ZAMBIA'S INTENDED NATIONALLY DETERMINED CONTRIBUTION (INDC) TO THE 2015 AGREEMENT ON CLIMATE CHANGE

1. INTRODUCTION

1.1 Background

This document presents Zambia's Intended Nationally Determined Contribution (INDC) to the 2015 Agreement on climate change in response to decisions adopted at the 19th and 20th sessions of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC).

Zambia's INDC includes both mitigation and adaptation components based on her national circumstances and is in line with decisions 1/CP.19 and 1/CP.20. The successful implementation of Zambia's INDC will result in an estimated total emission reduction of 38,000GgCO₂eq which translates to 47% (internationally supported efforts) against 2010 as a base year. This emission reduction is conditional and subject to the availability of international support in form of finance, technology and capacity building. The total budget for implementing both components is estimated at US\$ 50 billion by the year 2030, out of this USD 35 billion is expected to come from external sources while \$15 billion will be mobilized from domestic sources.

1.2 National Circumstances

Climate variability and change has become a major threat to sustainable development in Zambia. The country is already experiencing climate induced hazards which include drought and dry spells, seasonal and flash floods and extreme temperatures. Some of these hazards, especially the droughts and floods have increased in frequency and intensity over the past few decades and have adversely impacted food and water security, water quality, energy and livelihoods of the people, especially in rural communities.

Recent climate trends based on records from 1960 to 2003 indicate that mean annual temperature has increased by 1.3°C, since 1960, an average rate of 0.34°C per decade. On the other hand, the mean rainfall over Zambia has decreased by an average rate of 1.9 mm/month (2.3%) per decade since 1960. The future trends in the country are towards a higher average temperature, a possible decrease in total rainfall, and some indication of heavy events of rainfall. An assessment of potential climate impacts shows that they will seriously undermine the efforts to improve the livelihoods of Zambians if left unaddressed¹. The assessment² further analyzed the negative impacts of climate change on key economic sectors including water, agriculture, forestry, wildlife, tourism, mining, energy, infrastructure and health. Further studies have estimated GDP loss over a 10-20 year mid-term planning horizon for agriculture productivity and its associated effects on poverty levels³, the potential impact of an energy crisis, the higher cost of treating climate related diseases such as malaria and malnutrition, and the loss of natural resources which provide critical ecosystem services to urban, peri-urban and rural communities⁴.

³ Jain, S. 2007. An empirical economic assessment of impacts of climate change on agriculture in Zambia", Policy Research Working Paper No. 4291, The World Bank Development Research Group, Washington D.C.

¹ Ministry of Tourism, Environment and Natural Resources (MTENR). 2007. Formulation of the National Adaptation Plan of Action (NAPA) on Climate Change. Final Report. MTENR, 58 pp.

² Ibid.

⁴ Ministry of Tourism, Environment and Natural Resources (MTENR). 2011. The Economics of Climate Change in Zambia. MTENR, February 2011.

The aggregated estimated total GDP loss by sector was in the range of USD 4,330-5,440 million with the following sector GDP losses: Agriculture (2,200 – 3,130), Energy related (270 – 450), Health (460), and Natural Resources (1,400). In view of these challenges, Zambia has in the recent past developed various climate change-related policies, strategies, projects and programs in response to climate change impacts. These include: the National Policy on Environment (NPE, 2007); the National Climate Change Response Strategy (NCCRS, 2010); National Forestry Policy of 2014; National Energy Policy of 2008, The National Agriculture Policy of 2014 and Transport Policy of 2002; National Strategy for Reducing Emissions from Deforestation and Forest Degradation (REDD+, 2015); Second National Biodiversity Strategy and Action Plan (NBSAP2); the National Adaptation Plan of Action on Climate Change (NAPA, 2007); Technology Needs Assessment (TNA, 2013); Nationally Appropriate Mitigation Actions (NAMAs, 2014); Second National Communication (SNC, 2015).

