



REPUBLIC OF RWANDA

INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDCs) OF RWANDA



November 2015

FOREWORD

The Government of Rwanda recognizes the importance of climate change and its effects on both Rwanda and the international community. At the 17th session of Conference of the Parties (COP17) to the United Nations Framework Convention on Climate Change (UNFCCC) in 2011, Parties agreed that a new Climate Change agreement will be finalized in 2015 and come into force in 2020. As annex of the new agreement, all Parties agreed at 19th session of Conference of the Parties (COP19) to formulate and communicate to the UNFCCC Secretariat measures they intend to undertake at national level to mitigate global warming in the form of an Intended Nationally Determined Contributions (INDCs). Indeed, at 20th session of Conference of the Parties (COP20), Parties decided that Parties in a position to do so have to submit their INDCs in advance of 21st session of Conference of the Parties (COP21), scheduled to take place in Paris, France December 2015 .

Rwanda as a signatory to the United Nations Framework Convention on Climate Change (UNFCCC), understands the importance of fulfilling the commitments and obligations of the convention particularly the principle of "common but differentiated responsibilities and respective capacities". As one of the Least Developed Countries, the contribution of Rwanda to the exacerbation of global warming is very minimal but we recognise the impact of climate change not only on the overall development of the country but also on the Rwandans. Therefore, in the bid of reducing vulnerability of our citizens and reducing Green House Gas (GHG) emissions from defferent sectors of our economy, Rwanda adopted the Green Growth and Climate Resilience Strategy (GGCRS) which has a vision for Rwanda to be a developed climate-resilient, low-carbon economy by 2050. Guided by the same strategy, Intended Nationally Determined Contributions (INDCs) for Rwanda are action based in nature and have been designed through a sector based consultative process. They reflect the national ambition by 2030 to join global efforts toward curbing global temperature rise below 2°C by 2100.

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Acronyms

BAU	Business As Usual
BRT	Bus Rapid Transit
CAVM	College of Animal Sciences and Veterinary Medicine
CDM	Clean Development Mechanism
CO₂ and CO₂e	Carbon dioxide and Carbon dioxide Equivalent
COP	Conference of the Parties
EAC	East African Community
EDCL	Energy Development Corporation Ltd
EDPRS-II	Second Economic Development and Poverty Reduction Strategy
FAO	United Nations Food and Agriculture Organization
FONERWA	National Environment and Climate Change Fund
GDP	Gross Domestic Product
GGCRS	Rwanda's Green Growth and Climate Resilience Strategy
GHGs	Greenhouse Gases
GIS	Geographic Information System
GoR	Government of Rwanda
HFO	Heavy Fuel Oil
ICT	Information Communication and Technology
INDCs	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
LDCs	Least Developed Countries
LEAP	Long-range Energy Alternatives Planning
LULUCF	Land Use, Land-Use Change and Forestry
MCF	Methane Correction Factor
MIDIMAR	Ministry of Disaster Management and Refugee Affairs
MINAGRI	Ministry of Agriculture and Animal Resources
MINECOFIN	Ministry of Finance and Economic Planning
MININFRA	Ministry of Infrastructure
MoH	Ministry of Health

Mt	Metric Tons
MW and MWh	Megawatt and Megawatt hour
N₂O	Nitrous Oxide
NAEB	National Agricultural Export Development Board
NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programmes of Actions
NGO	Non-Government Organization
NISR	National Institute of Statistics of Rwanda
PoA	Programme of Activities
PPP	Public Private Partnership
PTPS	Public Transport Policy and Strategy Document
PV	Photovoltaic (solar)
RCAA	Rwanda Civil Aviation Authority
REG	Rwanda Energy Group
REMA	Rwanda Environment Management Authority
RHA	Rwanda Housing Authority
RIMP	Rwanda Industrial Master Plan
RIP	Rwanda National Industrial Policy
RNRA	Rwanda Natural Resources Authority
RoR	Republic of Rwanda
RPZ	Rural Productivity Zone
RRA	Rwanda Revenue Authority
RREPC	Rwanda Resource Efficient and Cleaner Production Centre
RSB	Rwanda Standards Board
RTDA	Rwanda Transport Development Agency
RURA	Rwanda Utilities Regulatory Authority
RWF	Rwandan Franc
RHA	Rwanda Housing Authority
SE4ALL	Sustainable Energy for All
SEZ	Special Economic Zones
SMP	Sustainable Mobility Project
SNC	Second National Communication

SSATP	Sub-Saharan Africa Transport Policy
UNDP	United Nations Development Program
UNFCCC	United Nations Framework Convention on Climate Change
USD or US\$	US Dollars
USDOT	US Department of Transport
WASAC	Water & Sanitation Corporation
WtE	Waste to Energy

Introduction

Rwanda, known as the "land of a thousand hills" is a landlocked country of 26,338 square kilometres, geographically located in Central Africa between 1°04' and 2°51' of south latitude and between 28°45' and 31°15' of east longitude¹. Rwanda has seen significant economic development in recent years, with GDP growing at an average of over 8% per year over the last decade and targeted to reach 11.5 % under Vision 2020². It has a population of 10,537,222 people, which is growing at 2.8% per year³. A vision for 2050 based on the Green Growth and Climate Resilience Strategy envisages Rwanda as a developed climate-resilient, low carbon economy, with a strong services sector, low unemployment and low levels of poverty. By 2050, development will be achieved with low carbon domestic energy resources and practices, reducing Rwanda's contribution to climate change while allowing it to be independent of imported oil for power generation. Finally, Rwanda will have the robust local and regional knowledge to be able to respond and adapt to changes in the climate and the resulting impacts.

This document constitutes Rwanda's Intended Nationally Determined Contributions under the framework of the UNFCCC. This reiterates Rwanda's commitment to engaging in the international process in the development of a climate change agreement.

Rwanda has been committed to addressing the challenge of climate change since 1998 when it ratified the United Nations Framework Convention on Climate Change (UNFCCC) and later the Kyoto Protocol in 2003. Rwanda submitted its first National Communication to the UNFCCC in 2005, National Adaptation Programmes of Action (NAPA) in 2006, and the Second National Communication in 2012. Rwanda is currently working on the development of the Third National Communication.

Rwanda's INDCs is built upon its Green Growth and Climate Resilience Strategy. The full implementation of this strategy rests upon five enabling pillars: Institutional Arrangements; Finance; Capacity Building and Knowledge Management; Technology, Innovation and Infrastructure; and Integrated Planning and Data Management.

¹ Second National Communication report 2012

² Rwanda Vision2020 revised 2012

³ Fourth Population and Housing Census 2012

Chapter one: National Circumstances

1.0 Introduction

The Rwandan relief is hilly and mountainous between 1,400 and 3,000 m and geographically located in Central Africa between 1°04' and 2°51' of south latitude and between 28°45' and 31°15' of east longitude⁴. In Rwanda, the equatorial climate is deeply modified by the relief at varied altitudes ranging between 900 m in south-west, 1500 to 2000 m in the south and the centre of the country, 1800 to 3000 m in the highlands of the north and the west, and 3000 to 4507 m in the regions of Congo-Nile Crest and the chain of volcanoes⁵.

Natural rain forests constitute the highest proportion of the Rwandan forest cover (33%), followed by Eucalyptus plantations (26%) and degraded natural forests (15.7%)⁶. Most rain forests are protected whereas the degraded forests are regularly used for various domestic purposes. Forest lands that have not been degraded since 2000 are mainly located in Nyungwe, Birunga and Akagera National Park.

