Kingdom of Eswatini National Bioenergy Policy Implementation and Monitoring Plan

ICAT Initiative for Climate Action Transparency

Initiative for Climate Action Transparency - ICAT

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AUTHORS

Vuyolwethu Mahlalela, Dr N T Zwane, Dr G Mavimbela

Affiliation: UNESWA-Centre for Sustainable Energy Research

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DEFINITIONS

Biomass Energy	Biomass is matter from recently living (but now dead) organisms which is used for bioenergy production.
Biofuels	Biofuel is a fuel derived directly from living matter.
Energy Access	Access to modern energy services provided through clean cooking fuels, clean heating and lighting systems, and energy for productive use and community services.
Energy Mix	The Energy Mix of a country is the specific combination of different energy sources it uses to meet its energy consumption needs- often a combination of non- renewable and renewable energy.
Independent Power Producer (IPP)	IPP is a private entity, which generates and supplies power to the state utilities or directly to the end user.
Renewable Energy	Renewable Energy is energy from a source that is not depleted when used.
Out growers	Out growers mean farmers growing crops (plants) to be supplied to a mill or other processing facility.
Wood fuel	Wood fuel (or fuelwood) is a fuel such as firewood, charcoal, chips, sheets, pellets, and sawdust.
Vulnerable Groups	The United Nations defines vulnerable groups as people who are more likely to experience discrimination, harm, or disadvantage due to their social, economic, geographic, or physical circumstances.

Abbreviations

CSER	Centre for Sustainable Energy Research
CCU	Climate Change Unit
CSO	Central Statistics Office
ECGA	Eswatini Cane Growers Association
EEA	Eswatini Environmental Authority
EEC	Eswatini Electricity Company
ESA	Eswatini Sugar Association
ESERA	Eswatini Energy Regulatory Authority
EWSC	Eswatini Water Services Corporation
GHGMI	Greenhouse Gas Management Institute
GoE	Government of Eswatini
ICAT	Initiative for Climate Action Transparency
KoE	Kingdom of Eswatini
MCIT	Ministry of Commerce Industry and Trade
MoA	Ministry of Agriculture
MoF	Ministry of Finance
MNRE	Ministry of Natural Resources and Energy
MTEA	Ministry of Tourism and Environmental Affairs
NBP	National Bioenergy Policy
NDC	Nationally Determined Contributions
PPCU	Policy and Programme Coordination Unit
RES	Royal Eswatini Sugar
SADC	Southern Africa Development Community
SAPP	Southern Africa Power Pool
UNESWA	University of Eswatini
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services

Executive Summary

This National Bioenergy Policy (NBP) is aimed at addressing three main challenges in the Kingdom of Eswatini's (KoE's) energy sector. In electricity supply, the main challenge is reliance on imports and, in this regard, the policy provides a framework for the exploitation of biomass for electricity generation. Biomass electricity has the potential to greatly improve Eswatini's security of electricity supply. In the fuels used for road transport the challenge is reliance on petroleum imports that is a result of having no internal petroleum resources. The policy proposed here provides for a framework for reducing the amount of imported petroleum through ethanol blending, using locally produced ethanol, thereby also reducing greenhouse gas emissions from the transport sector.

The third and final challenge addressed by this policy concerns the high consumption of fuel wood, particularly at a household level. This not only threatens Eswatini's natural forests, but also, when burned in an open, unprotected fire, particularly indoors, has major negative health effects. These health effects are suffered primarily by women who cook on open fires. Secondarily, the effects are suffered by other residents of the house where the open fire is used. The policy provides for a framework to reduce fuel wood consumption through the widespread dissemination of efficient cookstoves coupled with clean alternatives to firewood for cooking.

To address these challenges in the bioenergy subsector, the policy and policy actions set out herein comprise the following objectives, namely to:

1. Improve energy security through exploitation of bioenergy resources for electricity generation and biofuels production;
2. Promote access to affordable and sustainable sources of energy;
3. Accelerate the adoption of efficient biomass cookstoves and clean cooking technologies;
4. Combat the impacts of climate change; and,
5. Provide potential investors with requisite information on viable opportunities for bioenergy development and investment in the Kingdom of Eswatini (KoE).

Implementation of this bioenergy policy will have significant sustainable development impacts. Actions generated by this policy will significantly reduce greenhouse gas emissions in all three of the above-described areas (i.e. electricity generation, reduction of petroleum fuel usage in transport, and reduction of wood fuel for cooking. The actions will also have economic impacts at various levels of the economy, including at the community level. Clean cooking technologies will improve the health of the most vulnerable in society and improve people's quality of life.

Policy Positions

Government will:

1. Create a conducive environment to ensure adequate security of sustainable feedstock supply for biomass electricity generation and biofuel production.

