ICAT Renewable Energy and Sustainable Development Impact Assessment of the National Renewable Energy Policy and The Bio-Fuels Policy of Zimbabwe

Training Workshop Report

23 – 24 August 2021

Kadoma, Zimbabwe

Submitted by

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Contents

1.0 Introduction

The Initiative for Climate Action Transparency (ICAT) assessment guidelines improves transparency by providing policymakers with tools and support to measure and assess the impacts of their climate actions. The global climate change regime is changing at an accelerated pace with transformation of the energy sector being one of the areas being prioritised by Zimbabwe through the Nationally Determined Contributions to the UNFCCC. The UNEP Emissions GAP Report (2019), indicated that GHG emissions continue to rise, despite scientific warnings and political commitments. The fossil CO_2 emissions from energy use and industry which dominate total GHG emissions, grew 2.0 per cent in 2018, reaching a record 37.5 $GtCO_2$ per year. Given this scenario, Parties to the UNFCCC and the Paris Agreement are called upon to increase their ambition through higher emission reduction targets and related policy instruments.

The National Renewable Energy Policy of 2019 which targets 26,5% renewable energy mix in the electricity grid by 2030, supports Zimbabwe's first NDC and the revised draft NDC which calls for a reduction of greenhouse gases from the energy sector by 33% per capita by the year 2030. The National Renewable Energy Policy (NREP) supports the Biofuels Policy of Zimbabwe (BFPZ) which seeks to promote the local production and mandatory blending of ethanol and bio-diesel at 20% ethanol in petrol (E20) and 2% biodiesel blending in diesel (B2). The implementation of the policy will accrue a number of benefits which include reducing the countries import bill on energy, climate change mitigation and adaptation with sustainable development impacts. Both renewable energy (RE) policies will play a significant role in this transition.

Governments around the world are implementing increasingly ambitious policies to accelerate moving away from fossil fuel sources of energy to renewable sources. The declining cost of RE technologies and their potential to support sustainable development objectives are facilitating to accelerate the change. In this context, there is an increasing need to assess and communicate the impacts of RE policies to ensure they are effective in mitigating GHG emissions, advancing development objectives, and helping countries meet their sectorial targets and national commitments.

The Initiative for Climate Action Transparency (ICAT) Renewable Energy Methodology is designed to assist policy makers assess the impacts of RE policies and improve their effectiveness. It can play a critical role in providing the information needed for preparing reports under the Paris Agreement's Enhanced Transparency Framework (ETF). The training of government officials and technical experts provided a methodological guidance for assessing the GHG impacts of NREP (2019) and BFPZ (2019). A stepwise approach was adopted for estimating the effects of policy design characteristics, economic and financial factors, and other barriers on the prospective for RE policies to achieve technical potential or targets for the assessment period. GACMO model overview was provided to guide participants on how to convert this impact (expressed in terms of newly installed RE capacity or generated electricity) into GHG emissions reductions. The training provided an opportunity for technical expert input into the assessment of the policies in determining the potential impact of RE policies over the implementation period.

ICAT RE guidelines training, provided general principles and concepts, and a stepwise method for estimating the GHG impacts of RE policies. The methods are applicable to any type of RE policy, however the guidelines provide in depth analysis of Feed-in tariff, Auction system, and taxes and incentives which can be further explored by participants beyond the training. NREP (2019), was used

as the core policy for the training with reference to the BFPZ (2019) where applicable, since NREP (2019) contains policy instruments that are referred to in the ICAT RE guidelines, thereby providing reference for participants to follow the assessment guidelines stepwise methodology. Within the policy, the policy instruments /action referred to are as follows;

- Feed-in tariff policies (including feed-in premiums) – policies that aim to promote RE deployment by offering long-term purchase agreements with power producers at a specified price per kilowatt-hour (kWh).
- Procurement or Auction policies (including tender policies) – competitive bidding procurement processes for renewable electricity in the form of either capacity (megawatt – MW) or electricity generated (MWh)
- Tax incentive policies – policies under which authorities at the National, Subnational or Municipal level offer tax incentives for the installation and operation of RE installations.

2.0 Objectives

I. Provide an overview of ICAT assessment guidelines,
II. Conduct training of Government officials and experts on the step by step training on the ICAT Renewable Energy guidelines,
III. Contextualise the application of the ICT Renewable Energy Assessment Guidelines.
IV. Develop a case for application of the guidelines to the National Renewable Energy Policy, 2019 (NRP 2019) and the Biofuels Policy of Zimbabwe, 2019 (BFPZ 2019).
V. Identify policy design characteristics, financial and other barriers, and account for their effect on the technical potential for the assessment period of the policy.