These policies, strategies, programmes and projects are aligned with the Revised Sixth National Development Plan (RSDNP) and the Vision 2030 which promotes "A prosperous middle income country by 2030", both of which support development of a low carbon and climate-resilient development pathway. In addition, Government ratified the Kyoto Protocol in 2006 among other things to facilitate implementation of the Clean Development Mechanism. The country is also in the process of developing its National Adaptation Plan (NAP) for long term adaptation planning and mainstreaming of climate change into national development planning process. The development of the Seventh National Development Plan (SeNDP, 2017-2021) is also underway which will take into account climate change issues

An assessment undertaken as part of the INDC preparation for the mitigation component revealed that mitigation policies/actions/programs converge into three programs which have mitigation and adaptation effects: Sustainable Forest Management, Sustainable Agriculture and Renewable Energy and Energy Efficiency.

Similarly, adaptation measures identified based on vulnerability assessment of seven key economic sectors (agriculture, water, forestry, energy, wildlife, infrastructure and health) comprise three goals/programs that have strong synergies with mitigation. These are: Adaptation of strategic productive systems (agriculture, forests, wildlife and water); Adaptation of strategic infrastructure and health systems; and Enhanced capacity building, research, technology transfer and finance.

2. MITIGATION

2.1 Contribution

Zambia intends to reduce its CO_{2eq} emissions by implementing three (3) programs driven by the country's Climate Response Strategy and supported by national development policies including energy, forestry, agriculture, water, Town and Country Planning, sanitation, and transport. Further, these programs have been developed based on Zambia's plans and actions and supported by various climate-related activities such as REDD+, NAMAs and Technology Needs Assessment (TNA), among others (Table 1).

Table 1: Zambia's Programs Contribution to its National Mitigation Goal

Name of	Description	Objectives of the	Co-benefits ⁵
Programme		Programme	
Sustainable Forest Management	Program involves implementing - Forest enhancement including natural regeneration and afforestation/reforestation - Sustainable charcoal production to include improved kilns - Improved cooking devices to include improved biomass stoves, use of ethanol and LPG stoves, and switch to electric stoves - Participatory forest management (CFM, JFM, PFM) - Forest fire management	To promote natural regeneration, afforestation/ reforestation, sustainable charcoal production and utilization practices, and generation of electricity from forest waste and residues.	 Creation of job opportunities and alternative livelihoods contributing to rural poverty reduction Enhanced information awareness on forest management Increased biodiversity preservation Restored hydrological balance in the river basin Increased resource productivity leading to watershed services, and ecosystem protection restoration of natural habitats Increased rural household incomes from SMEs Local community empowerment and capacity building, Reduced GHG emissions Improved air quality
Sustainable Agriculture	Program involves implementing - Conservation/ Smart agriculture - Rural biogas plants - Rural biomass electricity generating facilities	To promote conservation/ smart agriculture activities leading to adaptation benefits and enhancing climate resilience, especially in rural areas, and generation of electricity from agriculture waste.	 Rural poverty reduction particularly among women and the youth Creation of job opportunities and alternative livelihoods contributing to reduced rural poverty Reduced GHG emissions due to reduced fertilizer use and less turning of soil Biodiversity preservation due to reduced tillage Improved soil productivity leading to improved crop productivity Soil carbon sequestration Reduced indoor air pollution due to cleaner energy use

⁵ Co-benefits were assessed utilizing the Development Impact Assessment Visual Tool, available at https://www.ec-leds.org

Renewable Energy and Energy Efficiency	Program involves implementing - Fuel switch (diesel/HFO to biodiesel) - Fuel switch (coal to biomass) - Switch from existing isolated diesel to mini-hydro - Introduce and increase blending of bio-fuels with fossil fuels and where possible substitution with bio-fuels - Off grid RE to non-electrified rural – P.V and Wind - On grid expansion program to support economic growth and grid extension through inter-basin water transfer	To promote the switching from conventional and traditional energy sources to sustainable and renewable energy sources and practices, and use of off grid renewable energy technologies for rural electrification as decentralized systems.	 Improved health impacts due to child and maternal mortality and retention of medical personnel Improved education impacts due to longer hours of study and advanced teaching methods, safety, creation of opportunity for girl child and women's education Improved food security due to increased agriculture production resulting from use of irrigation especially for women Increased rural development impacts due to increased economic activities through SMEs Reduced GHG impacts and improved air quality
	water transfer - Grid extension to non-electrified rural areas		Reduced GHG impacts and improved air quality Reduced energy deficits

The extent and magnitude of contribution of Zambia's GHG reduction will depend on the availability of resources from: (i) domestic efforts with limited international support and (ii) Domestic efforts with substantial International support, as shown in Figure 1.