2. Create a conducive environment to ensure efficient and reliable power production from biomass resources.
3. Create a conducive environment to ensure efficient and reliable production of biofuels.
4. Create a conducive environment to ensure minimization of negative environmental impacts in biomass electricity production and biofuel production.
5. Create a conducive environment to ensure minimization of negative social impacts from bioenergy supply chains.
6. Create a conducive environment for fostering investment and ensuring cost-effectiveness in bioenergy electricity generation and biofuel production.
7. Create an enabling environment for the adoption of improved cook stoves in all households, including all vulnerable groups, to reduce overall biomass consumption and associated environmental impacts.
8. Create an enabling environment for the promotion of access to cleaner and more sustainable alternatives for cooking and heating, considering affordability and practicality for all households all vulnerable groups.
9. Prioritize sustainable forest management practices and promote reforestation initiatives to ensure long-term availability of biomass resources.
10. Ensure that there is comprehensive development of national capacities in biomass electricity generation and biofuels production. And Government will ensure that the development of national capacities in the sector is inclusive, with men and women, boys and girls, and all vulnerable involved.
11. Ensure that the public, including men and women, boys and girls, and all vulnerable groups, is educated about the health and environmental impacts of unsustainable biomass use.
12. Ensure that the country advances and keeps up with developments in biomass cook stoves.
13. Create a conducive environment by developing a regulatory framework to ensure that the development and implementation of bioenergy projects contribute to gender equity, youth empowerment, and the inclusion of vulnerable groups.

1. Introduction

The Kingdom of Eswatini's (KoE) bioenergy policy aims to harness the potential of biomass resources to enhance energy security, promote sustainable development, and mitigate the impacts of climate change. This implementation strategy outlines the key actions and initiatives to be undertaken to achieve these objectives, focusing on three primary areas: bioenergy electricity generation, biofuels (Blending of petrol with ethanol), and promoting clean and efficient cooking technologies.

By prioritizing these areas, the KoE can leverage its abundant biomass resources to diversify its energy mix, reduce dependence on imported fossil fuels, and create new economic opportunities. This strategy will also contribute to the country's efforts to achieve its climate change mitigation goals and improve the lives of its citizens through access to affordable and sustainable energy.

This implementation and monitoring plan corresponds in part with chapter 8 of the bioenergy policy “Guidelines for implementation”. As guided by the Drafting of Public Policy Guidelines, the Strategic and Action Plan formulation, Policy Implementation Responsibilities, Monitoring and Evaluation, and Resource Mobilization are part of one chapter in a National Policy. Policy Implementation Responsibilities and Resource Mobilization are articulated only in the bioenergy policy, hence, this document covers the remaining sub-chapters: Action Plan and Monitoring and Evaluation.

The implementation and monitoring plan is intended to be updated on an annual basis and revised after every five years.

2. Context

The Bioenergy Policy is subtended on the overarching National Energy Policy of 2018. The NEP was enacted in response to the trends and developments of the Energy sector in the KoE. The vision for the bioenergy policy and the bioenergy implementation and monitoring plan represents the fundamental aspiration of the Government of the KoE to increase local energy generation through local resources, improve access to modern energy and ensure the environment is protected:

> “**To enhance energy security of Eswatini through sustainable integration of bioenergy resources to drive economic growth and mitigate the impacts of climate change, while improving the quality of life of Emaswati**.”

In support of the national goal stated above, the main objectives of the bioenergy policy

are:

1. To improve energy security through exploitation of bioenergy resources for electricity generation and biofuels production;
2. To promote access to affordable and sustainable sources of energy;
3. To accelerate the adoption of efficient biomass cook stoves and clean cooking technologies;
4. To combat the impacts of climate change;
5. To generate employment and income-generating opportunities, particularly to rural people in the bioenergy sector; and,
6. To provide potential investors with requisite information on viable, profitable opportunities for bioenergy investment and income generation in the bioenergy sector in, the KoE.

3. Implementation Plan

The implementation of the bioenergy policy will require coordinated efforts from various government agencies and stakeholders. The Ministry of Natural Resources and Energy, energy department, will lead in coordinating the implementation, working closely with other relevant ministries, the private sector and international partners.

The implementation plan is structured along the lines of the bioenergy policy chapter 7 on policy positions. All implementation actions are linked to electricity generation or biofuel production or promotion of clean and efficient cooking technologies. While actions such as capacity building, public awareness, social and environmental consideration and economic incentives are generic and cross-cutting in all three subsectors.

Implementation plans are overall descriptions of the main actions needed to achieve the Positions. Each action shall include a regulatory instrument, responsible party, budget if applicable and a time frame. In the application of the implementation plan, short term means a period of 1-2 years, medium term means a period of 2-5 years and long term means a period greater than 5 years.