Rwanda is experiencing fast socioeconomic and demographic transformation since 2000. On average, GDP has been growing 8% annually since then, mainly driven by agriculture and services, that contribute to 33% and 47 % of the GDP respectively⁷. The agriculture-based growth has implications for the environment, due to overexploitation of the soil. Therefore, integrated management of this natural resource is necessary in order to achieve sustainable agricultural and economic development within the current framework of climate change.

At the policy and strategy level, protection of environment and sustainable natural resource management is one of the three cross-cutting areas in Vision 2020. In fact, Rwanda's Vision 2020 clearly defines the future of the country. Currently, the major areas of attention are the mainstreaming of environmental sustainability into productive and social sectors and reducing vulnerability to climate change. Considerable efforts are underway in the implementation of policies and strategies to support this: tree planting is being promoted and anti-erosion structures

⁴ Second National Communication report 2012

⁵ MINIRENA, 2006. National Adaptation Programmes of Action To Climate Change

⁶ REMA, 2009. Fourth National Report to the Convention on Biological Diversity

⁷ NISR, 2015. Integrated Household Living Conditions Survey, EICV4 (2013/14)

on steep slopes are being constructed and rehabilitated. There are also efforts in the conservation of biodiversity through strengthened protected area management⁸.

1.1 National sustainable development context

Sustainable development is a pattern of economic growth in which resource use aims to meet human needs while preserving the environment so that these needs of the present, and also the future generations can be met. The assessment of sustainable development is mostly done with reference to ‘three pillars’-Economic growth, human development and environmental protection. These can be examined at local, national, regional or global levels⁹. The sustainable development context of Rwanda is discussed in the following paragraphs.

1.1.1 Sustainable development goals and plans

The government of Rwanda has already taken proactive steps to a more sustainable future. Vision 2020, Poverty Reduction Strategy Paper (PRSP), Economic Development and Poverty Reduction Strategy (EDPRS) and sector strategies all provide guidance for sustainable economic development and poverty reduction. They promote gender equality, equity and sustainable management of natural resources. Rwanda has implemented the PRSP from 2002 to 2005 to manage the transitional period of rehabilitation and reconstruction after the period of war and genocide against the Tutsi¹⁰. Good progress was achieved with better results in social sectors (health and education) than in productive sectors such as agriculture, infrastructure and the private sector. Hence, the below optimal performance in these productive sectors did not translate into significant reductions of poverty and inequality.

In view of responding to constraints faced during the implementation of the PRSP, EDPRS was developed for the period 2008-2012, focusing on three flagship programmes: sustainable growth for jobs and exports, Vision 2020 Umurenge program to address the issue of extreme poverty and vulnerability, especially in rural areas as well as good governance which focused on maintaining peace and security. The EDPRS guides the development of sector strategic plans and districts development plans¹¹.

⁸ REMA (2009): Rwanda State of Environment and Outlook Report

⁹ Republic of Rwanda, 2012. National Preparatory Process Report for RIO +20

¹⁰ MINECOFIN, 2011. EDPRS: Lessons Learned 2008-2011. Kigali, Rwanda

¹¹ Republic of Rwanda, 2012. National Preparatory Process Report for RIO +20

Currently, Rwanda is implementing the second EDPRS 2013 – 2018 for which the main objective is to devise Rwanda’s medium-term strategy in order to put Rwanda on a higher growth trajectory and ensure that the country achieves middle-income status by 2020. To realise sustainable growth, Rwanda released its Green Growth and Climate Resilience Strategy in October 2011. The major goal of this strategy is to lead the country towards a sustainable and secure future, and prepare Rwanda to tackle the vulnerabilities and risks associated with climate change whilst balancing its needs for socio-economic growth.

1.1.2 Key development challenges

Land scarcity drives environmental degradation while environmental degradation exacerbates the effects of land scarcity. With a population density of 415 persons¹² per square kilometer, the highest density in Africa, Rwanda’s population is around 83 percent rural and highly dependent on subsistence agriculture.

The rugged topography of the country, often referred to as the ‘Land of a Thousand Hills’, greatly increases the threat of soil erosion. It is estimated that half the country’s farmland suffers moderate to severe erosion. Increasing intensity of agricultural land use and ongoing gradual agricultural transformation further increases the threat of soil degradation.

Cultivation has been pushed onto seasonally flooded bottomlands and steep, fragile slopes previously devoted to grazing and woodlots. Fallow periods are declining. Traditional land tenure systems exacerbate problems of fragmentation of agricultural land, further driving land degradation.

High demand for wood (and charcoal) for domestic fuel, industry and construction maintains pressure on the country’s limited forest resources, which are mostly plantations of exotic tree species and a diminishing area of natural forest reserve. Virtually all rural Rwandans use biomass fuels, mostly firewood as the principal energy source.

1.2 National climate change context

The observed climate change in Rwanda is linked to the general circulation of winds and the variation of temperatures in the region of Central Africa where Rwanda is located. According to

¹² NISR, 2012. Population size, structure and distribution in Rwanda -fourth census.

Rwanda's second national communication to the UNFCCC¹³ and the GGCRS, Rwanda has experienced climate change for the past 30 years in terms of frequency, intensity and persistence of extreme changes such as heavy rain-falls, heat waves, drought and climate events such as El Nino and La Nina. Rwanda is currently highly vulnerable to climate change as it is strongly reliant on rain-fed agriculture both for rural livelihoods and exports of tea and coffee. Currently, Rwanda depends on hydropower for half of its electricity generation. In that case, reliance on Rwanda's energy to drive economic growth is highly threatened by climate change.

1.2.1 Climate change strategies, plans and objectives

Rwanda has put in place environmental policies and strategies to limit the losses linked to climate variability and to increase climate change adaptive capacity. This is in line with the overall strengthening of public sector management systems including compliance with international best practices. Some of the existing adaptation - mitigation policies and strategies in Rwanda are summarized in table 1.

¹³ Rwanda Second National Communication under the UNFCCC, MINIRENA

Table 1: Existing policies and programmes for mitigation and adaptation to climate change

SN	Policy/Strategy	Plan/goals
1	East African Community Climate Change Policy (2010)	To guide Partner States and other stakeholders on the preparation and implementation of collective measures to address Climate Change in the region while assuring sustainable social and economic development. The policy prescribes statements to guide Adaptation and mitigation actions to address Climate Change ¹⁴ .
2	East African Community Climate Change Master Plan 2011 – 2031.	To ensure that: “The People, the Economies and the Ecosystems of the EAC Partner States are climate resilient and adapt accordingly to Climate Change.” The key sectors identified and prioritised by the EAC Partner States, as being vulnerable to climate change are: (1) Agriculture (crops, livestock and fisheries) and (Food Security); (2) Water Security; (3) Energy Security; (4) Ecosystems Services and Biodiversity; (5) Tourism; (6) Infrastructure (buildings, roads, railways, waterways and airways); (7) Human Health, Sanitation and Settlements; (8) Trade and Industry; (9) Education, Science and Technology ¹⁵ ;
3	National Adaptation Programmes of Action to Climate Change, NAPA – Rwanda (2006)	This document guides political decision makers and national planners on priorities in vulnerable economic sectors as well as strategies and priority actions of adaptation to climate change, and areclassified into six priorities:

¹⁴ EAC Secretariat, 2010. East African Community Climate Change Policy, Arusha.

