ICAT Initiative for Climate Action Transparency

MINISTRY OF NATURAL RESOURCES & CLIMATE CHANGE

Republic of Malawi's NDC Tracking Framework

Development of a Framework for Tracking Nationally Determined Contributions for the Republic of Malawi

Activity 3 Guidance Report

30th August 2024

Supported by Implementing Partners:

RICARDO

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Guidance Report on Malawi's NDC Tracking Framework for Energy, Transport & Agriculture Sectors

Activity 3 Guidance Report: Inclusive of ICAT Deliverables 3.1 - 3.7

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Table of Contents

List of Tables

List of Figures

Executive Summary

Malawi's NDC Implementation Plan includes a set of mitigation and adaptation indicators, but gaps remain in data availability, consistency, and within institutional responsibilities. Strengthening the NDC tracking framework is therefore essential to ensure that progress towards NDC targets can be monitored accurately and used to guide national decision-making. This report presents the findings, outputs, and recommendations from Activity 3 of the ICAT Malawi programme, which focuses on the development and validation of an NDC tracking framework for the energy, transport, and agriculture sectors. This activity under the ICAT programme of support aims to strengthens national capacity to track and monitor NDC actions within Malawi's priority sectors by engaging stakeholders, assessing data availability, and identifying gaps within existing tracking systems - preparing the initial groundwork for developing a sector-specific NDC tracking and monitoring framework. The support under this activity included a review of: the existing indicators for mitigation and adaptation; the current institutional arrangements and data protocols for collection; processing and quality assurance practices; discussions of good practice for building a roadmap for implementation of the NDC tracking framework; building capacity on core steps for operationalisation and integration with national systems; and recommendations for future improvements. Primarily, this activity of work focused on delivering comprehensive NDC tracking training and validation workshops aimed at strengthening awareness and in-country technical capacity among sectoral experts and data champions. The workshop sessions included the introduction and practical application of the GACMO model to support effective NDC tracking.

Enhancing Malawi's NDC tracking framework was achieved through multiple capacity-building workshop that took place in August 2025 under the ICAT Malawi programme. Three sector-specific working groups participated in the training conducted by Ricardo Team. The training included ETF reporting requirements, need of indicators to track NDC implementation progress, and defining indicators based on SMART criteria. The participants then reviewed the indicators in Malawi's NDC-2 implementation plan based on SMART Criteria guided by Ricardo Team. The review generated a set of new and enhanced indicators. A framework was created to link measures, indicators, data sources, corresponding assumptions and in-country focal points, which would be used to enhance NDC tracking in Malawi. Use of GACMO results under the NDC Tracking module was demonstrated in tracking of the NDC targets and commitments. Further, opportunities, challenges and recommendations are made to enhance NDC tracking as one way of implementing the ETF for Malawi. Among others, it is recommended to consider and develop the NDC tracking processes and structures as an integral part of the country's national Transparency System under the UNFCCC, thus ensuring gaps and/or duplications in structures and processes and that other elements of the system can feed into the NDC tracking framework (e.g. national GHG inventory data) and can draw from it (e.g. Biennial Transparency Reporting process, process for the development of the subsequent NDC). This activity would generate information and practice to improve NDC-3 formulation for Malawi.

1. Introduction

1.1. Background

Under Malawi's Initiative for Climate Action Transparency (ICAT) support, Malawi is undertaking targeted efforts to strengthen its institutional and technical capacity to track progress towards its Nationally Determined Contributions (NDCs). This support phase is focused on three priority sectors, energy, transport, and agriculture, which are central to Malawi's mitigation and adaptation ambitions. This guidance report falls under Activity 3 of the ICAT Malawi programme, centred on supporting the development of a national NDC tracking framework for Malawi. This phase of support involved working with sectoral stakeholders across Malawi's government ministries to review existing NDC tracking approaches, in the form of NDC implementation indicators, identify gaps in data collection, assess current institutional arrangements for data gathering, and develop new or revised indicators to more effectively track progress on Malawi's NDC implementation.

Activity 3 also encompassed a substantial capacity-building component, delivered through a series of training workshops, live demonstrations, and hands-on sessions focused on the use of GACMO as Malawi's primary tool for tracking progress on NDC implementation. These sessions were complemented by capacity building on a supplementary excel-based tool designed to capture additional data required for monitoring NDC indicators outside of GACMO data collection, such as qualitative information on data collection frequency, primary government institutions for implementation or focal points within the primary institution for example. Together, these two tools are intended to function in a complementary manner as Malawi continues to strengthen and formalise its national NDC tracking framework.