3.0 List of Participants

The participants for the training workshop are presented in Table 1

Table 1: Participant List

Ministry/Department	Official	Sex	Designation
Climate Change Management Department	K. Ndidzano	M	Deputy Director
	T. Muhwati	M	ICAT Coordinator
	L. Mashungu	M	Mitigation Officer
	V. Taurai	F	Administrative Assistant
MECTHI Finance	B. Chiya	F	Accountant
	B. Mangwende	M	Deputy Director
	S. Maheya	F	Renewable Energy Officer
	S. Chatsama	M	Energy Development Officer
Ministry of Transport and Infrastructure Development	N. Chifema	M	Deputy Director
	K. Manyanga	M	Engineer
Zimbabwe Energy Regulatory Authority	T. Mudzingwa	M	Engineer
Finealt Biodiesel Engineering	W. Mukosera	M	Engineer
National Communications Office - Consultant	T. Marowa	M	National Communication Mitigation Expert
African Youth Initiative on Climate Change	R. Matsika	F	IPCC GHG Energy Sector Trainee
Renewable Energy Association of Zimbabwe	I. Nyakusendwa	M	Director
ICAT Local Consultant	L. Makurumure	M	Consultant
MECTHI Administration	N. Ruoko	M	Driver/Transport Assistant

Online Participants (Via Zoom)

Organisation	Official	Sex	Designation
UNEP Denmark Technical University	Jingjing Gao	F	ICAT Programme Manager
	Jyoti Prasad Painuly	M	ICAT Policy Assessment Renewable Energy Expert
MECTHI/UNDP	T. Dhlakama	M	NDC Partnership Coordinator

4.0 Details of Presentation

4.1 Climate Change Policies

Presenter: Mr Tirivanhu Muhwati (Ministry of Environment, Climate, Tourism and Hospitality Industry, Climate Change Management Department)

The climate change policy framework in relation to the energy sector

National Renewable Energy Policy and the Biofuels Policy of Zimbabwe have integrated climate change in their development approach, policy targets were framed to support a low carbon transition. Energy sector particularly renewable energy is at the centre of the climate change agenda in Zimbabwe because it is the major contributor of GHG emissions. Greenhouse gas emissions from the energy sector emanate from combustion of carbon-based fuels as well as fugitive emissions during coal mining and handling processes. Policy objective of the climate policies is to ensure a climate resilient low carbon Zimbabwe that is to be attained under the guidance of the National Climate Policy (NCP). The National Climate Policy is the overarching policy for climate change in Zimbabwe, supported by the National Climate Change Response Strategy (NCCRS) which guides the design and implementation of four critical climate frameworks namely Low Emission Development strategy (LEDS), National Adaptation Plan (NAP), Nationally Determined Contributions (NDC'S) to the UNFCC and the National Climate Change Learning Strategy (NCCLS).

Climate Change Policy frameworks outline support for mitigation and low carbon development that are critical to the energy sector. In addition, the National Climate Change learning strategy has identified key energy sector actions that resonate with the energy policies and support the achievement of the targets. These actions include; strengthening low carbon energy provisions through education and training, creating awareness on policies and regulatory frameworks for renewable energy, energy conservation and energy efficiency, promoting research and development in the renewable energy sector, demand side management and strengthening energy planning. All these efforts are driven on the energy sector since it is currently the biggest contributor, including transport sector, to the total National GHG emissions in Zimbabwe, accounting for 33% of GHG emissions by 2017. The main source of GHG emissions in the sector is thermal power generation (37.71%), followed by residential (19.08%), road transportation (15.48%) and agriculture (13.84%). The revised NDC's has identified 9 energy related mitigation projects from the energy and transport sector also covered by the NREP (2019) and the BFPZ (2019).

Policy impact assessments for the two policies need to be undertaken to align with the Enhanced Transparency Framework under the Paris Agreement which requires Parties to move towards transparency of action and support. Such assessments will be critical for the Biennial Transparency Reporting (BTR) and Technical review from 2024 that will replace the Biennial update reports and. At domestic level the assessment will enable informed policy review, strategic planning and measurement of progress over time in line with the country's climate change commitments.

4.2 Overview of Renewable Energy Policies

Presenter: Mr. B. M Mangwende (Ministry of Energy and Power Development, Department of Energy Conservation and Renewable Energy)

Overview of Renewable Energy and Biofuels Policies in Zimbabwe

The policy assessment for the National Renewable Energy Policy (NREP), 2019 and the National Biofuels Policy (NPFPZ), 2019 are key elements in the implementation of the policy. Impact assessment is being conducted at a time when the Ministry of Energy and Power Development (MoEPD) is developing an implementation frame work for the policies that will also provide mechanisms for monitoring and evaluation during the implementation.