¹⁵ EAC Secretariat, 2011. East African Community Climate Change Master Plan 2011 – 2031. Arusha

		<p>1)An Integrated Water Resource Management – IWRM;</p> <p>2) Setting up an early warning hydro-agro meteorological information system and rapid intervention mechanisms;</p> <p>3)Promotion of non-agricultural income generating activities;</p> <p>4) Promotion of intensive agro-pastoral activities;</p> <p>5) Introduction of climate-resilient species;</p> <p>6) Development of firewood alternative sources of energy.</p>
4	Rwanda Sectoral Analysis - Nationally Appropriate Mitigation Actions (NAMAs) (2015)	The report analysis focuses on identifying ‘business-as-usual’ (BAU) baseline emission scenarios for the sectors and the potential emissions scenarios under GHG mitigation alternatives which would be applicable for NAMA designs, and could attract international support to implement selected NAMAs
5	Rwanda National Policy on Environment (2003)	The major goal is the improvement of human well-being, the judicious utilization of natural resources and the protection and rational management of ecosystems for sustainable and fair development of Rwanda.
6	National Green Growth and Climate Resilience Strategy (2011)	This strategy builds upon work that is already being done in Rwanda on climate change, focusing the various projects and policies into a holistic national document which encompasses long-term direction and short-term actions. Hence, the focus has been on adaptation as Rwanda is highly vulnerable to climate change due to its dependence on rain-fed agriculture.

<p>7</p>	<p>Other key Environment and Natural Resources Sector Policies includes:</p> <ol style="list-style-type: none"> 1) Urbanisation and Human Settlements Policy (2002) 2) The National Land Policy (2004) 3) The National Forestry Policy (2010) 4) National Policy for Water Supply and Sanitation (2010) 5) The Mining Policy (2010) 6) National Policy for Water Resources Management (2011) 7) The National Biodiversity Policy (2011) 8) Etc. 	<p>The adoption or revision of several national policy and related strategies is the result of national Vision 2020 and other regional and international agreements related to sustainable development.</p>
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1.2.2 National level institutional arrangements to address climate change

At the national level, the Ministry of Natural Resources (MINIRENA) is the Ministry responsible for designing and monitoring national policies related to climate change and environment, while Rwanda Environment Management Authority (REMA) is the official organ in charge of implementing national policies related to climate change and environment. In addition, the Department of Climate Change was established under REMA.

Successful implementation of the actions highlighted in this INDCs requires a close coordination and collaboration between MINIRENA, REMA and all potential stakeholders from private sector, civil society and public institutions including Ministry of Agriculture and Animal resources, Ministry of Trade and Industry, Ministry of Local Government, Ministry of Infrastructure, Ministry of Education, Ministry of Health, the Ministry of Finance and Economic Planning, Ministry of Disaster Management and Refugee Affairs, Rwanda Meteorology Agency, National Institute of Statistics, Rwanda Development Board, Rwanda Standards Board, Rwanda Agriculture Board; Rwanda

Energy Group; Water and Sanitation Corporation; Rwanda Natural Resources Authority, Rwanda Biomedical Centre, Rwanda Transport Development Agency; Rwanda Housing Authority; Rwanda Revenue Authority; National Industrial Research and Development Agency, research centres, and Universities, etc.

In order to coordinate and monitor the implementation of adaptation and mitigation actions in the different sectors, Rwanda has set up different bodies and institutional arrangements to operationalise these actions. Specifically, these are Green Economy Technical Coordinating Committee and the National Fund for Climate change and Environment (FONERWA), as a national green fund to mobilize additional internal and external climate funds. In addition, MINIRENA has been accredited as implementing entity for Adaptation Fund and Green Climate Fund (GCF) while REMA has been nominated as national designated authority for GCF. These institutions are based on a sector wide approach and work closely with development partners, civil society, academia and the private sector.

Chapter Two: Adaptation

2.1 Rationale and process for developing INDCs on adaptation

Rwanda is highly vulnerable to climate change, as it is strongly reliant on rain-fed agriculture both for rural livelihoods and exports of tea and coffee. According to the fourth population census, Rwandan population is projected to increase from 10.5 million in 2012 to 16.9 million (high scenario) to 16.3 million (medium scenario) or 15.4 million (low scenario) by 2032. This suggests that by 2030s the future size of Rwandan population would be approximately 50% more than the last 2012 census¹⁶. A direct consequence of this evolution is the unprecedented increase in population density: as high as 645 inhabitants per square kilometre according to the medium scenario putting more pressure on natural resources. As a result, adaptation concerns are central to Rwanda's INDCs.

Equally important, extreme weather events in Rwanda have increased in frequency and magnitude which, in some parts of the country, have led to significant losses of human lives, among other things. The National Adaptation Programmes of Action “NAPA” and the baseline report for climate change vulnerability index¹⁷ indicated that the Eastern and Southern Provinces of Rwanda are more vulnerable to drought risks while the Northern and Western Provinces are more vulnerable to intensive precipitation, floods and erosion. Generally, the expected adverse impacts of climate change in Rwanda include: high degradation of arable land (due to erosion), desertification trend, lower lake levels and degradation of forests¹⁸.

Rwanda is believed to have sufficient water resources, characterized by a good hydrological network (with the sources of the Nile originating in Rwanda’s highlands), and 101 lakes and 860 wetlands covering 16% of the surface area of Rwanda¹⁹. Nevertheless, a lowering of water tables as well as impacts of reduced water flows has been observed especially, but not only, in eastern Rwanda. These impacts are at least partially attributed to climate change stresses (other drivers are related to non-climatic causes such as sub-optimal water resource and watershed management), which limit water availability.

¹⁶ NISR, 2012. Population Projections-the Republic of Rwanda Fourth Population and Housing Census, Rwanda.

¹⁷ Rwanda baseline climate change vulnerability index 2015

¹⁸ GoR, 2006. National Adaptation Plan of Action to Climate Change, MINIRENA.

¹⁹ REMA (2011) - Atlas of Rwanda’s Changing Environment: Implications for Climate Change Resilience”

It is also important to highlight, the need for investments in soil and water conservation given the very small land holdings. Rwanda's topography, soil and nutrient erosion is a constraint to agricultural growth and a pressing environmental problem that also affect downstream countries. Climate change is likely to add to existing pressures including erosion through more intense rains. With this in mind, the economic diversification, improved soil and water management and increased use renewable energy sources are important for sustainable use of the country's natural resources and resilient communities²⁰.

2.2 Summary of climate change trends, impacts and vulnerabilities

Rwanda has experienced a temperature increase of 1.4°C since 1970 to date²¹, higher than the global average, and can expect an increase in temperature of up to 2.5°C by the 2050s from 1970. Rainfall is highly variable in Rwanda but average annual rainfall may increase by up to 5-10% by the 2030s from 1970²². Consequently, climate related incidences leads to torrential rainfall events, floods, draughts, storms and landslides.

Negative impacts of climate change will be exacerbated on the (i) irrigation potential for agricultural production, (ii) availability of good drinking water, and (iii) feasibility of hydro electrical schemes in place/planned in Rwanda. For example, lower water flows or frequent extreme flash floods often carrying high sedimentation loads, could lead to increasing high levels of siltation, and be worsened by severe erosion problem. These may adversely impact on micro-hydropower schemes, which will have to deal with more erratic water supplies, as well as higher maintenance costs, which need to be factored into designs²³.

The baseline climate change vulnerability index for Rwanda shows that The Southern Province has the highest sensitivity to climate change due to lower family income levels, less diversity in household incomes, higher levels of dependency within the household, less use of water catchment, less irrigation of fields dependent on rain fed agriculture, lower soil fertility and greater changes in the natural environment. In addition, the Southern Province appears to have the greatest potential vulnerability considering both exposure and sensitivity in Rwanda, followed

²⁰ Sida Helpdesk, 2013. Environment and climate change policy brief- Rwanda.

²¹ Republic of Rwanda, 2011. Green growth and climate resilience – National Strategy for Climate Change and Low Carbon Development

²² IPCC Fifth Assessment Report 2013, p. 1358.