The development of the sectoral NDC tracking framework itself was undertaken in close collaboration with the relevant sectoral ministries and government agencies. This process included a series of technical consultations, an NDC tracking workshop held in August 2025, and a validation workshop in December 2025 to ensure that the proposed framework using the GACMO tracking tab as well as the complimentary excel-based tracking tool is both contextually appropriate and operationally feasible. The outputs from this activity will form an integral part of Malawi's broader climate transparency and reporting architecture.

1.2. Objectives of this guidance report

This report presents the findings, outputs, and recommendations from Activity 3 of the ICAT Malawi support programme, which focuses on the development and validation of an NDC tracking framework for the energy, transport, and agriculture sectors. The specific objectives of this activity are to:

a) **Strengthen national capacity to track and monitor NDC actions in Malawi's priority sectors** by engaging stakeholders, assessing data availability, and identifying gaps in existing systems.
b) Prepare the **initial groundwork for developing a sector-specific NDC tracking and monitoring framework**, including reviewing existing indicators for mitigation and adaptation, institutional arrangements, and data protocols for collection, processing, and quality assurance.
c) Discuss **good practice for building a roadmap for implementation of the NDC tracking framework**, building capacity on core steps for operationalisation, integration with national systems, and recommendations for future improvements.
d) Conduct **NDC tracking training and validation workshops to build technical capacity amongst sectoral experts and data champions**, including the introduction and application the GACMO model for NDC tracking.

These objectives aim to support Malawi in enhancing its climate transparency, improving the quality of its reporting, and strengthening institutional readiness for future NDC cycles. Table 1 presents a summary of the Activity 3 scope of work and the key deliverables achieved under the project within the Malawi country team.

Table 1: Summary table on the key deliverables and outputs achieved under Activity 3.

Activity	Implemented Scope of Work	Deliverable	Output
Activity 3.1. Gaps in NDC tracking (mitigation and adaptation)	○ Engaged sectors on existing NDC implementation plan indicators and available information ○ Identified existing indicators to track progress towards the implementation and achievement of Malawi's NDC targets under Article 4 aligned with the requirements of the CMP decision 18/CMA.1 ○ Involved relevant ministries and agencies, assess the availability of relevant climate mitigation and adaptation data, data gaps, and existing institutional arrangements for collecting the required data	3.1: Report on NDC tracking indicators and data gaps for selected sectors	Report 5: Malawi's NDC Tracking Framework (inclusive of deliverables 3.1 - 3.7)
Activity 3.2: NDC tracking (mitigation and adaptation) indicator development	○ Presented the draft set of indicators to the stakeholders for feedback and comments ○ In consultation with the technical experts, selected NDC tracking tool (e.g. GACMO) and developed the calculation template to be used as the NDC tracking tool	3.2 Completed NDC tracking tool for selected sectors	Finalised GACMO file Malawi NDC Tracking Framework Excel (included in Appendix of Report 5)
Activity 3.3: Pre-workshop training session on NDC tracking tools	○ Introduction to NDC tracking tools	3.3: Preparations for NDC tracking tool training [Workshop 4]	Report 5: Malawi's NDC Tracking Framework (inclusive of deliverables 3.1 - 3.7)
Activity 3.4: Training on the NDC tracking tool for selected sectors (mitigation and adaptation)	○ Trained experts and other stakeholders from relevant ministries and agencies on the application of the GACMO tool. The aim of the training was to introduce the GACMO tool, including its scope and functionality in the national context, and appoint data champions that will use the tool in various agencies and institutions.	3.4: NDC tracking tool training workshop [Workshop 5.2]	
Activity 3.5: Adaptation of the	○ Defined and validated input parameters required for the	3.5: Data for the NDC tracking tool	

tool to the national context	GACMO model to be applied in the national context	set up	
Activity 3.6. Validation of NDC tracking framework	○ Finalised the indicator set and integrated them into the NDC tracking framework, including high level adaptation action tracking ○ Developed the data protocols for data collection, processing, and QA/QC procedures, roadmap for addressing data gaps ○ Developed recommendations for integration of other adaptation actions into M&E framework covering the NAP, SDGs and Sendai Framework	3.6: NDC tracking validation workshop [#5.2]	Report 5: Malawi's NDC Tracking Framework (inclusive of deliverables 3.1 - 3.7)
Activity 3.7. Arrangements for NDC tracking framework	○ Report on NDC tracking indicators and presenting the overarching institutional arrangements	3.7: Report on NDC tracking indicators and presenting the overarching institutional arrangements	Report 5: Malawi's NDC Tracking Framework (inclusive of deliverables 3.1 - 3.7)

2. Gaps in Malawi's NDC Tracking

Malawi's NDC Implementation Plan[1] includes a draft set of mitigation and adaptation indicators, but gaps remain in data availability, consistency of data reporting, and the identification of institutional responsibilities. Strengthening this NDC tracking framework is therefore essential to ensure that progress towards NDC targets can be monitored accurately and used to guide national decision-making.