Policy Position 1: Government will create a conducive environment to ensure adequate security of feedstock supply for biomass electricity generation and biofuel production.
a) Promote a diversified feedstock portfolio that prioritizes utilization of agricultural residues, commercial and industrial by-products as well as organic waste, while exploring dedicated energy plants. b) Promote good agricultural practices such as efficient use of water, good harvesting techniques and practices that minimize soil erosion and nutrient depletion while maximizing biomass yield, among others. c) Establish a monitoring framework to track progress towards achieving secure feedstock supply, regularly assess the effectiveness of implemented policies and adjust strategies as needed, encourage transparency in the biomass supply chain to ensure responsible sourcing practices

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
1(a)	i) Conduct a national assessment of potential biomass resources, including agricultural residues, dedicated energy plants, commercial and industrial waste, etc.	Studies	MoA, MTEA, MNRE	1.5 million	Short Term
	ii) Develop incentive programs for farmers and businesses to: Utilize agricultural residues Explore cultivation of dedicated energy plants Implement biomass residue and waste-to-energy solutions	Sugar Act, Cane Growers Act, Flora Protection Act, Investor's Handbook for Eswatini	MNRE, MoA, MCIT	-	Long Term
	iii) Implement benefit-sharing mechanisms that ensure fair compensation for feedstock	Sugar Act, Need an instrument on timber side	MoA,ESA, Forestry Department		Short term
	iv) Develop a research program focused on identifying high-yielding, fast-growing native plant species and non-invasive crops suitable for sustainable biomass plantations.	Program Documentation	MoA, MTEA, MNRE, private sector	1.5 million	Long Term
1(b)	i) Develop and disseminate training programs for farmers on sustainable agricultural practices for biomass feedstock production, including soil conservation techniques, nutrient management, sustainable irrigation techniques, etc.	Program Documentation	MoA	1 million	Long Term

1(b)	ii) Introduce certification schemes for sustainable biomass production that consider soil health, water use efficiency, and responsible fertilizer application.	Licensing Framework	MoA, MNRE	-	Long Term
	iii) Introduce renewable energy (mini and micro grids) to help decrease energy costs for farmers in turn unlocking biomass production to realize an increase in biomass production.	IPP policy	MNRE, MoA	25 million	Medium term
	iv) Expand Wattle Association to include out-growers with plantations growing other species.		MTEA, Forestry Department	0.5 million	Medium Term
1(c)	i) Establish a national biomass feedstock registry to track the type, quantity, and origin of biomass resources used for energy generation and biofuel production.	Feedstock Registry, Cane Growers Act, Flora Act	MoA, MTEA, MNRE		Long Term
	Develop and implement a monitoring framework to track progress towards achieving secure feedstock supply, including metrics on: Area under dedicated energy crop cultivation and invasive plants harvesting. Quantity of agricultural residues and by-products utilized for biomass energy. Soil health indicators in biomass production areas.	Monitoring framework	MoA, MTEA	0.5 million	Long Term
	iii) Promote transparency in the biomass supply chain by requiring reporting on sourcing practices and sustainability efforts from biomass producers.	Monitoring framework	MoA, MTEA		Long Term

Policy Position 2: Government will create a conducive environment to ensure efficient and reliable power production from biomass resources.

a) Establish minimum efficiency standards for biomass power plants to maximize energy output and minimize waste.
b) Strengthen existing dispatch frameworks to ensure biomass power plants contribute to base load requirements.

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
2(a)	i) Conduct a review of existing efficiency standards for biomass power plants in the region and internationally. Based on the review, establish minimum efficiency standards for new biomass power plants to be connected to the national grid. Consider factors like plant size, technology type, and fuel characteristics.	Study, Standards	MNRE, EEC, SWASA	0.5 million	Medium Term
	Develop a program to incentivize existing biomass power plants to improve efficiency through: Mobilizing funds for efficiency upgrades like boiler optimization or heat recovery systems. Performance-based incentives linked to exceeding efficiency standards.	Program Documentation , Investor's Handbook for Eswatini	MNRE, MoF, MoEPD	0.5 million	Medium Term
	iii) Establish a monitoring, reporting, and verification (MRV) system to track the efficiency performance of biomass power plants.	MRV Framework	MNRE, MTEA	0.5 million	Medium Term

2(b)	i) Strengthen existing dispatch framework to accommodate seasonality of part of the biomass resource while ensuring baseload commitments are met all year round.	Dispatch Framework	ESERA, MNRE, EEC	1.5 million	Short Term

Policy Position 3: Government will create a conducive environment to ensure efficient and reliable production of biofuels.

a) Encourage the development and adoption of advanced biofuel production technologies that are efficient and minimize environmental impacts.
b) Introduce mandatory fuel blending. (energy policy position 13, page 42)
c) Establish quality standards for biofuels and blending standards to ensure they meet performance criteria and minimize engine wear in vehicles.