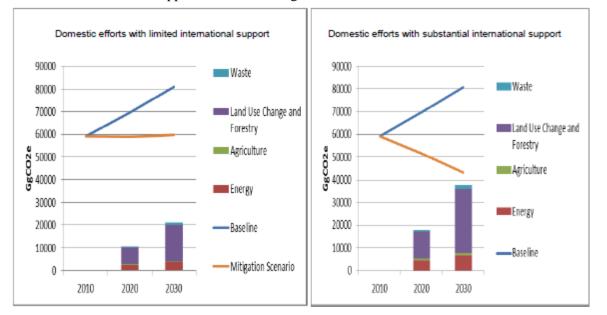


Figure 1: Extent and magnitude of contribution of Zambia's GHG reduction with scenarios for limited and substantial international support

Implementation of the domestic efforts with substantial international support is conditional upon strong commitment of international climate, bilateral and multilateral finance in addition to provision of domestic resources. It is expected from this scenario that by the end of 2030, estimated 38,000 Gg CO₂eq could be mitigated, compared to 20,000 Gg CO₂eq under the domestic efforts with limited international support. This translates into a reduction potential of 25% and 47% against 2010 as the base year for the domestic efforts with limited international support respectively.

Financial Needs	Meeting the conditional target requires an overall investment estimated at USD		
	35 billion up to 2030, to be mobilized through new climate finance		
	mechanisms such as; the Green Climate Fund (GCF) and other climate related		
	bilateral, multilateral and domestic financing including private sector.		

2.2 Assumptions and Methodological Approaches

Time Frame	The time for implementation of the INDC is up to 2030	
Gases Covered	Carbon dioxide (CO_2) , methane (CH_4) and nitrous oxide (N_2O)	
Sectors covered	Energy (i.e. manufacturing, commercial, residential, agriculture, transport, mining and electricity)	
	Agriculture (i.e. Enteric Fermentation and Manure Management, Rice Methane, Agriculture Soils, Burning of Savanna and Agriculture waste)	
	Waste (i.e. Solid waste disposal, Solid waste open burning, Domestic wastewater handling, Industrial wastewater handling and Human sewage)	
	Land-use, Land-Use Change and Forestry (LULUCF): Sources- (i.e. Deforestation and forest degradation through land clearing for agriculture, uncontrolled fires, infrastructure, timber harvesting, and charcoal production. Sinks-Regeneration from abandoned land from disturbed forests (firewood collection, charcoal production and timber harvesting), agriculture farrow and plantations, afforestation and reforestation)	
BAU Scenario	GHG emission projection for 2030, starting in 2010, and 2016 as the first year of implementation of the programs recommended.	
Mitigation Scenarios	GHG emission projections for 2030, starting in 2016. The baseline and mitigation scenarios were developed for Energy Sector using the "Long-range Energy Alternatives Planning System" (LEAP) software. Scenarios for the agriculture, land use, land use change and forestry, and waste sectors were developed using standard analysis spreadsheets. Both scenarios in Figure (1) are based on data from the National and Sector Statistics, which included economic, demographic and sectoral information.	
Global Warming Potential (GWP)	The GWP values used were: GWP $CO_2 = 1$ (by convention), GWP $CH_4 = 21$ and GWP $N_2O = 310$	
Methodology for Estimating Emissions	The methodology used is Revised 1996 IPCC Guidelines and 2000 Good Practice Guidance.	
Contribution of International Market Based Mechanisms	Zambia does not rule out the possibility of using market based mechanisms in meeting emission reduction target.	

3. ADAPTATION

3.1 Adaptation measures

As a minimal contributor to global GHG emissions, Zambia places significant importance and priority on adaptation to the effects of climate change in order to enhance the resilience of its population, ecosystems, infrastructure, productive and health systems. The key socio-economic sectors identified as most vulnerable to climate change impacts include: agriculture, water, forestry, energy, wildlife, infrastructure and health. All the adaptation actions have strong synergies with mitigation actions.

Zambia's capacity to undertake and sustain strong mitigation actions is dependent upon support for the implementation of the cross-cutting adaptation actions described herein.