The NREP (2019) has key objectives of increasing the share of renewable energy in the overall energy mix, ***addressing issues of climate change,*** drive cost effective implementation of sustainable energy sources and encourage social uplifting of communities. Given the rapid transition within the energy sector the policy will be in force for 10 years and will end in 2030 where a new policy framework will be developed. The Policy seeks to increase the share of Renewable Energy electricity from 6% in 2017 to 27% by 2030 using technology specific mechanisms which are shown in table 2:

Table 2: Technology specific procurement mechanisms

Technology	Procurement mechanism
Solar PV	Competitive Bidding
Concentrated Solar Power (CSP)	Competitive Bidding
Wind Energy	Feed in Tariff (Up to 2025) Competitive bidding
Geothermal and Biomass	Feed in Tariff
Roof top solar	Net metering

Key issues addressing developmental risks of renewable energy polices include; the reduction of approval time lines for all licences required in the establishment of a RE project such as grid connection, water extraction, land use and Environmental Impact Assessments. The establishment of a Nodal Agency to facilitate timely approvals for projects has been recommended. The agency will be a resource centre for investment in RE and has a facilitator role to ensure administrative within government agencies are not complex and time consuming. In addition the Policy will develop funding mechanisms for Renewable Energy including the Green energy fund, Sovereign guarantee, and prescribed asset status for RE projects.

The National Biofuels Policy of Zimbabwe aims to provide an enabling environment for the development of a biofuel sector in Zimbabwe with the objective of ensuring 20% mandatory ethanol blending in petrol (E20) and 2% blending of Bio diesel (B2) by 2030. It focuses on liquid biofuels in the transport sector namely: ethanol from sugar cane, and biodiesel from Jatropha, while exploring the possibility of using other feed stocks for biofuel production. In achieving these targets the policy will ensure enhanced energy security and support the development of a Green Economy.

Since the adoption of these policies in March 2020 the following actions are under implementation;

- Regulations are being aligned to the policies (including SI 147 of 2010 on duty free importation of solar products),
- Net-metering Regulations gazetted, and programme implementation to be expedited,
- Mandatory Solar geyser regulations for new buildings to be implemented (SI 235 of 2019),

- AfDB is working on developing a ***competitive bidding framework*** for solar, wind and hydro projects,
- Licensing timelines for renewables and license fees are being reviewed,
- Renewable Energy Policy and Biofuels Policy **Implementation Matrices** are being finalised for implementation.

4.3 Overview of ICAT Guidelines

Presenter: Jingjing, Gao (UNEP DTU Partnership)

Introduction to use of ICAT methodologies

The ICAT guideline were developed to support the implementation of the Enhanced Transparency Framework under the Paris Agreement article 4. The objective of the guidelines is to provide policymakers around the world with tools and support to assess the impacts of their climate policies and actions and support greater transparency, effectiveness trust and ambition in climate policies worldwide. ICAT series of guidance documents introduces the guidance documents and describes how to use them, and helps users plan the assessment of the impacts of their policies and actions. Purpose of the guidance documents is to assist user asses the GHG emissions, sustainable development and transformational impacts of policies in an integrated way. The guidance documents assists decision makers develop effective strategies for achieving GHG mitigation and ensure consistent and transparent reporting GHG, sustainable development and transformational impacts, and policy effectiveness.

ICAT series of guidelines is a flexible methodology that enable users to apply the guidelines with the context of their own objectives and circumstances at any level of government, in any sector and for policies at various stages of implementation. In application of the guidelines, the most comprehensive approach is to apply the methodology before (ex-ante), regularly during, and after policy implementation (ex- post). This follows an implementation cycle from defining the policy objectives, identifying potential policies, and assessing the potential impacts (ex-ante), selecting and implementing policies, monitoring progress during the policy implementation and assessing the actual impacts (ex-post). The impact assessment focuses on GHG assessment and has a relationship to GHG inventories and national MRV systems. This is in line with the ETF and will support the Biennial Transparency Reporting (BTR) coming into effect from 2024. The guideline therefore will help track progress made in implementation, support needed and received by countries. Overall, the ICAT methodology has significant relevance to the Paris Agreement as it helps countries understand the impacts of various policies and actions and monitor progress over time as indicated in Article 4: Parties are required to account for their NDCs, which include GHG targets, non-GHG targets and actions. The guidelines support countries that intend to transparently assess the GHG and sustainable development impacts of policies that may be transferred to another country and facilitate improved quality and transparency of the information countries report and prepare for technical expert review as indicates in Articles 6.2, 6.4, and 13.3.