²³ Republic of Rwanda, 2010. Assessment of Operational Framework Related to Climate Change in Rwanda, REMA.

by the Eastern Province, then the Western Province²⁴. Rwanda NAPA prioritised actions addressing the mutual influences and cumulative impacts of²⁵:

- High degradation of arable land due to erosion, following torrential regime of rains in Northern regions , Centre/West and floods in their downhill slope;
- Desertification trend in agro-bioclimatic regions of the East and South-East;
- The lowering of lake levels and water flows due to pluviometric deficit and prolonged droughts; and Degradation of forests.

These factors explain the vulnerability of Rwanda in a context of climate insecurity. In particular, the current strong dependency on natural resources makes economic activities directly dependent on climate conditions. Without sound environmental management, development activities in key sectors such as agriculture, industry, infrastructure, commerce, and energy can lead to significant environmental degradation that can undermine economic growth. Economic impacts are likely to be exacerbated by climate change, which through increased occurrence of floods, landslides and droughts, is likely to increase damage to infrastructure and property. Research has estimated that climate change could result in additional net economic costs (on top of existing climate variability) for Rwanda that are at least equivalent to a loss of almost 1% of GDP each year by 2030²⁶.

Climate change could affect water security and food security, and as a result, could increase levels of poverty and force subsistence farmers into informal urban settlements. Rwanda's energy security may be at risk as hydropower contributes 50% of electricity, making it vulnerable to variation in rainfall and evaporation. Droughts reduce generating capacity of hydroelectric dams, and floods increase soil erosion and siltation which can damage dams. As an example, the drought in 2004 in Rwanda reduced hydropower capacity so much that the government was forced resort diesel power plants in order to meet domestic demand. Joint regional projects are underway to complete four hydropower plants on the Rusizi River to supply Rwanda, the Democratic Republic of Congo (DRC) and Burundi with 500MW of hydropower. The power plants are being designed to use the maximum capacity of the current river flows, which may be affected by climate change and therefore affect the capacity and efficiency of the plants.

²⁴ REMA, 2015. Baseline Climate Change Vulnerability Index for Rwanda

²⁵ Republic of Rwanda, 2006. National Adaptation Plan of Action to Climate Change, MINIRENA.

²⁶ Republic of Rwanda, 2013. Economic Development and Poverty Reduction Strategy II, 2013 -2018.

Equally, tourism, one of Rwanda's largest earners of foreign exchange, is dependent on the survival of gorillas in the Volcanoes National Park, and the preservation of the Nyungwe and Gishwati forests and Akagera National Park. These areas of natural beauty are biodiversity hotspots which are highly vulnerable to changes in temperature and rainfall that could reduce viable habitat and allow the spread disease.

Climate change is expected to increase vulnerability to existing stresses, thus putting additional burdens notably on the rural poor, particularly amongst those living below the poverty line. . As temperatures rise, diseases could spread to new areas, particularly higher altitudes. Out of the main livestock diseases in Rwanda, ticks (as ectoparasites), tick-borne diseases and trypanosomosis are the most likely to be sensitive to climate change.²⁷

It is important to mention that floods, landslides, and drought episodes constitute the major repetitive natural disasters for Rwanda associated with climate change often linked with El Nino/Southern Oscillation index (ENSO) episodes. Since the year 1902, a series of big famines, following prolonged droughts episodes has been registered in Rwanda. In 1999/2000 East and South-eastern regions of the country were seriously affected by a low agricultural production associated with La Nina 1999/2000 episode. The same case was reproduced in 2005/2006. Also, an increase of frequent prolonged droughts has been experience since the 1980's²⁸.

Consequently, the intensity of the catastrophe registered determines the gravity of the impact in the region and to the affected sectors. Once such catastrophe affects a group of populations, different sectors involved in socioeconomic development are also affected at different degrees. Therefore, in order to safeguard biodiversity and ecosystems services; to ensure food, water and energy security; and to support future socio-economic development, Rwanda must adapt to the changing climate and become climate resilient.

²⁷ Republic of Rwanda, 2011. Green growth and climate resilience – national strategy for climate change and low carbon development.

²⁸ Republic of Rwanda, 2006. National Adaptation Plan of Action to Climate Change, MINIRENA.

2.3 Long term and near-term adaptation visions, goals and targets

2.3.1 Typology of adaptation goals and targets

The major goal to alleviate and adapt the climate change in Rwanda is to continue to put in place strategies aiming at increasing resilience and reducing vulnerabilities of communities to climate change impacts by focusing on developing and implementing eco-friendly policies and strategies in all sectors of the economy²⁹. For the ‘green economy’ approach, priority area focuses on two targets related to (i) green urbanisation and (ii) the promotion of green innovation in industrial and private sectors³⁰.

The Rwanda’s Green Growth and Climate Resilience Strategy also provide a number of principles, already given in Rwanda Vision 2020 and EDPRS. The principles as cited below ensure that no actions are taken that conflict with decisions already made by the people of Rwanda regarding their future prosperity. They are:

- i. Economic Growth and Poverty Reduction
- ii. Welfare and Wellness of all citizens in a growing population
- iii. Gender Equality and Equity
- iv. Sustainability of the Environment and Natural resources
- v. Good Regional and Global Citizenship

Inspired by the same strategy, adaptations contributions reported herewith for Rwanda’s INDCs are outcome based. Qualitative and quantitative goals and targets are reported accordingly. Table 3 provides details of adaptation contributions for Rwanda.

²⁹ Republic of Rwanda, 2012. Rwanda Vision 2020. Revised ed. 2012.

³⁰ Republic of Rwanda, 2013. Economic Development and Poverty Reduction Strategy II, 2013 -2018.

2.3.2 Adaptation Contributions

Table 2: Adaptation contributions per sector

Agriculture			
Programme of action	Actions	Description and goals/targets	Mitigation benefits
1. Sustainable intensification of agriculture	1.1 Mainstreaming agro ecology techniques using spatial plant stacking as in agro forestry, kitchen gardens, nutrient recycling, and water conservation to maximise sustainable food production;	Seasonal shortages of food supply as a result of poor harvests caused by droughts and flooding and soil erosion are among the most significant signs of how the agriculture sector is vulnerable to climate change in Rwanda. In order to adapt to this situation, Rwanda intends to mainstream agro ecology technologies in its current agriculture intensification programme and other natural resource-based livelihood programmes. 100% of the households involved in agriculture production will be implementing agro forestry sustainable food production by 2030.	Reduced GHG emissions from land use change
	1.2 Utilising resource recovery and reuse through organic waste composting and wastewater irrigation;	The steep nature of Rwanda's topography coupled with very high population density (415 inhabitants / km ²) ³¹ leads to several pressures on natural resources, including land, and this remains the main reason for land degradation. Arable lands also show little tolerance when it comes to climate change effects like heavy rains and draughts. In fact, heavy rains lead to soil erosion resulting in fertility decline and low productivity.	Reduction of methane emissions from landfills