The intended contribution on adaptation stated here is for the purposes of information so that an overview of the range of planned climate-related actions of the country is made known; it does not constitute an international obligation to the country. The extent of implementation of the intended contribution is contingent upon the financial resources, capacity and technologies available to the country through both domestic and international support to stimulate investments and innovation.

3.2 Approach for Adaptation Measures

The adaptation measures are applicable to the following sectors: Agriculture; Water; Forestry; Energy; Wildlife; Infrastructure; and Health. These have been identified in the NAPA (2007) and subsequent assessments as the most vulnerable sectors to impacts of climate change especially droughts and floods.

In terms of implementation, Zambia will take a landscape approach at watershed level to enhance synergies between adaptation and mitigation actions. Zambia has six major watersheds: Tanganyika; Luapula; Chambeshi; Luangwa; Kafue; and Zambezi

3.3 Impacts and Vulnerability

Zambia's geographic characteristics coupled with high poverty levels (currently estimated at 60%)⁶ and limited institutional capacity for adaptation, make it a highly vulnerable country to the adverse impacts of climate change especially droughts and floods

3.4 Planned Actions

The adaptation measures comprise three (3) goals/programs and 11 priority actions (Table 4):

Program 1: Adaptation of strategic productive systems (agriculture, wildlife, water

Priority Actions	Key Activities	Co-benefits
1. Guaranteed food security	1.1 Promote CSA practices through	- Poverty reduction
through diversification	conservation agriculture, agroforestry,	- Increased food security
and promotion of	use of drought tolerant varieties, water	due to improved
Climate Smart	use efficiency management and	agricultural production and
Agricultural (CSA)	fertilizer use efficiency management.	diversification
practices for crop,	1.2 Promote crop land races of cassava,	- Increased rural household
livestock and fisheries	maize, sorghum, finger millet, beans,	incomes from diversified
production including	cowpea and their wild relatives.	production systems
conservation of	1.3 Promote livestock CSA practices	- Increased soil fertility and
germplasm for land races	through: improved feed management,	conservation leading to
and their wild relatives.	improved animal health, improved	improved crop
	rangeland management and use of	productivity
	drought-tolerant breeds.	- Improved agro-
	1.4 Promote sustainable aquaculture	biodiversity conservation
	practices through improved water	- Improved health impacts
	management, improved feeding	as a result of food security
	regimes and use of appropriate stocks.	and nutrition

⁶ World Bank. 2015. Country Overview – Zambia. http://www.worldbank.org/en/country/zambia/overview

	1.5 Develop and implement policy incentives for farm diversification.	 Increased livestock productivity, system resilience and reduced vulnerability Increased fisheries productivity, system
		resilience and reduced vulnerability.
2. Develop a National Wildlife Adaptation Strategy and ensure its implementation through supportive policies, local community, civil society and private sector participation.	 2.1 Develop a National Wildlife Adaptation Strategy. 2.2 Map and protect wildlife corridors and refuges. 2.3 Promote community/public/private partnerships in the sustainable management of wildlife resources. 2.4 Enforce equitable benefit sharing arrangements among government, communities and the private sector in the management of wildlife resources. 	 Improved governance of the wildlife estate Increased wildlife system resilience and reduced vulnerability Increased income from tourism-related activities
3. Protection and conservation of water catchment areas and enhanced investment in water capture, storage and transfer (linked to agriculture, energy, ecological, industrial and domestic use purposes) in selected watersheds.	 3.1 Promote the protection of catchment forests in the Zambezi, Kafue and Luangwa watersheds. 3.2 Develop management plans for the three focal landscapes in 3.1 above. 3.3 Promote rainwater harvesting in the three focal landscapes. 3.4 Improve water storage through a network of dams and weirs. 3.5 Develop and improve water transfer infrastructure through canals and piped systems. 3.6 Adopt and promote integrated water management. 3.7 Undertake restoration projects. 	 Improved water security for ecological, domestic and industrial purposes Increased hydrological systems resilience and reduced vulnerability to climate change impacts. Improved water quality.