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
3.(a)	i) Mobilize research funds to support research and development of advanced biofuel production technologies.	-	MNRE	1.5 million	Long Term
	ii) Collaborate with research institutions and the private sector to develop a technology roadmap for the advancement of the biofuels sector in Eswatini.	MOUs with academia	MNRE	-	Long Term
	iii) Facilitate technology transfer and collaboration with international partners with expertise in advanced biofuel technologies.	MOUs with industry and development partners	MNRE	-	Long Term

3(b)	i) Conduct a feasibility study to assess the technical and economic viability of introducing mandatory biofuel blending mandates beyond 10 percent.	study	MNRE	1.5 million	Short Term
	ii) Based on the feasibility study, develop and promulgate regulations establishing a biofuel blending mandate.	Regulatory Framework	MNRE	0.5 million	Medium Term
	iii) Collaborate with the Ministry of Finance and fuel retailers to establish mechanisms to ensure the price competitiveness and affordability of biofuels compared to fossil fuels.	Tax regulations	MNRE, MoF	-	Long Term
3(c)	Develop national biofuel quality standards based on international best practices. These standards will address: Fuel specifications for performance, compatibility with existing engines, and emission characteristics. Sustainability criteria to ensure biofuel production meets environmental and social responsibility standards	Standards	MNRE, ESERA, SWASA	0.5 million	Short term
	ii) Establish a testing and certification system for biofuels to ensure compliance with the national standards.	Monitoring Framework	MNRE, ESERA	0.5 million	Short term
	iii) Establish a clear regulatory framework for biofuel production, distribution, and licensing.	Regulatory Framework	MNRE	1 million	Short term

Policy Position 4: Government will create a conducive environment to ensure minimization of negative environmental impacts in biomass electricity production and biofuel production.

a) Set emission standards for biomass power plants and biofuel production plants to regulate air and water pollution.
b) Promote the use of efficient pollution control technologies.

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
4(a)	i) Establish a working group to review existing national and international air and water quality standards relevant to biomass power plants and biofuel production plants.	Study, Standards	MNRE, EEA, MTEA, DWA	0.5 million	Short term
	ii) Based on the review, develop and promulgate new regulations establishing specific emission limits for key air pollutants.	Regulatory Framework	EEA, MTEA, DWA, MNRE	0.5 million	Medium term
	iii) Improve environmental monitoring by procuring additional air quality monitoring stations near existing and planned biomass power plants and biofuel production plants.	Monitoring Framework	EEA, MTEA	2 million	Medium term

Policy Position 5: Government will ensure minimization of negative social impacts from bioenergy supply chain.

a) Develop regulations that address potential social impacts such as land use changes and community wellbeing

	iv) Mandate all biomass power plants and biofuel production plants to install and operate Continuous Emissions Monitoring Systems. Periodic reports on both water and air pollutants from sampling.	Monitoring Framework	EEA, MTEA	-	Short term
	v) Mandate all biomass power plants to practice safe disposal of ash.	Monitoring Framework	EEA, MTEA	-	Short term
	vi) Partner with international development agencies or private sector entities to facilitate technology transfer and capacity building for the operation and maintenance of advanced pollution control equipment.	MOUs with industry/development partners	MNRE	-	Medium term

Policy Pos. #	**Action**	**Regulatory Instrument**	**Responsible Party**	**Budget if Applicable (E)**	**Time Frame**

Policy Position 6: Government will create a conducive environment for fostering investment and ensuring cost-effectiveness in bioenergy electricity generation and biofuel production. Government shall, in conjunction with relevant stakeholders

a) Review the various tax obligations as well as deductions, exemptions and special incentives/both fiscal and non-fiscal for biomass electricity generation investments and biofuel production investments. (IPP policy position 17 page 51)

5	i) Conduct a comprehensive social impact assessment to identify potential social impacts of biomass development, including: Land-use changes and competition with food production. Impacts on livelihoods and access to resources for local communities. Potential health risks associated with air and water pollution.	Study	MTEA, MNRE, MoA,, MoH, CSO, MTAD	0.5 million	Medium term
	ii) Partner with universities or NGOs with expertise in social impact assessments.	MOUs with academia and NGOs	MNRE	-	Medium term
	iii) Develop a national land-use plan for biomass feedstock production.	Land use plan	MoA	0.5 million	Short term

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
6	i) Review the various tax obligations, exemptions and special incentives for biomass power plants and biofuels investments. This shall be done as part of a broader process of developing a detailed "Investor's Handbook for Eswatini".	Study	MNRE, EIPA, MoF, MCIT	0.5 million	Short Term
	ii) Develop an "Investor's Handbook" for Swaziland.	Guideline	EIPA	0.2 million	Short Term
	iii) Amend legislation as necessary	Legislation	MOF, MOEPD, MNRE	-	Medium Term

Policy Position 7: Government will create an enabling environment for the adoption of improved cook stoves in all households, including vulnerable groups, to reduce overall biomass consumption and associated environmental impacts

a) Mobilize funds to provide affordable, clean-burning cook stoves with higher efficiency in heat transfer, reducing reliance on fuelwood.
b) Support training programs on proper stove use and maintenance for maximizing efficiency and minimizing emissions.