Eight guidelines have been developed under the Impact Assessment Methodologies to cover: Renewable Energy, Building Efficiency, Transport Pricing, Agriculture sector, Forestry sector, Sustainable Development, Transformational Change and Non- State Subnational Action.

4.4 ICAT Renewable Energy Guideline

Presenter: Dr Jyoti Prasad Painuly (UNEP DTU Partnership)

Training Workshop on Policy Assessment using ICAT Guidelines – Focus on the National Renewable Energy Policy and the National Biofuels Policy

Zimbabwe NDC has indicated the mitigation contribution for Zimbabwe as 33% below the projected business as usual energy emissions per capita by 2030. This mitigation is set to be achieved by a number of actions including deployment of solar water heaters, ethanol blending, increasing hydro in the energy mix and solar powered off Grids. These actions are supported by the RE polices which include Renewal purchase obligations, tax incentives, viability gap funding, feed-in tariff and competitive bidding. Based on the above policy instruments ICAT responds to the critical need to support improved transparency and capacity building under the Paris Agreement. The methodology supports the Biennial Transparency Reporting (BTR) by providing information necessary to track progress made in implementation and achieving Nationally Determined Contributions under Article 4 of the Paris Agreement.

The ICAT guidelines covers three policies namely: Feed-in Tariff, Auction, and Tax Incentives. The renewable energy has a combination of all three policies although the three policies are assumed to be mutually exclusive in applying the guidance. In applying the guidelines the assessment objectives need to be clarified, the assessment is an ex – ante assessment for the three policies, that will estimate and asses the GHG emissions reductions under the policy scenario, hence evaluating the effectiveness of policies and improving their design and implementation. The guidance structure has four main levels which are; the objectives of the RE policies, defining the assessment, assessing the impacts, and monitoring and reporting. In the assessment, estimating RE addition of the policy ex–ante is a stepwise approach to estimate RE addition. After defining the technical potential which is the objective of the policy then assessment steps will account for policy design characteristics (2nd step), account for effect on financial feasibility of RE technologies (3rd step), and account for other barriers (4th step).

To account for Policy design characteristics, the following steps were followed;

- Step 1 Identification of design characteristics that influence RE technical potential.
- Step 2 Description of how the identified policy design characteristics are expected to influence RE deployment.
- Step 3 Estimation of overall influence of these characteristics on the RE technical potential.

Accounting for Effects on Financial Feasibility of RE-technologies

- Step 1 Calculate LCOE for different renewable energy technologies.
- Step 2 Compare the LCOE with financial incentives provided by renewable energy policies.
- Step 3 Account for other cost considerations in a national context (if applicable).
- Step 4 Consider the effect of other policies in the sector (if applicable).
- Step 5 Consider the effect of sectoral trends (if applicable).

Accounting for Barriers

- Step 1 Identify barriers.
    - *Example:* ***Technical barriers*** *such as outdated transmission and distribution infrastructure prevents grid connection of newly installed capacity.*
- Step 2 Evaluate severity of barriers.
    - *Options Simultaneous rating or pairwise comparison methods.*
- Step 3 Identify policies that may help overcome barriers.
- Step 4 Determine effect of barriers on technical potential for the assessment period.

When the potential of the policy has been estimated, the GHG impacts of the policy are calculated using approved GHG methodology under the 2006 IPCC guidelines using the Emission trajectory method or Grid emission factor method. The Causal Chain diagram will assist in identifying the source of GHG emissions to be reduced based on the policy action and setting the assessment boundary

The guidelines provides methodological guidance for assessing the GHG impacts of RE policies. The methodology provides a stepwise approach for estimating the effects of policy design characteristics, economic and financial factors, and other barriers on the potential for RE policies to achieve their technical potential for the assessment period. Zimbabwe has the National Renewable Energy Policy and the National Biofuels Policy that are comprehensive policies with specific targets to be achieved.

When undertaking the assessment, it is important that countries not only identify the quantitative aspects associated with projections, but also properly characterize the methodology used to prepare such projections.

- Socio-economic, physical and technical elements could influence the estimation of emissions and projections. Examples include:
    - Economic activity (e.g. GDP, household disposable income);
    - Population;
    - Energy prices (e.g. prices of natural gas, petroleum products, coal, biofuels, electricity) and other relevant prices (e.g. commodity prices);
    - Costs (e.g. of various technologies).