Program 2: Adaptation of strategic infrastructure and health systems

Priority Actions	Key Activities	Co-benefits
4. Institutionalize	4.1 Develop National Land Use	- Harmonized land use plans
integrated land use	Planning Guidelines.	at sectoral, district, regional
planning compatible	4.2 Integrate land use planning into	and national planning levels
with sustainable	official institutions and structures to	resulting in collaboration,
management of natural	facilitate legally binding land use	efficiency and cost-
resources and	plans.	effectiveness.
infrastructure	4.3 Revise and enforce the National	- Strategic alignment of
development	Construction Codes and Standards	resources for
	to safeguard infrastructure against	implementation.
	climate change impacts.	- Conservation of biodiversity
	4.4 Improve monitoring systems for	- Avoided land use conflicts.

	infrastructure at all administrative levels.	 Reduced GHG emissions and impacts. Creation of employment, both high- and low-skilled jobs. Reduced human safety hazards through disaster prevention. Reduced maintenance costs for infrastructure. Increased poverty reduction
5. Mainstream climate change in the National Health Policy, Environmental Health (EH) Policy, and Water and Sanitation Policy.	 5.1 Identify entry points for mainstreaming climate change adaptation into the three policies (e.g., policy formation and revision, national planning processes, resource allocation processes, etc.) 5.2 Finalize the EH policy 5.3 Strengthen health surveillance at all levels 5.4 Conduct mainstreaming awareness programes. 5.5 Establish an inter-departmental and 	and more balanced national development. - Coordinated/harmonized policies resulting in efficiency and costeffectiveness at both planning and implementation levels - Effective delivery of health services - Improved human health - Increased health systems resilience and adaptive capacity to climate change
6. Enhance decentralized climate information services for early warning and long-term projections on the effects of climate change to support sustainable management of the production systems, infrastructure development and public health.	sectoral coordination mechanism. 6.1 Provide timely information to the end users and elicit quick emergency responses in face of adverse climate events that impact on the productive systems, infrastructure and health sectors. 6.2 Coordination of Early warning system information dissemination 6.3 Strengthen implementation of the decentralization policy.	impacts - Enhanced preparedness to mitigate climate change impacts. - Local empowerment to make the right decision. - Local community empowerment to enforce community by-laws.

Program 3: Enhanced capacity building, research, technology transfer and finance for adaptation

Priority Actions	Key Activities	Co-benefits
7. Capacity building in	8. Conduct trainings for farmers,	- Increased adaptation knowledge and
Climate Smart	extension and technical staff on	skills among target groups.
Agriculture (CSA),	CSA, SFM, SFA, RET, EWS and	- Increased resilience and adaptive
Sustainable Forest	climate change planning.	capacities among target groups
Management (SFM),	9. Conduct public awareness	- Increased public awareness on CSA,

Sustainable Fisheries and Aquaculture (SFA), Renewable Energy Technologies (RET), and Early Warning Systems (EWS), Change management and climate change planning. 11. Water technologies for savings, recycling, irrigation and sustainable management for household, agriculture and industrial purposes.	campaigns on climate change, CSA, SFM, SFA, RET and EWS. 10. Conduct trainings for top and middle management in relevant sectors on change management. 10.1 Conduct research on locally-specific adaptation scenarios in Zambia's three Agro-ecological Regions (especially AERs I and II) (e.g., climate downscaling techniques, socio-economic scenarios, decision tools, stakeholder approaches, sector-specific tools, micro-climatic conditions and appropriate locally-specific adaptation measures, etc.). 10.2 Disseminate research results widely. 11.1 Conduct water deficit/availability assessments in AERs I and II. 11.2 Implement the various water technologies based on the assessment results and potential. 11.3 Establish ground and surface water monitoring systems.	SFM, SFA, EWS and (assessed) positive action. Improved sectoral management due to increased understanding of organizational change in face of climate change. Improved decisions by farmers, local communities, extension staff, planners and policy-makers. Improved early warning information systems and appropriate responses specific to certain locations. Reduced GHG emissions and climate change impacts. Employment creation leading to increased poverty reduction. Increased water security Improved energy security through enhanced hydro-power generation. Improved agricultural productivity through enhanced irrigation capacity. Improved health impacts from clean water, easy access and sanitation Reduced water utility bills for
12. Development of an insurance market against climate change induced risks related to agriculture and infrastructure	12.1 Establish appropriate insurance schemes.	households and industries. - Improved local skills in various water technologies. - Reduced loss and damage - Protection of developers (entrepreneurs) and consumers against loss.
13. Mainstream climate change adaptation into country development plans and strategies.	 13.1 Develop guidelines for mainstreaming CC in the SeNDP. 13.2 Conduct awareness on mainstream CC in sectoral plans and strategies. 	 Improved economic resilience. Poverty reduction Integrated approach to CC response and development. Employment creation. Ecosystem and biodiversity conservation.