³¹ Fourth Population and Housing Census, 2012

		<p>Rwanda intends to promote recovery and reuse of both organic waste and wastewater in order to restore and maintain soil fertility. Organic waste use through composting, currently used at a small scale, will be implemented to reach 100% of the households involved in agriculture production countrywide by 2030. Waste water irrigation, mainly practiced in correction centers under national prisons services will be implemented countrywide by 2030.</p>	
	1.3 Using fertiliser enriched compost	<p>Rwanda relies on imported inorganic fertilisers for its agriculture intensification activities. For instance, 36000 Mt of these were imported in 2014 and these importations are likely to increase in the near future. Although good at increasing yields, intensive use of inorganic fertilisers has adverse impacts to the environment in general and climate change in particular. In contrast, the use of organic fertilisers by composting has many environmental benefits whereby it provides an excellent way to manage the huge volume of organic waste and utilise it in a productive manner.</p> <p>The effectiveness of composted organic waste can be further improved by enriching and blending it with nutrients (Nitrogen phosphorus). This technique ensures a more efficient use of inorganic fertilizers, and adds valuable organic matter to soils, which also maximizes terrestrial carbon in farm soils.</p> <p>Rwanda intends to ensure the use of fertilizer</p>	Reduce GHG emissions from fertilizer manufacturing processes

		enriched compost and shift from using pure inorganic fertilizers by 2030.	
	1.4 Mainstreaming sustainable pest management techniques to control plant parasites and pathogens	<p>Increasing average temperatures, changes in precipitation and water shortage are seen as climate change aspects that result in pests and diseases proliferation.</p> <p>In order to adapt to this, Rwanda intends to promote sustainable pest management techniques that incorporates a cropping system based on producing multiple crop and fodder yields but which is also designed to control plant parasites and pathogens such as stemborers and striga weed. Rwanda also intends to implement push-pull system using Napier grass and desmodium legume to manage pests under maize, sorghum, millets and rain-fed rice plantations. The main adaptation benefits of the push-pull system are the increase of yields, soil fertility improvement through nitrogen fixation and provision of a continuous supply of fodder to cattle from the harvest of Napier grass and desmodium. This improves milk yields of cattle while reducing methane emissions as a result of improved fodder regimes.</p>	Reduced GHG emissions from enteric fermentation
	1.5 Soil conservation and land husbandry	<p>90% of Rwanda's crop land is on slopes ranging from 5 to 50% which makes it vulnerable to climate change impacts like soil erosion leading to permanent fertility loss. Rwanda intends to expand its soil conservation and land husbandry programmes through:</p> <p>Installation of land protection structures like</p>	Reduced GHG emissions from farm land and increased carbon sink through agro forestry practices

		<p>radical and progressive terraces where these structures will be installed on 100% of the relevant area by 2030;</p> <p>Development and implementation of an intensive agroforestry programme with a target of covering 100% of arable land by 2030.</p>	
	1.6 Irrigation and water management	<p>The Rwandan agriculture mainly rain fed which makes it vulnerable to weather shocks. Rwanda intends to increase investment in irrigated agriculture to increase production, harness fresh water resources while ensuring food security to its population. Under this action, district irrigation master plans will be designed and small-scale schemes will be developed where possible based on water catchments, and farmer organisations trained in their development. Agricultural land fitted with operational irrigation infrastructure was estimated at 4% of the total land with irrigation potential in 2012. The overall target of the new irrigation programme is to reach 11% by 2030.</p>	Efficient use of irrigation water reduce nitrogen losses including nitrous oxide emissions.
2. Agricultural diversity in local and export markets	2.1 Add value to agricultural products through processing to meet its own market demand for food stuffs;	<p>Food stuff distribution faces challenges when it comes to rural community market places where traded commodities can be damaged under extreme weather conditions. Rwanda intends to expand local markets by constructing market infrastructure, including roofed market facilities, serviceable road and transport networks, developing decentralized village-based agricultural processing centers that incorporate low-carbon sources of</p>	Reduced GHG emissions as a result of using low carbon energy sources and reduced transport distance.

		<p>energy, such as biogas-digesters and solar driers, and decentralized compost plants.</p> <p>This forms a conduit for agricultural-based trade based on less food miles for regionally and internationally imported food products.</p> <p>Strengthening local markets will also build economic resilience in rural areas that is less dependent on linear commodity flows of raw goods leaving rural areas unprocessed and without added value.</p> <p>Group based organizations involved in agriculture production and running agro processing facilities were estimated at 10% of the total operating group based organizations in 2014. The target is for this percentage to increase by up to 90% by 2030. Also the installed capacity of agro processing installations is to reach 1,200,000 MT by 2030 from 400,000 MT³² in 2014.</p> <p>In addition, Rwanda targets to have 100% of farmers with access to services for post harvest treatment and storage of food crops and reduce post harvest losses to at least 1% by 2030 from 10.4%, 27.4% and 8.3% in 2014 for maize, beans and rice respectively. The use of solar energy in warehouses will be actively promoted.</p>	
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³² Metric Tons

Forestry			
Programme of action	Actions	Description and goals/targets	Mitigation benefits
3. Sustainable Forestry, Agroforestry and Biomass Energy	3.1 Promote afforestation/reforestation of designated areas through enhanced germplasm and technical practices in planting and post-planting processes;	<p>The Rwandan forestry sector provides the main part of the primary energy needs (97% of cooking energy) to the population. Since 2002, there have been consistent gap in wood products supply and demand with deficits reaching 12 million cubic meters in 2009. This deficit shows how the forest sector is and likely to remain under pressure. In order to deal with this main issue, Rwanda intends to improve the management of its forest resources by increasing efforts in using quality germplasm, planting trees at the right time (rain season) and improving post-planting care,. Furthermore, the country intends to use mixed-species approaches which contribute greatly to the achievement of both mitigation objectives and adaptation benefits of ecosystem resilience and biodiversity.</p> <p>Through this strategic action, the country's target is to achieve an overall 30% sustained forest cover of the total national land surface by 2030 from 28.8% in 2013.</p>	Reduced GHG emissions through sequestration

	<p>3.2 Employ Improved Forest Management for degraded forest resources;</p>	<p>Land scarcity is a primary constraint to the expansion of Rwanda's forest resources. Rwanda should maximize the productivity of its many degraded forest plantations which present an opportunity to increase biomass supply without converting additional land. By 2030, Rwanda will implement public private partnerships to sustainably managing all forestry plantations through multiyear contracts with forests operators (in cooperatives) who will plant and maintain young plantations until they reach their commercial size.</p>	<p>Reduced GHG emissions through sequestration</p>
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Tourism			
Programme of action	Actions	Description and goals/targets	Mitigation benefits
4.Ecotourism, Conservation and Payment for Ecosystem Services Promotion in Protected Areas	4.1 Maximise business tourism (the largest source of export revenues) through strategic conference management in order to maximise the distribution and volume of business travellers throughout the year	<p>Rwanda will promote business conferences in efforts to maximize the distribution and volume of business travelers throughout the year. These efforts will result in increased bed occupancy at available hotels and lodges within Kigali, and subsequent visitation to its surroundings including Volcanoes National Park (VNP), Nyungwe forest and Akagera National Park</p> <p>Through this strategic action, Rwanda expects business and leisure tourists to increase from 545,000 people in 2012 to 1,262,000 people in 2030.</p>	

Water			
Programme of action	Actions	Description and goals/targets	Mitigation benefits
5.Integrated Water Resource Management and Planning	5.1 Establish a national integrated water resource management framework that incorporates district and community-based catchment management;	<p>Rwanda will integrate management of water resources at the district and community levels, define catchment wide responsibilities, cluster catchment partner-districts according to sub-catchment regions, and improve understanding of water users within districts and catchments.</p> <p>The national framework for IWRM will be cascaded down to district and catchment levels. To this end, catchments committees and water users associations (WUAs) will be established and trained at district level to cover all the 30 districts by 2030. Also, detailed catchment management plans have will be developed and implemented for all the nine identified main catchments areas by 2030.</p>	IWRM is expected to result in improved water resources in both quality and quantity. This will increase opportunities for hydropower development thus reducing emissions from fossil fuels used for electrical power generation.
	5.2 Develop water resource models, improved meteorological services, water quality testing, and improved hydro-related information management; and	<p>To allow precise planning of water resources and improved allocation, Rwanda will develop water balances at district and catchment levels, supported by hydrological models, improved rainfall monitoring, and a better understanding of agro-meteorology and water quality testing.</p> <p>The important national water datasets will be identified to enable monitoring</p>	