5.0 Impact Assessment Training

Presenter: Eng. L. Makurumure

Impact assessment steps of the NREP, (2019) and BFPZ, (2019) will follow steps based on the guidelines which are identified as defining the policy to be assessed, defining the assessment to be conducted and identifying the GHG impacts, assessment boundary and assessment period, assessing the impacts of the policy through estimation of RE addition and GHG impacts ex- ante and ex-post, monitoring and reporting, identification of key performance indicators and parameters to monitor. The stepwise methodology can be applied to any policy within the Renewable energy sector, hence the training although focused on the NREP and NBFPZ can be applied to future policies intended to be developed such as the Feed-in Tariff and Competitive bidding policies or frame works.

5.1 Definition of Impact Assessment Boundaries

Zimbabwe is undertaking and assessing the NREP, (2019) and the BFPZ, (2019) using the ICAT renewable energy and sustainable development guidelines, in order to undertake the assessment that the experts will input in the definition of the boundaries for the policy assessment. Table 3 presents the characteristics of NREP, (2019) and BFPZ, (2019).

Table 3: Characteristic of NREP and BFPZ

Title	**National Renewable Energy Policy**	**National Bio fuels policy**
Date Implemented	March 2020	March 2020
Status	Adopted	Adopted
Description	Regulations and standards	Regulations and standards
Targets	Two thousand one hundred Mega Watts (2,100 MW) by the year 2030 or twenty six comma five percent (26.5%) of total generation from RE sources, whichever is higher.	• Achieve a consistent and sustainable ethanol blending ratio of up to 20% by 2030 • Introduces biodiesel at a blending ratio of up to 2% by 2030
Policy Coverage	2020- 2030	2020 - 2030

Definition of the assessment boundary considered other policies that have an impact on the two policies' ability to meet the intended target. There include:

1. Nationally Determined Contributions
2. Draft Revised NDC
3. Long Term Low Emission Development Strategy
4. National Development strategy (NDS) 1
5. Vision 2030

Based on the inputs, the policy assessment will be an ex-ante assessment, the policies were launched in 2019 and are in the infancy of implementation. The COVID-19 pandemic has disrupted the first year of implementation as the country has been operating under lock down conditions and the GACMO model provides 5 year time series for assessment which has not been reached. The impact assessment period will be conducted up to 2030, which is in line with the country's national policies which aim at developing a middle income economy by 2030, reporting period for the NDC amongst other policies

and frameworks. The year 2017 will be used as the baseline for the assessment due to availability of comprehensive inventory data for the energy sector that can be used to develop a baseline scenario and NDC's have also established emission targets relative to the same year 2017 as the base year, therefore, the year is adopted for consistency across frameworks and policies. Moreover, the RE policy has a target of increasing from 6% in 2017 to 26.5% in 2030.

Policy interaction between the NREP and the BFPZ policies overlap and reinforce each other, the NREP provides the broader framework for renewable energy including biofuels development whilst the BFPZ provides an in-depth sector development guidelines, both policies are working towards a target of 4600 GWh by 2030 as stated in the NREP. Impact assessment will therefore consider both policies in the assessment as a package of policies. Table 4 presents the description of renewable energy policies for Zimbabwe.

Table 4: Description of RE policies

Description	NREP	BFPZ
Objectives	Two thousand one hundred Mega Watts (2,100 MW) by the year 2030 or twenty six comma five percent (26.5%) of total generation from RE sources, whichever is higher.	• Achieves a consistent and sustainable ethanol blending ratio of up to 20% by 2030 • Introduces biodiesel at a Blending ratio of up to 2% by 2030
Impacts	• Improving the ***share of renewable energy in the overall energy mix*** • ***Addressing issues of Climate Change***, • Driving cost-effective implementation of sustainable energy sources, • Social up-liftment through community involvement • Gender equality and employment	• ***Enhanced energy security***, especially in the transport sector; • Creation of a large market for agricultural products, representing significant economic opportunities in the rural areas; • Improvement of the country's trade balance; • ***Contribution to a cleaner environment*** through reducing greenhouse gas emissions and other vehicular emissions.
Target GHG	***CO_2, N_2O, CH_4***	***CO_2, N_2O, CH_4***
Implementing Entities	***MoEPD***, ZERA, ZETDC,	***MoEPD***, MoTI, NOIC

5.2 Technical Expert Input – Group Work

Participants provided technical input in groups on the impact assessment methodology, the assignment was to identify the technical potential of the policies, develop a causal diagram for the policies, set the assessment boundary and perform a barriers analysis for the policies.