4. PLANNING PROCESS

The mitigation and adaptation programmes elaborated in this INDC will be integrated in the Seventh National Development Plan (SeNDP) currently being developed. Planning for adaptation and mitigation programs under the Zambia's INDC will be integrated in existing planning processes and supported by national budget allocations to sectors, ministries and sub-national authorities towards implementation of both the domestic and international supported efforts.

In addition, the decentralisation process currently being undertaken in the country will enhance multi stakeholder participation in the implementation of the INDC.

The planning process also recognizes the efforts being made to establish the National Climate Change Development Council for climate change coordination in the country as stipulated in the draft National Policy on Climate Change. Furthermore, the National Adaptation Planning process being undertaken by Government provides a good basis for long term adaptation programming and mainstreaming of climate change adaptation into the existing national planning processes.

The National Designated Authority (NDA) for the Green Climate Fund has already been designated and is expected to play a key role of "clearing house or entity" for climate change projects to be funded from GCF in Zambia. The process is on-going to select a National Implementing Entity (NIE) and establishing a National Climate Change Fund (NCCF).

The effectiveness of the INDC implementation will be ensured through development and strengthening of existing Monitoring Reporting and Verification (MRV) systems to track progress of implementation of both the mitigation and adaptation programs.

5. MEANS OF IMPLEMENTATION, TIMEFRAME AND MONITORING

5.1 Means of Implementation

Zambia's contribution will be implemented with both domestic and international support. It is estimated that over USD 50 billion is required for both mitigation (USD 35 billion for Domestic efforts with substantial International support) and adaptation (USD 20 billion) actions across the programs up to 2030. Of this, USD 15 billion will be unconditional support provided by the Zambian Government and USD 35 billion will be conditional support to be sourced externally. Zambia will require international support in form of finance, investment, technology development and transfer, and capacity-building to fully realize its intended contribution. Further analysis will be necessary to refine the required investment cost and determine the domestic support as more data and results of studies become available. During implementation of these programs, Government will engage all relevant stakeholders to achieve the emission reduction target as part of the country's contribution to attainment of 2 degree goal.

5.2 Monitoring and Evaluation

Since the INDC is a part of the national development and planning process for climate change issues, it will be monitored and evaluated according to the existing monitoring and evaluation frameworks. Further, this will be done in a wide consultative and participatory manner. In addition, since INDC is a planning tool, it will be reviewed and updated as part of the national planning process.

5.3 Fairness and Ambition

Zambia considers her INDC fair and ambitious enough to contribute to low carbon and climate resilient economy by 2030 in accordance with its special national circumstance and desire to become a high middle income and prosperous Nation by 2030. Zambia is low contributor to the global greenhouse gas emission. In developing the INDC, Zambia considered the general principles and provisions of the Convention especially those related to Common But Differentiated Responsibilities and Respective Capabilities (CBDR) and equitable access to atmospheric space.

In light of above, Zambia will endeavor to make significant emission reduction through implementation of this ambitious INDC and provide leadership in the region through a set target of 47% emission reduction target, with 2010 being the base year. The country's INDC is guided by the country's desire to reduce poverty, attainment low carbon climate resilient economy, sustainable development and become a high middle income and prosperous nation by 2030 in line with its Revised Sixth National Development Plan and the country's Vision 2030.

The successful implementation of Zambia's INDC is conditional and dependent on the level of support to be provided through the Convention and other multilateral and bilateral arrangements. However, the country is committed to meeting its obligations under the Convention by implementing ambitious mitigation and adaptation programmes across the prioritized sectors. This will support the well-being of the citizens and contribute to the attainment of the objective of the Convention once adequate support is provided. This is what constitutes fairness and ambition for Zambia's INDC.