		<p>of the water balance, model abstraction and future demand. Furthermore, assessments will be undertaken of water resources under a range of climate change scenarios. In this regard, surface water quality monitoring will be carried out on selected sites of main rivers. All the existing 53 gauging stations will be upgraded to automated real time data stations by 2030.</p>	
	<p>5.3 Develop a National Water Security Plan to employ water storage and rain water harvesting, water conservation practices, efficient irrigation, and other water efficient technologies.</p>	<p>Rwanda will establish a comprehensive National Water Security Plan to expand water storage and irrigation infrastructure, rainwater harvesting, water conservation and water efficiency practices. This strategic action brings together the national policies and strategies for irrigation, water supply and sanitation, IWRM and energy. In this regard, an assessment of the current water storage capacity will be carried out and the improved water storage will be the main outcome of the assessment with reference to the IWRM subsector strategic plan. Rwanda will also implement the water resources master plan which identified potential sites for multipurpose dam construction countrywide for improved water storage. In addition to the detailed design for one of the identified, others</p>	

		<p>will be initiated and finished by 2030. Rainwater harvesting will also be mandatory and will be made an integral part building codes by 2030.</p>	
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Land use			
Programme of action	Actions	Description and goals/targets	Mitigation benefits
6. Integrated approach to Sustainable Land Use Planning and Management	6.1 Employ an integrated approach to planning and sustainable land use management;	Given the size of the country and its very high demographic pressure, competition for land will continue to grow with increasing pressures from agriculture and livestock making land resources more vulnerable to climate change impacts. Encroachment on sensitive areas will persist until land reforms are completed. Rwanda will implement rigorous planning and zoning regulatory framework to manage the changing demands on land. In addition to initiatives like systematic land registration and implementation of land tenure regularization reform. Rwanda intends to reduce the plot size for single family houses from current 600 m ² to 300 m ² by 2016 and to 225 m ² by 2030.	Combined actions under this programme will result in availing more land space which might be converted to others uses such as new forest plantations thus serving as carbon sink.
	6.2 Improve spatial data by harnessing ICT and GIS (Geographic Information System) technology;	Rwanda will develop National Spatial Data Infrastructure (SDI) to manage the nation's land information resources and to identify the fundamental datasets required to manage land and water resources, monitor land use and environmental change, support economic development, and enable Rwanda to better plan, monitor, and respond to the impacts of climate change. It is planned that the establishment of the National Spatial Data Infrastructure will be operational by 2030.	This strategic action will result in better estimations of GHG emissions from land use, land use change and forestry thus improving planning and implementation of specific mitigation actions for the same sector.

Cross cutting			
Programme of action	Actions	Description and goals/targets	Mitigation benefits
7. Disaster Management	7.1 Conduct risk assessments and vulnerability mapping	<p>Specific risk and vulnerability assessments are key for better planning and implementation of relevant adaptation actions. In addition to the countrywide vulnerability index that was completed recently, Rwanda will conduct risk assessments and initiate vulnerability mapping to develop effective disaster management systems. Risk assessments will be conducted and completed countrywide by 2030.</p> <p>Every five years, Rwanda will be updating the recently developed climate change vulnerability index as to reflect the real situation of vulnerability to Climate change at any given time in the country. In addition, other assessments (such as national communication) with a vulnerability assessment will be conducted periodically.</p>	
	7.2 Establish an integrated early-warning system, and disaster response plans	<p>Rwanda is exposed to climate related disasters like droughts, floods and landslides. In addition to existing disaster management initiatives mainly focusing on preparedness, assessment, mitigation and disaster reduction , Rwanda will establish and early-warning system in order to prevent the impact of natural climate disasters on humans. Rwanda will also improve its capacity in disaster preparedness and mobilization and distribution of relief to populations affected by specific disaster events.</p>	
	7.3 Employ community-based	Rwanda will implement the following community based DRR activities: improved farming techniques	

	<p>disaster risk reduction (DRR) programmes designed around local environmental and economic conditions, to mobilise local capacity in emergency response, and to reduce locally-specific hazards</p>	<p>that mitigate flood and landslide impacts; first aid training; and environmental and public health awareness for disease prevention, particularly following flood and storm episodes. In order to reduce locally-specific hazards, relocation from high risk zones is considered as one of the strategic actions. In addition to households previously relocated from high risk zones, Rwanda will relocate additional 30 000 households by 2030.</p>	
<p>8. Climate data and projections</p>	<p>8.1 improve observation facilities to provide all climate information necessary for future monitoring, climate trend detection, management of climate variability, early warning and disaster management</p>	<p>Rwanda will establish of additional observations in order to provide climate information necessary for future monitoring, climate trend detection, management of climate variability, early warning and disaster management by upgrading and maintenance of existing stations and calibration of meteorological instruments including weather radar.</p>	

2.4 Means of Implementation

The Government of Rwanda already spends a considerable portion of its annual budget on infrastructure which contributes to addressing the negative impacts of climate change by reducing vulnerabilities of its people and the environment. On the other hand, the full implementation of Rwanda's adaptation contributions requires predictable, sustainable and reliable support in the form of finance, capacity building and technology transfer.

Rwanda has conducted a study on economic impact of climate change in 2009 and an initial costing of 3 sectors from GGCRS which revealed that Rwanda needs 24.1 Billion USD for Energy, Agriculture and Water Resources Management for 2015 to 2030 (REMA, 2015).

The implementation of the above mentioned adaptation actions, requires continuous development and strengthening of Rwanda's capacities. Therefore, it is imperative to consolidate platforms for the exchange of knowledge and information related to adaptation at all levels of government, as well as to strengthen the networks with academic institutions and civil society.

Adaptation requires the introduction of climate smart technologies like climate smart agriculture. These require the transfer of technology from the developed to the developing countries to effectively and efficiently introduce in the proposed measures. Main adaptation technology needs have been identified for Rwanda with considering of agriculture as a priority sector for adaptation in Rwanda. Prioritized technologies include; seed and grain storage, agro forestry, radical terraces, drip irrigation, rainwater harvesting, integrated fertilizers and pesticide management, biotechnology for climate change adaptation of crops and sprinkler irrigation. Rwanda's constrained human resource capacity is a challenge facing climate change adaptation. Actions to build capacity must harness existing efforts as much as possible, in order to promote efficiency of investment in current resources. Capacity building initiative would support professional development in all the sectors proposed under adaptation.

At the national level, there is a need for synergetic efforts across the various sectors directly involved in the planning, implementation and monitoring and evaluation of programmes and projects.

In addition, Rwanda requires international support for the development of its own technologies as well as for technology transfer and innovation to increase its adaptive capacity. For Rwanda, the increase of investment in climate smart agriculture, water resources management and disaster prevention is of utmost relevance, as well as the development of an insurance market against hydro meteorological and catastrophic risks.

Chapter Three: Mitigation

3.1 Introduction

According to the UNFCCC decision as stated under Lima Call for Climate Action Decision -/CP.20, Paragraph 10, “...each Party’s intended nationally determined contribution towards achieving the objective of the Convention as set out in its Article 2 will represent a progression beyond the current undertaking of that Party...” and also, “...the least developed countries and small island developing States may communicate information on strategies, plans and actions for low greenhouse gas emission development reflecting their special circumstances in the context of intended nationally determined contributions...” as stated in paragraph 11 of the same decision.