5.2.1 Group Work Combined Outputs

Table 5: Technology Specific Policy Targets for 2030

Technology	Target
Small Hydro	150 MW
Grid Solar	1575 MW
Wind Power	100 MW

Bagasse	275 MW

Table 6: Casual Diagram Analysis

Technology	Positive Impacts	Negative Impacts
Small Hydro	Off sets fossil fuel emissions from electricity generation	Emissions generated from manufacturing equipment.
		Release of Soil Carbon
Grid Connected Solar	Off sets fossil fuel emissions from electricity generation	Low capacity factor of the technology
		Emissions generated from manufacturing equipment
Wind	Off sets fossil fuel emissions from electricity generation	Emissions generated from manufacturing equipment and technology
	High capacity factor	
Bagasse	Off sets fossil fuel emissions from fuel usage	Emissions generated from manufacturing equipment.
Bio-fuel	Carbon Neutral	Soil carbon release
20%Ethanol 2% biodiesel	Offsets Gasoline emissions	

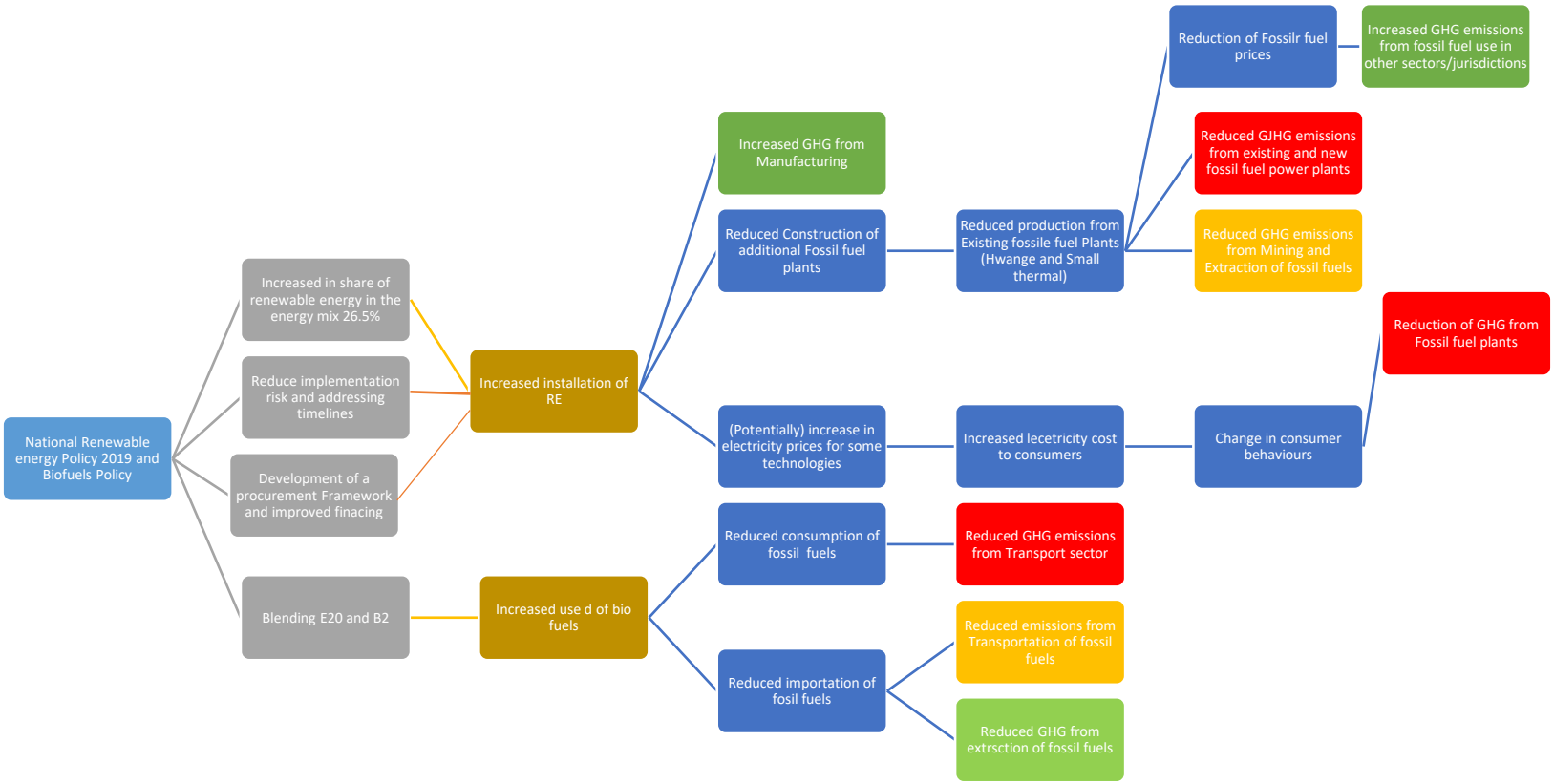

Fig 1: Casual diagram

Table 6: Setting GHG Assessment Boundary

GHG Impact	GHG	Likelihood	Relative magnitude	Included or Excluded	Explanation
Reduced GHG emissions from existing and new fossil fuel power plants	CO_2 ,	Very likely	Major	Included	The main GHG impact of NREP
Reduced emissions from mining of fossil fuels	CO_2 ,	Possible	Minor	Excluded	Considered insignificant for the NREP and is conservative to exclude
Increased emissions from manufacturing of RE equipment	CO_2 , CH_4 , N_2O	Possible	Minor	Excluded	Considered insignificant for both policies policies, and is offset by decreased emissions from construction of fossil fuel power plants.
Reduced emissions from construction of fossil fuel power plants	CO_2 , CH_4 , N_2O	Possible	Minor	Excluded	Considered insignificant, and is offset by increased emissions from construction of RE power plants
Leakage emissions to other jurisdictions	CO_2 , CH_4 , N_2O	Possible	Minor	Excluded	Considered insignificant
Reduced emissions from lower energy use due to increased cost of electricity	CO_2 , CH_4 , N_2O	Possible	Minor	Excluded	Considered insignificant as the tariffs are not yet cost reflective
For geothermal power plants, fugitive emissions of CH_4 and CO_2	CO_2 , CH_4	Possible	Moderate	Excluded	Limited availability of data for geothermal
Hydropower plants, emissions of CH4 and CO2 from water reservoirs Policy dependent	CO_2 , CH_4	Possible	Minor	Excluded	Significant for RE policies involving hydropower plants with reservoirs, RE policy exclude large Hydro
For biomass power plants, emissions associated with agriculture and land-use change CO_2 , CH_4 , N_2O	CO_2 , CH_4 , N_2O	Very Likely	Very likely Minor–Major	Included	Significant for most biomass power plant
Emission Reduction for replacement of liquid fossil fuel with Bio fuels	CO_2 , CH_4 , N_2O	Very likely	Major	Included	The main GHG impact of the BFPZ
Emission reduction from Transportation and importation of liquid fossil fuels	CO_2 , CH_4 , N_2O	Possible	Moderate	Excluded	Considered insignificant