Policy Pos. #	**Action**	**Regulatory Instrument**	**Responsible Party**	**Budget if Applicable (E)**	**Time Frame**
7(a)	i) Conduct a study to assess the existing landscape of cook-stove technologies in Eswatini	Study	MNRE, CSO	1.5 million	Short term
	ii) Conduct a study to assess the existing landscape of cook-stove technologies in Eswatini and regionally, identifying the most efficient and affordable options for the local context.	Study	MNRE	1.0 million	Short term
7(b)	Develop a national improved cook-stove program with two key components: Part I: Subsidies or Affordability Schemes: ● Partner with private sector cook-stove manufacturers and distributors to offer subsidized cook-stoves to low-income households. ● Explore alternative financing mechanisms to facilitate cook-stove purchase for other segments of the population.	Program documentation	MNRE	10 million	Short term

7(c)	Part II: Awareness Raising and Training: ● Conduct public awareness campaigns to educate communities on the benefits of improved cook-stoves, including reduced fuel consumption, improved air quality, and health benefits. ● Organize training programs on proper cook-stove use and maintenance to maximize efficiency and lifespan.		MNRE, MoH	0.5 million	Short term

Policy Position 8: Government will create an enabling environment for the promotion of access to cleaner and more sustainable alternatives for cooking and heating, considering affordability and practicality for all households including all vulnerable groups

a) Expand access to electricity for households, particularly in rural areas, where grid extension is feasible and through mini-grids.
b) Promote use of liquefied petroleum gas (LPG) as a cleaner cooking fuel option, considering affordability and distribution infrastructure.
c) Explore the feasibility of introducing biogas digesters for all households with organic waste resources, promoting renewable energy production at the household level.

Policy Pos. #	**Action**	**Regulatory Instrument**	**Responsible Party**	**Budget if Applicable (E)**	**Time Frame**
8(a)	i) Conduct a feasibility study to identify rural areas with potential for cost-effective grid extension for electricity access	Study, grid code	MNRE, ESERA, EEC,MTAD	0.5 million	Short Term
	ii) Where grid extension is not feasible, provide efficient cook-stoves, biogas digesters and invest in mini-grid and micro-grid solutions powered by renewable energy sources targeting women headed, child headed households and vulnerable groups.	Cook-stoves program	MNRE, MTAD	10 million	Medium Term

8(b)	i) Conduct a market analysis to assess the affordability and availability of LPG in Eswatini, identifying potential bottlenecks in the supply chain, e.g distance to refill stations.	Study	MNRE, ESERA	0.5 million	Short Term
	Develop a targeted LPG subsidy program for low-income households, focusing on areas with limited electricity access. Encourage the expansion of LPG distribution networks, particularly in rural areas. Develop safe and efficient LPG cook-stove models and standards tailored for the Eswatini context.	Program documentation	MNRE, ESERA	1.5 million	Short Term
	iii) Design and implement public awareness campaigns to educate households on the benefits and safe use of LPG for cooking.	Awareness campaigns	MNRE, ESERA	0.5 million	Short Term
8(c)	i) Conduct pilot projects for households with abundant organic waste resources to assess the technical and economic viability of biogas digesters for household energy needs.	Project plan	MNRE, MTAD	1 million	Medium Term
	ii) Based on the pilot projects, develop guidelines and best practices for biogas digester installation and operation in Eswatini.	Guidelines	MNRE	0.5 million	Medium Term
	iii) Explore financing mechanisms, such as microloans or subsidies, to support the adoption of biogas digesters by households or community groups.	Workshop/meetings	MNRE	-	Medium Term

	iv) Develop capacity building programs for households on biogas digester maintenance and safe utilization.	Program documentation	MNRE	0.5 million	Medium Term

Policy Position 9: Government will prioritize sustainable forest management practices and promote reforestation initiatives to ensure long-term availability of biomass resources.

a) Implement regulations and enforcement mechanisms to prevent illegal logging, deforestation, and cutting indigenous trees.
b) Support reforestation initiatives to replenish wood resources and improve environmental health.

Policy Pos. #	**Action**	**Regulatory Instrument**	**Responsible Party**	**Budget if Applicable (E)**	**Time Frame**
9(a)	i) Develop regulations and enforcement mechanisms to: Prevent illegal logging, deforestation, and the cutting of indigenous trees. Hold violators accountable through stricter penalties and improved detection methods.	Flora Protection Act	MTEA, MTAD	0.5 million	Short Term
	ii) Develop and implement a national forest management plan that promotes sustainable harvesting practices, including: Rotational logging systems to ensure forest regeneration. Selective cutting and preservation of biodiversity. Designation of protected forest areas and corridors for conservation.	Forest management Plan	MTEA	1.5 million	Medium Term

	iii) Develop a forest monitoring system utilizing remote sensing and on-ground assessments to track deforestation and forest health.	-	MTEA, EEA	1.5 million	Medium Term
9(b)	i) Develop a national reforestation strategy that prioritizes: Planting indigenous tree species for ecological restoration and biodiversity enhancement. Establishing woodlots for sustainable biomass production and fuelwood needs.	Strategy	MTEA	0.5 million	Short Term
	ii) Launch public awareness campaigns to encourage individual and community participation in tree planting activities. Aligns with the National Development Commitment (NDC) to plant 10 million trees by 2030	Awareness Campaigns	MTEA, MTAD	0.5 million	Short Term

Policy Position 10: Government will ensue that there is comprehensive development of national capacities in biomass electricity generation and biofuels production. Government will ensure that the development of national capacities in the sector is inclusive, with men and women, boys and girls, and all vulnerable groups involved.

a) Mobilize funds for research institutions to study sustainable biomass production methods and advanced conversion technologies.
b) Support training programs for farmers, technicians, engineers and other related professions on sustainable biomass management and power generation technologies and biofuel production.
c) Raise public awareness about the benefits and potential challenges of biomass energy to encourage public support.