Although Rwanda has one of the lowest emissions per capita in the world, estimated at 0.4 tCO₂e/person, compared to a global average of 6.7 tCO₂e/person, as according to Rwanda’s second national communication to the UNFCCC, the country is committed to integrate climate change into national development. In this regard, Rwanda has been implementing CDM projects since 2009 to date and since 2012; Rwanda has been implementing a Green Growth and Climate Resilience Strategy. This strategy touches all the sectors of the economy and will be implemented up to 2050.

Rwanda believes that the implementation of programmes and strategic actions proposed under this strategy for different sectors would be a great contribution toward climate change mitigation. Rwanda’s mitigation contributions under this INDCs have been defined and proposed based on current and future implementation of strategic actions under the above mentioned strategy. Proposed strategic actions have been classified per sector.

Inspired by the same strategy and being the most recent greenhouse gases (GHG) mitigation design document available, Rwanda NAMAs were referred to when developing this mitigation part of the INDCs. Based on the interconnection between NAMAs and INDCs, countries were expected to look internally at NAMAs and other emission reduction measures like CDM and REED + as building blocks for their INDCs. NAMAs were expected to form the most important element of INDC and future of climate negotiations.

For consistency purposes and given the nature of the existing greenhouse gas emission reduction initiatives which are mainly planned - under different sector strategic plans, Rwanda’s mitigation contribution is action based and is detailed per sector in section 3.4.

3.2 National GHG inventory for the latest year available

According to the Second National Communication in Rwanda³³, the total GHG emissions for the year 2005 considered as the baseline year, amount to 5,010.4Gg CO₂eq including agriculture with 3909Gg CO₂eq (78%), energy with 891.3Gg CO₂eq (17, 8%), industrial processes with 150.52Gg CO₂eq (3%), wastes with 47.25Gg CO₂eq (0.9%) and land use, land use change and forestry with 10.9Gg CO₂eq (0.2%). In addition, it was noted that the national balance between emissions and absorption was negative in 2005 with the total emissions of 5010.4Gg CO₂eq and total absorption of -8545Gg CO₂eq, the balance was -3534.6Gg CO₂ eq, i.e. absorption of -3534.6Gg CO₂eq.

Rwanda INDC takes reference on GHG emissions estimates for 2012 as a base year and projections for 2030 which were established in recent Rwanda's sectoral analysis for NAMA opportunities. These GHG emissions estimates and projections were established using three different internationally recognized model methodologies to quantify GHG emissions including IPCC Tier 1 national model, LEAP national model and CDM methodologies which are often based on the IPCC's 2006 Guidelines for National Greenhouse Gas Inventories.

3.3 Mitigation actions and initiatives

Rwanda has already taken proactive approach of a more sustainable future. Vision 2020, EDPRS, green growth strategy and other sector strategies all provide guidance for economic development and poverty reduction. They promote gender equality, equity and sustainable management of natural resources and recognise Rwanda's role in the region.

Several initiatives and actions aiming at reducing GHG emissions have been proposed and discussed under paragraph 3.4; They are reported under several sectors of the economy namely energy, transport, industry, waste and forestry.

Rwanda's mitigation contributions are outcome based in nature and only additional initiatives to business as usual have been identified and reported for the purpose of this INDCs.

Both qualitative and quantitative targets are reported accordingly.

³³ Rwanda Second National Communication under the UNFCCC, MINIRENA

3.4 Mitigation Contributions

Table 3: Mitigation contribution per sector

Energy				
Programme of action	Actions	Description and targets		Adaptation benefits
		Baseline scenario	Mitigation scenario	
1. Low carbon energy mix	1.1 Establishment of new grid connected renewable electricity generation capacity in the form of large-scale hydro power plants and solar PV power	In the current national energy mix, fossil fuel electricity generation makes 32% of the total generation capacity, with a projection of 46% in 2020 and much more in 2030 under business as usual scenarios.	Rwanda will increase the share of renewable energy in country power generation through construction of hydro, solar power plants and methane to electricity power plantshenceshifting from using fossil fuels for its electricity needs. Further to this, Rwanda is committed to create a regional interconnectivity through construction of new transmission lines and sub-stations and will improve/upgrade existing ones This will allow the import of electricity that would be otherwise generated from fossil fuel power plants (diesel or peat power plant) to meet the futute supply and demand for energy.	Through these initiatives, there will be creation of off farm jobs thus increasing adaptive capacities of local communities. Availed electricity will create more opportunities for diversified commercial activities in the construction industry and services for example.

2.Sustainable Small Scale energy installation	2.1 Installation of solar PV mini-grids in rural communities.	Rural communities depend mainly on kerosene for their lighting needs, wood fuel and agriculture residues for their cooking needs.	Rwanda will establish up to 100 solar PV mini-grids in rural communities, with total capacity of up to 9.4 MW and will establish rural productive zones using electricity for increasing the income generating potential of rural communities.	Rural electrification will create additional income generating activities for communities and lowers some of the daily energy-related burdens of community members, It will also contribute to the success of forestry management programmes where wood fuels are replaced by electricity
3.Energy efficiency and demand side management	3.1 Increase energy efficiency through demand-side measures and grid-loss reduction	Currently demand side management is not well undertaken in Rwanda and grid losses are estimated at 23%	Through the energy utility, Rwanda will establish dedicated energy efficiency and demand side management unit to oversee the design and implementation of relevant efficiency programs to clip electrical peak demand. The dedicated unit will also be in	Demand side management and energy efficiency initiatives would increase opportunities

			charge of planning and implementing measures aiming at reducing grid losses. These are expected to drop from 23% c to 7.8% by 2030. The unit will also investigate expanding and managing bulk procurement and distribution of ³⁴ CFLs for residential customers (based on current consumption and end-user affordability) with targeted subsidies for retrofits.	of more off farm jobs.
	3.2 Promote environmentally sustainable use of biomass fuels	Biomass is almost wholly relied on for cooking and related uses by both urban and rural households. The single most important appliance in the biomass sector is the cookstove. This determines the efficiency with which biomass is used. Wood fuel consumption including charcoal	Given the fact that poor performing cook stoves are still used in most cases leading to inefficiencies in fuel consumption and health effects, Rwanda intends to increase the diffusion of improved cook stoves and reach 100% of all households in needs 2030. Additional supporting initiatives are mainly the installation of 35 000 domestic biogas digesters and 15 institutional biogas digesters annually, and increasing average charcoal yields up to 50% by 2030. In addition, Rwanda will enhance the use of LPG ³⁵ through tax reductions on importations.	Adaptation benefits under these initiatives rely in the fact that they will result in reduced deforestation thus ensuring sustainable basic energy source. Further to this, indoor airpollution will be reduced and

³⁴ Compact fluorescent lights

³⁵ Liquefied Petroleum Gas

		<p>was estimated at 4.2 Mt/year in 2010. With continued population growth and urbanisation , this consumption will exceed 11Mt/year by 2030 under the business as usual scenario.</p>		<p>quality of life improved. Revenues will also increase as a result of energy savings.</p>
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Transport				
Programme of action	Actions	Description and targets		Adaptation benefits
		Baseline scenario	Mitigation scenario	
4. Efficient resilient transport system	4.1 Bus Promotion of public transport, improvement of transport infrastructure, setting vehicles' emission standards and regulations and integrated national transportation planning	The Rwandan transport sector is experiencing a rapid growth of vehicles population and an increase in light duty vehicles equipped with (post-1998 era) 3-way catalytic converters. It is expected that under the business as usual scenario, the annual increase in population vehicles will reach 16.5% from 12% while light duty vehicles will increase 20% by 2030.	A high rate increase in population of vehicles and light duty vehicles would lead to the high GHG emission scenarios in the future as explained in the BAU. To avoid these emissions, By 2030, Rwanda will implement the following actions: Construction of central Bus Terminal(s) and Customer Service Centers in Kigali, Standardized Route Optimization planning and implementation, Planning, rehabilitation and construction of intra-modal passenger terminals, Construction of 17 km BRT main corridor and 6 modern interchanges which will result in GHG emissions reductions estimated 1,260,000 tCO ₂ e. Construction of dedicated "rush hour" high speed bus lanes, Improvement of traffic and pedestrian controls and street lighting using solar panels Enforcing Fleet renewal and scrapping (heavy, medium, mini-bus), Setting emission standards (equivalent to Euro standards) for new vehicles,	Increase of climate resilience by creating affordable, reliable and accessible transport services to the community.