5.2.2 Assessment of barriers

Several other barriers hinder RE deployment, these include: technical, regulatory, institutional, market, financial, infrastructure, awareness and public acceptance barriers. Such barriers also indirectly reflect risks for investors, financiers or other actors to develop and implement RE projects in Zimbabwe. The groups identified other barriers not addressed by the policy and their effect will be accounted for on the technical potential for the assessment period of the policy. The barrier analysis focuses only on those barriers not directly addressed by the policy being assessed. The identified barriers to the implementation of the NREP and BFPZ are shown in Table 7.

Table 7: Identified Barriers to implementation of NREP and BFPZ

Barrier category	Description	Explanation
Technical	Capacity	Technical capacity to implement some of the required technologies such as wind and geothermal is relatively low.
	Funding	Limited funding for development of preparatory studies to improve investor confidence in new technologies such as wind and geothermal.
	Reinforcement and implementation of standards	Despite availability of standards the influx of substandard products has been high especially for solar products
Regulatory	Reduction of licensing fees	Regulatory framework for the reduction of licensing fees
	Standards	Standards need to be supported by ST for them to be enforceable
Institutional	Nodal Agency	Delays in the formation of a Nodal Agency to assist developers in the application processes
Market	Lack of non-cost reflective tariff	Lack of a non-cost reflective tariff on the fossil based electricity increases the time required for RE plants to be competitive with grid.
	Competition with fossil fuels	Discovery and exploration of new fossil fuel resources such as Muzarabani oil deposits will impact the focus on biofuels as import substitution was a major driver
	Distribution Monopoly	Distribution monopoly by ZETDC reduces the competition within the sector
		ZESA becomes a power producer through ZPC and the sole grid operator through ZETDC, hence IPP might not be able to compete with the utility.
Financial	Lack of Domestic Finance	Limited domestic finance for RE projects
	Repatriation of Funds from FDI	Limited availability of foreign currency for repatriation of funds from Foreign Direct investments.
	Requires long term finance	Non availability of long term finance on the domestic market
	Development costs high	Development cost have not been reduced especially cost for preparation including water permits from ZINWA and EMA fees
	Requirements to get Prescribed Assets status	No defined guidelines on methods for applying PAS and the approval criteria
Awareness and Public acceptance	Perception that solar does not meet energy requirements	Due to the influx of substandard equipment the public has a general perception that solar does not meet the energy requirements