Policy Pos. #	**Action**	**Regulatory Instrument**	**Responsible Party**	**Budget if Applicable (E)**	**Time Frame**

Policy Position 11: Government will ensure that the public, including men and women, boys and girls, and all vulnerable groups, is educated about the health and environmental impacts of unsustainable biomass.

a) Raise public awareness about the health and environmental impacts of unsustainable biomass use and promote the benefits of cleaner cooking and heating alternatives, targeting both men and women, boys and girls, and all vulnerable groups.

10(a)	Mobilize research funds to support research institutions in conducting studies on: Sustainable biomass production methods, including soil health, nutrient management, and efficient water use practices. Advanced biomass conversion technologies like gasification, advanced combustion techniques, and biofuel production.	Letters of Support	MNRE, MTEA, RSTP, MoA	1.5 million	Medium Term
10(b)	Develop training programs for farmers on: Sustainable biomass feedstock production practices. Soil conservation techniques and nutrient management. Best practices for harvesting and storage of biomass feedstock.	Training program documentation	MTEA, MoA	0.5 million	Medium Term
	Collaborate with technical colleges and vocational training centers to offer training programs for technicians and engineers on: Operation and maintenance of biomass power plants. Biomass conversion technologies and associated equipment. Safety protocols for handling biomass feedstock and emissions control systems.	MOUs	MNRE	1 million	Medium Term
10(c)	i) Develop educational materials (brochures, infographics, videos) that explain the benefits and potential challenges of biomass energy in a clear and accessible manner.	-	MNRE	0.2 million	Short term

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
11	i) Develop educational materials (brochures, infographics, videos) that explain the health impacts of air pollution from traditional cook-stoves, including respiratory illnesses and cardiovascular diseases.	-	MNRE, MOH	0.2 million	Short Term
	ii) Train public health workers to conduct public health campaigns highlighting the link between indoor air pollution and respiratory illnesses, particularly targeting women and children most exposed to cooking smoke.	Training program documentation	MOH	1.5 million	Short Term
	iii) Work with community leaders and traditional authorities to: Disseminate information about the policy and its objectives within communities. Promote behavior change and encourage adoption of cleaner cooking and heating practices.	-	MNRE, MTAD	0.2 million	Short Term
	iv) Train community leaders and educators as advocates for sustainable biomass use and clean energy access.	Training program documentation	MNRE, MTEA, MTAD	0.5 million	Medium Term

Policy Position 12: Government will ensure that the country advances and keeps up with developments in biomass cook stoves.

a) Support research, development and demonstration efforts to explore cleaner and more efficient biomass conversion technologies.

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame

12	i) Mobilize resources to establish a dedicated research fund to support domestic research and development research efforts focused on cleaner and more efficient biomass conversion technologies suitable for household use in Eswatini.	-	MNRE	-	Medium Term
	ii) Partner with research institutions in Eswatini and abroad to: - Conduct research on promising biomass conversion technologies like advanced gasification systems or efficient charcoal production methods. - Develop prototypes and pilot projects for domestic-scale biomass conversion technologies.	MOUs with academia	MNRE	0.5 million	Medium Term
	iii) Explore collaboration opportunities with international development partners to leverage expertise and access funding for biomass conversion technology research and development.	MOUs with development partners	MNRE	-	Medium Term
	iv) Develop a regulatory framework that incentivizes private sector investment in the development, commercialization, and deployment of clean biomass conversion technologies for domestic use.	Regulatory Framework	MNRE	0.5 million	Long Term
	v) Organize workshops and conferences to connect researchers, entrepreneurs, and investors to foster partnerships and accelerate technology commercialization.	-	MNRE	0.2 million	Long Term
	vi) Provide technical assistance and support to private sector companies developing and piloting clean biomass conversion technologies in Eswatini.	Implementation agreements	MNRE	0.5 million	Long Term

	vii) Invest in training programs for researchers, engineers, and technicians on advanced biomass conversion technologies and domestic applications	-	MNRE	0.5 million	Medium Term

Policy Position 13: Government will create a conducive environment by developing a regulatory framework to ensure that the development and implementation of bioenergy projects contribute to gender equity, youth empowerment, and the inclusion of vulnerable groups.

a) Support equity and ensure inclusiveness in the bioenergy sector in ways that promote equitable access to benefits and resources for men and women, boys and girls, and all vulnerable groups.
b) Encourage active participation of men and women, boys and girls, and all vulnerable groups in decision-making processes related to bioenergy development.
c) Invest in capacity-building programs that enhance the skills and knowledge of men and women, boys and girls, and all vulnerable groups in the bioenergy sector.

