable Environmental Sanitation (CSES) contributes with a broad knowledge on biogas technology, prefabricated biogas systems, training and energetic and environmental impact analysis. USTB-CSES is further cooperating with the Biogas committee of the China Association of Rural Energy Industry (CAREI), which develop standards for the Chinese rural energy market and certifies products being sold in the market.

5.6 Sectors

The SNC shows that three major sectors account for the emissions burden of the country. These are Energy (including transportation), Agriculture and Waste sector. However, in the SNC, emissions from forestry and other land uses, as well as in industrial processes have not been analysed since they have a relatively insignificant share in total GHG emissions. However, in the future these will be monitored and analysed to establish the emerging trends with time.

5.7 Gases

Nitrous Oxide (N₂O) is the major contributor accounting for 41%, followed by methane with 36% of the total CO₂eq emissions. Carbon Dioxide accounts for the least emissions with 23% of the total emissions. Emissions of GHGs not listed are negligible but will still be monitored and reported. Fluorinated gases are not covered since they are rarely used and their emissions are marginal.

5.8 Accounting Methodologies

GHG inventories based on IPCC guidelines and methodologies will remain the foundation of emissions accounting in the context of the UNFCCC. They are currently reported and included in the national communications. In future they will be reported and included in the biannual update reports. Lesotho considers the establishment of an international market mechanism vital to reduce the total costs to achieve the target of limiting the temperature increase to 2°C. Thus the country remains open to the possibility of using of international market-based mechanisms in line with agreed accounting rules to achieve its conditional and/or unconditional targets. Reporting of GHG inventories and updates on mitigation actions and goals via national communications, as well as verification of this information via in-depth reviews, international assessment and review and international consultations Biennial updates to GHG inventory and reporting on mitigation actions will also be developed as part of the Climate Change Policy and Response Strategy.

Emissions from the Forestry sector will be tackled via (Reducing Emissions from Deforestation and Forest Degradation (REDD) initiatives. Lesotho intends to adopt the SADC REDD Strategy (2012 – 2015).

5.9 Institutional Arrangements for Implementation

The Lesotho Meteorological Services (LMS) under the Ministry of Energy and Meteorology the coordinating agency charged with the responsibility of monitoring and reporting on weather, climate and climate change issues. In addition, LMS is the focal point in the planning and co-ordination of activities for Lesotho's commitments under the UNFCCC. A National Climate Change Committee (NCCC) was formally established in 2013 to effectively coordinate climate change issues in the country. The committee serves as an advisory body to the LMS.

The INDC report was informed by a broad representation of experts and stakeholder institutions in a national launching workshop. Subsequently, the respective experts consulted broadly across governmental and non-governmental stakeholder institutions and expert informants. The draft mitigation and adaptation

reports were subjected to a one day validation workshop prior to consolidation by the Lead Expert. The final summary report to the UNFCCC was endorsed by national stakeholders in a validation workshop and reviewed by an appointed international institution. Subsequently the report was presented for endorsement by a relevant sub-committee of the National Assembly.

5.10 Equity and Fairness

Lesotho's INDC is an ambitious, fair and responsible contribution to global efforts toward meeting the objective of the UNFCCC with the goal of limiting global average temperature rise to below 2°C. Lesotho's proposed targets are ambitious, despite its status as a very vulnerable, small, landlocked least developed country with a fragile mountainous ecosystem and numerous pressing social and economic development needs and priorities. We submit that these nationally intended contributions are fair and equitable commensurate to the national circumstances especially its low GDP per capita (\approx US\$1,126) and the level of dependence on external support. Though Lesotho's GHG emissions represent only 0.005% of global emissions and net per capita emissions, inclusive of all sectors, are 1.1 tCO_{2e}, it is highly vulnerable to climate change, particularly in the agriculture, energy and water sectors and has already experienced extreme weather shifts. Nevertheless, Lesotho is a responsible party committed to tackling global climate change by transforming its development route to a low emissions pathway, which requires progressive decoupling of carbon emissions from economic growth.