5.3 GHG Assessments Using GACMO Model

GHG assessment involves projections of anthropogenic GHG or air pollutant emissions by sources that encompass the effects of policies and measures which have been adopted. The emissions trajectory method develops a trajectory for future emissions from the electricity grid based on the expected future mix of generating technologies. The method involves making assumptions about the future electricity mix. It can be done using limited data or more complex models that model the energy sector development in detail. The resulting emissions trajectory can be used either as a stand-alone assessment to determine whether the trajectory is on track to meet a target, or in combination with a baseline scenario to determine the emissions reductions.

5.3.1 Estimating GHG Emissions

The causal chain diagram developed for assessing mitigation initiatives or tracking their progress, identifies the GHG impacts to be tracked. The actions are comprehensively described as this facilitates the development of a common understanding of their technical and economic boundaries, effects and opportunities. In this context, the scope, description and objectives can work as a basic information package to which other relevant elements can be added, e.g. costs, non-mitigation benefits, amongst others.

Ex-ante assessments of mitigation effects for any activity can be estimated and quantified in terms of their effect on GHG emissions. The first step in this process is to identify relevant data, methodologies and models to estimate a baseline scenario. Once this is done, a project scenario is developed that estimates the impact that can be achieved by the implementation of the project activity and associated mitigation measures in comparison to the baseline. Sources of data and assumptions include:

- GHG inventories and prior national communications
- Energy statistics and energy balances
- Annual reports of Institutions
- National economic and demographic statistics and surveys
- Planning reports from utilities
- Relevant studies (e.g. low carbon scenarios, renewable energy assessments).

Where the relevant data or knowledge resources are not available domestically, international data and studies can help fill the gaps. However, Zimbabwe has develop consistent accounts of energy use and emissions for base year (and, other historical years) that will be referred to during the assessment.

The possible results of calculating mitigation scenario emissions will be expressed in the following forms;

1. GHG Emissions
    - Cumulative mitigation potential over the assessment period a Mt CO2e (2020 – 2030);
    - Five year mitigation potential over the assessment period a Mt CO2e (2025 and 2030);
2. Costs of mitigation actions, policies and measures (US$/t CO2e)
    - Market costs
    - Social costs

6.0 Monitoring and Reporting

Monitoring serves the objectives of evaluation of the policy's performance (monitor trends in performance parameters to understand whether the policy is on track and being implemented as planned) and estimation of the policy's GHG impacts. Performance indicators will be used to track performance of the policy over time and define the parameters necessary to estimate GHG emissions ex-post. The selection of indicators and parameters is tailored to the policy, the needs of stakeholders, the availability of existing data and the cost of data collection.

6.1 **Progress Indicators**

Progress indicators for mitigation assessments are developed based on quantitative measurements or statistics of a certain condition tracked over time. These often relate to the inputs for the mitigation initiatives, the activities carried out, and their intermediate or along the way effects. These help yield an initial estimate of the impact on the GHG emissions.

These progress indicators serve two main functions which are:

- Measuring aggregate emissions reduction from mitigation actions,
- Identifying co-benefits of mitigation actions, policies and measures for sustainable development and for economic and social growth.

Table 8: Proposed Performance Indicators

Parameter and Unit	Potential Sources of Data	Parameter Type	Suggested Monitoring Frequency
Installed RE capacity (MW)	Monitoring reports and surveys, installation registers by ZERA and ZETDC	Measured	Quarterly or Annually
Electricity mix (GWH per technology)	Monitoring reports and surveys energy dispatch metering by ZETDC	Measured	Quarterly or Annually
Production of Ethanol and Biodiesel	Monitoring reports and survey, blending reports by NOIC and ZERA	Measured	Quarterly or Annually

7.0 Conclusions and Recommendations

The ICAT Renewable Energy Guidelines is a step by step methodology on the assessment. Training was the first step in utilising the guidelines henceforth, giving an appreciation of the methodology. Barriers identified during the training sessions will be used for the assessment, a ranking and prioritization matrix for the barriers will be developed and shared with the participants to determine the impact of the barriers on the technical potential. Consultations with the sector experts present at the training will continue through the impact assessment process and the development and utilisation of the GACMO model.