Policy Pos. #	Action	Regulatory Instrument	Responsible Party	Budget if Applicable (E)	Time Frame
13(a)	i) Collaborate with civil society organizations, community groups, and international partners to implement the gender, youth, and vulnerable groups policy within bioenergy projects.	MOUs	MNRE	0.2 million	Short Term

13(b)	Organize workshops to disseminate information to vulnerable groups so they are equipped to participate actively in decision making on bioenergy.	-	MNRE, MTAD	0.2 million	Short Term
13(c)	i) Provide training and resources to government agencies, project developers, and other stakeholders on integrating gender, youth, and vulnerable groups considerations into bioenergy initiatives.	Training program documentation	MNRE, MTAD	0.5 million	Short Term

4. Monitoring and Evaluation

The monitoring and Evaluation of the Bioenergy Policy will be the responsibility of the Energy Department in the Ministry of Natural Resources and Energy. The monitoring and evaluation of the policy will be done through tracking of indicators for the different actions as well as tracking of indicators for GHG impacts. The monitoring plan is structured along the lines of the bioenergy policy chapter 7 Positions. The plan is summarized in the table below.

Policy #	**Indicator**	**Owner**	**Data Source**	**Timing**
1(a)	i) Database of available biomass resources	MNRE	ESA, ECGA, timber companies, wattle grower association	Annually
	ii) Number of incentive programs for farmers and business to promote sustainable farming in the bioenergy sector. - Number of farmers that benefited from incentive programs.	MoA	ESA, ECGA, timber companies, wattle grower association	Annually
	iii) Number of research program focused on identifying high-yielding, fast-growing native plant species and non-invasive crops suitable for sustainable biomass plantations. - Number of people involved in the research programs. - Number of articles published in the research programs.	MNRE, MoA	MNRE and Research Centers	Annually
1(b)	i) Number of sustainable farming training programs in the bioenergy sector. - Number of farmers that benefited from training programs.	MoA	ESA, ECGA, timber companies, wattle grower association	Annually

	ii) Number of farmers that received certification for sustainable biomass production.	MoA	ESA, ECGA, timber companies, wattle grower association	Annually
	Iii) Number of farmers with mini or micro grids and their capacity	MNRE, ESERA	ECGA, timber companies, wattle grower association, ESERA	Annually
	iv) Number of farmers (non-wattle growers) that are part of Wattle Association.	Forestry Department	Wattle Association	Annually
1(c)	i) Bioenergy Feedstock Registry	MNRE	MoA, Forestry Department , ECGA, timber companies, wattle grower association	Annually
	ii) Monitoring framework	MNRE	MoA, Forestry Department , ECGA, timber companies, wattle grower association	Once
2(a)	i) Reviewed efficiency standards for biomass power plants in Eswatini.	ESERA	MNRE	Annually
	ii) Number of incentive programs for biomass power plants to improve efficiency.	MNRE	ESA, MoF, MoEPD	Annually
2(b)	i) Dispatch Framework for biomass power plants	EEC	ESA, ESERA	As necessary
3(a)	i) Funds for biofuel research	MNRE	MoF	Annually
	ii)Number of MOUs	MNRE		Annually
3(b)	i) Study Report	MNRE	MNRE study	Once
	ii) Regulatory Framework	ESERA	MNRE	Once
3(c)	i) Biofuel Quality Standards	SWASA		Once
	ii) Monitoring Framework for biofuels	ESERA	ENPC	Once
	ii) Regulatory Framework for biofuels	ESERA	ENPC	Once
4(a)	i) Study Report - Environmental Standards in bioenergy sector	EEA	EEA, MNRE, MTEA, DWA	Once
	ii) Environmental Regulatory Framework in bioenergy sector	EEA	EEA, MNRE, MTEA, DWA	Once
	iii) Environmental Monitoring Framework in bioenergy sector -Number of air quality monitoring stations near	EEA	EEA, MNRE, MTEA, DWA	Once, Annually

	biomass power plants and biofuel production plants.			
	iv) Reports on both water and air pollutants from sampling from biomass power plants and biofuel production plants.	EEA	Sugar companies, US Distillers, timber companies	Annually
	v) Monitoring Framework for Ash disposal	EEA	Sugar companies, USA Distillers, timber companies	Once
	vi) MOUs	MNRE		Once
5.	i) Study Report	MNRE	Study - MTEA, MNRE, MoH, CSO, MTAD	
	ii) MOUs	MNRE		Once
	iii) National Land Use Plan for biomass feedstock production	MoA		Once
	iv) Benefit Sharing Mechanism, to be included in – Sugar Act Review, Cane Grower Act Review	MoA	ESA,	Once
6.	i) Study Report	EIPA	Study - EIPA, MoF, MCIT	Once
	ii) Eswatini Investor Handbook	EIPA		Once
	iii) Amended Legislations	MoF	MOF, MOEPD, MNRE	As needed
7(a)	i) Study Report	MNRE	Study	
	ii) Study Report	MNRE	Study	
7(b)	- Program Documentation - Number partners (private sector cook stove manufacturers and distributors) - Number and Amount of alternative financing mechanisms	MNRE	CSO	-Once -Annually -Annually
7(b)	- Number of public awareness campaigns. - Number of training programs on cook stoves - Number of trained people	MNRE	Program implementers	Annually
8(a)	i) Study Report	MNRE	Study - MNRE, ESERA, EEC,MTAD	Once
	ii) Number of efficient cook-stoves distributed	MNRE	MNRE, CSO	Annually