			Use of higher fuel efficiencies and low carbon technologies for new vehicles, Standardized compliance and inspections for non-Rwandan registered vehicles, Integration with International Airport and convention/business center.	
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Industry				
Program me of action	Actions	Description and targets		Adaptation benefits
		Baseline scenario	Mitigation scenario	
5. Green industry and private sector development	5.1 Scale up resource efficiency to reduce energy demand in agro processing industries	Industrial emissions are mainly resulting from non efficient technologies that are being used by plants during the production process. As Rwanda pursues industrialization and development, under the BUA scenario, the industrial sector is expected to be the fastest growing sources of GHG emissions.	Under the mitigation scenario, Rwanda is committed to achieve energy efficiency by starting with agro-processing industries as large consumers of wood fuels. By 2030, Rwanda intends to avoid total GHG emission reductions of 146,000 tCO ₂ e from Tea and Coffee industries. This action will focus on energy efficiency improvements through the installation of less energy intensive equipments and technologies for drying, roasting packaging, improvements of water efficiency through loss minimization, recycling and reuse.	These initiatives will lower consumption of wood fuels thus sustaining adaptation roles of forests.
	5.2 Establishment of Eco-industrial park of Green Industry complex	Rwanda has prioritized the development of industrial parks and special economic zones (SEZs) for export oriented markets. Development of such industrial parks will require significant energy and the	Rwanda will establish Eco-Industrial Parks / Green Industries Complex where following principles will be applied: The production of goods and services in the industrial park must, at a minimum comply	

		<p>concept of establishing green industrial parks will focus on reducing the carbon footprint of goods produced in these industrial zones through a greater use of renewable, energy efficient technologies and shared resources.</p>	<p>with defined standards;</p> <p>Any CO₂ emissions that remains after consideration of heating, cooling, fixed lighting and ventilation must be less than or equal to a pre defined carbon compliance limit.</p> <p>Any remaining CO₂ emissions, from regulated energy sources must be reduced to zero</p> <p>The actual emission reduction potential can vary greatly based on the actual level of low carbon technologies implemented and in implementing “zero-carbon” principle, the emission reduction potential can be as high as 80-100% compared to a baseline based only on carbon intensive energy source.</p>	
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Waste				
Program me of action	Actions	Description and targets		Adaptation benefits
		Baseline scenario	Mitigation scenario	
6.Implem entation of Low carbon urban systems	6.1Utilization of urban waste as a high value resource stream	Under the BAU, the waste sector will undergo substantial growth in the future based on expected population growth and urbanisation. The majority of solid waste collected in urban areas is centrally deposited. With this continued trend the expected baseline scenario of annual GHG emissions from landfills will be high.	With respect to the urban waste management By 2030, Rwanda is committed to achieve the following : Development and implementation of landfill regulations in all urban areas , Extraction and utilization of Landfill Gas (LFG) for power generation; approximately 586,000 tCO2e will be reduced from this action.	Creation of off farm jobs during the implementation and operation phases thus enhancing climate resilience capacity of local communities

Forestry				
Program me of action	Actions	Description and targets		Adaptation benefits
		Baseline scenario	Mitigation scenario	
7.Sustain able Forestry, Agro forestry and Biomass Energy	7.1 Mandate licensing of sustainable charcoal production techniques	In 2012 Rwanda had a sink (or negative emissions) of -2,540,000 tCO ₂ e. It is difficult to directly predict the future use of wood resources or BAU, due to various streams of use, therefore the mitigation (sink) potential is derived for the savings of wood resources not used under alternative emission scenarios.	Rwanda will apply a Sustainable Charcoal Value Chain to reduce the demand of wood in charcoal production and downstream activities, leading to a potential net reduction in wood use of approximately 5,770,000 tonnes between 2016 – 2030 (equal to 5,770,000 tCO ₂ saved).	Most notable benefits resulting from this measure are mainly; improved forest productivity, improved access to efficiently produced domestic fuels, jobs creation, and potential lower fuel (charcoal) cost.

3.5 Means of Implementation

In order to fully implement the strategic actions in mitigation, Capacity building, technology transfer and finance are the most important needs in Rwanda. Specific national needs are:

- Access to and overcoming barriers to the diffusion of appropriate clean technologies;
- Building of climate information systems;
- Promotion of renewable energies and energy efficiency, including the involvement of the private sector;
- Setting up of public-private partnerships.

In this context, in addition to the specific mitigation strategies included above, the Government of Rwanda plans to:

- Promote and encourage the development, transfer and diffusion of climate technology; and
- Promote and encourage the mainstreaming of gender considerations in climate change issues;
- Promote and enhance climate change education, public awareness and capacity development through communication, training, information and knowledge management;
- Promote climate change research and development and information exchange in all sectors impacted on by climate change;
- Provide adequate support for policies and programmes that take into account the interactions between population dynamics, climate change and development, including the link between the national and sub-national governments;

The Government of Rwanda will continue to commit significant resources to climate change-relevant strategies. Rwandan communities, private sector and NGOs can also contribute significantly to these climate change-related activities through public-private partnerships.

However, the full implementation of the strategic mitigation actions is conditional on the support of international stakeholders. The implementation of the prioritised policies and actions assume the continued use of existing and planned national and international financial sources.

Implementation costs will be adjusted as more evidence-based information is obtained.. The costs for the implementation of additional policies and measures will need to be assessed at a later stage. Rwanda intends to meet its commitments and/or increase the level of its contribution through the use of international market mechanisms where appropriate, building upon the experience of the Clean Development Mechanism and other existing market mechanisms.

3.6 Monitoring and reporting progress

The Republic of Rwanda through the Ministry of Natural Resources holds the responsibility to monitor and evaluate the implementation of INDCs through regular stakeholders consultative engagement. This will ensure the effective updating and implementation of both mitigation and adaptation plans.

Chapter four: Equity and Ambition

Rwanda is a small and developing country with one of the lowest GHG emissions per capita in the world, estimated at 0.6 tCO₂eq/person compared to a global average of 6.7 tCO₂eq/person in 2005 (RoR, 2012). With Rwanda's Green Growth and Climate Resilience Strategy, contributing towards a low carbon and climate resilient future. This contribution is reflected in a fair and ambitious INDCs through policies and strategies that will see Rwanda improving the share of renewable energy in the nation's electricity generation, improving energy efficiency, increasing the forest cover through efficient land use and new forest plantations and agro forestry, waste to energy and the implementation of resilient transport systems thus reducing overall GHG emissions. Rwanda believes that this contribution guarantees an equitable commitment.

Rwanda ambitious contribution will lead to long term transformations in key sectors of energy, agriculture, transport waste, land use, land-use change and forestry that will decrease the future vulnerability of the concerned populations and territories. The implementation of Rwanda's Green Growth and Climate Resilience Strategy through different sector specific policies and strategies will support the commitments made by the international community.

All in all, above mentioned contributions from Rwanda will only be achieved if developed countries and other parties in the position to do so avail financial resources as well as adequate technology to reduce emissions and increase resilience of our citizen as requested by the obligations of the convention.

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Annex

Annex 1: List of Consulted Stakeholders

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