	- Number of households with efficient cook-stoves - Number of households with biogas digesters - Number of communities with mini-grids or micro-grids - Number of households connected to mini-grids or micro-grids			
8(b)	i) Study Report	MNRE	Study	Once
	ii) Number of LPG subsidy program for low-income households - Number of households involved in program - Safe and efficient LPG cookstove models and standards tailored for the Eswatini context	MNRE	MNRE, CSO	Annually
	iii) Number of public awareness campaigns to educate households on the benefits and safe use of LPG for cooking	MNRE	MNRE	Annually
8(c)	i) Number of households with biogas digesters	MNRE	MNRE, CSO	Annually
	ii) Guidelines for biogas digester installation and operation in Eswatini.	MNRE	MNRE	Once
	iii) Number of workshops/meetings with potential financiers and development partners.	MNRE	MNRE	Annually
	iv) Number of capacity building programs for communities on biogas digester maintenance and safe utilization	MNRE	MNRE, MTAD	Annually
9(a)	i) Regulations for the Flora Protection Act and finalized Forestry Bill	Forestry Department	MTEA	Once
	ii) National forest management plan that promotes sustainable harvesting practices	Forest Department	MTEA	Once
	iii) Forest monitoring system	Forest Department	MTEA	Once
9(c)	i) National reforestation strategy	MTEA	MTEA	Once

	ii) Number of public awareness campaigns to encourage individual and community participation in tree planting activities	MTEA	MTEA	Annually
10(a)	i) Funds available to support research in sustainable biomass production.	MNRE	MNRE	Annually
10(b)	i)Number of training programs for farmers in sustainable biomass feedstock production.	MNRE	MN, MoA	Annually
	ii) MOUs	MNRE	MNRE, MoA	Annually
10(c)	i) Number of educational materials that explain the benefits and potential challenges of biomass energy in a clear and accessible manner.	MNRE	MNRE	Annually
11	i) Number of educational materials that explain the health impacts of air pollution from traditional cook-stoves, including respiratory illnesses and cardiovascular diseases.	MNRE	MoH, MNRE	Annually
	ii) Number of public health campaigns highlighting the link between indoor air pollution and respiratory illnesses.	MoH	MoH, MTAD	Annually
	iii) Number of community leaders involved in in awareness campaigns	MNRE/MoH	MoH, MTAD	Annually
	iv) Number of community leaders and educators trained as advocates for sustainable biomass use and clean energy access.	MNRE/MoH	MNRE, MoH, MTAD	Annually
12.	i) Amount of resources dedicated to support domestic research focused on cleaner and more efficient biomass conversion technologies suitable for household use in Eswatini.	MNRE	MNRE	Annually
	ii) Number of MOUs	MNRE	MNRE	Annually
	iii) Number of MOUs	MNRE	MNRE	Annually
	iv) A regulatory framework that incentivizes private sector investment in the development, commercialization, and deployment of clean biomass conversion technologies for domestic use	MNRE	MNRE/MoF	Once

	v) Number of workshops and conferences to connect researchers, entrepreneurs, and investors to foster partnerships and accelerate technology commercialization.	MNRE	MNRE	Annually
	vi) Number of training programs for researchers, engineers, and technicians on advanced biomass conversion technologies and domestic applications.	MNRE	MNRE	Annually
13.	i) Number of training programs to government agencies, project developers, and other stakeholders on integrating gender, youth, and vulnerable groups considerations into bioenergy initiatives.	MNRE	MNRE	Annually
	ii) Number of workshops held	MNRE	MNRE/MTAD	Annually

The policy will also be monitored overall for environmental impacts. In particular, the policy will be assessed for GHG impacts. The actions in this policy, if achieved, can contribute significantly to the mitigation plans of the KoE. To track progress, the Energy Department will collect the data outlined in the table below and pass it on to MTEA. The data will then be used to track the contributions of the actions to GHG emissions mitigation efforts.

	Indicator	**Data Source**	**Timing**
Biomass Electricity	Units of electricity generated	MNRE – Energy Balance	Annually
Biofuels	Litres of ethanol in blending	ENPC -	Annually
Cook-Stoves	Number of households using efficient cook-stoves	MNRE/CSO	Annually
	Number of households using LPG	MNRE/CSO	Annually
	Number of households using biogas	MNRE/CSO	Annually