By doing so, a more robust framework will help Malawi understand how mitigation measures in the energy, transport, and agriculture sectors contribute to national climate goals, identify where progress is lagging, and support timely adjustments to policies and investments. This strengthens domestic ownership of climate action and enables evidence-based planning. An enhanced tracking system is also necessary for Malawi to meet the reporting requirements of the UNFCCC's Enhanced Transparency Framework, particularly the preparation of Biennial Transparency Reports (BTRs). Clear indicators, reliable data flows, and defined institutional arrangements will allow Malawi to report progress with confidence and reduce the reporting burden over time.

2.1. Current approach to NDC tracking in Malawi

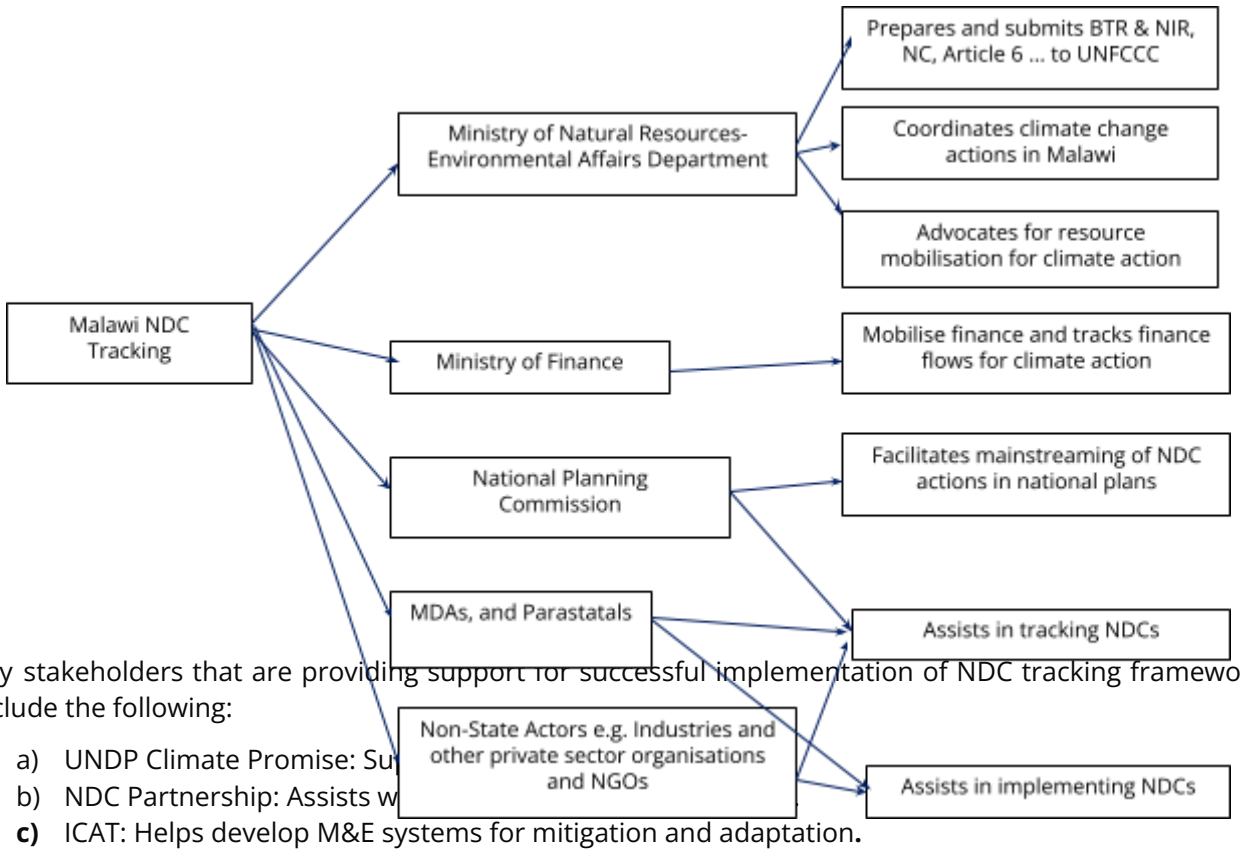
Malawi already has several systems and processes in place to monitor the implementation of its NDC commitments. These include relevant policies, regulations, institutional arrangements, and operational procedures that support both implementation and tracking. The NDC tracking framework proposed as part of ICAT's support is designed to build on and strengthen these existing structures and processes,

[1] Government of Malawi. (2021). *Malawi NDC Implementation Plan*. NDC Partnership. Accessed from https://ndcpartnershipplans.com/public/view/0d52c427-748a-4e7d-91ed-6088d047d483

adding value without introducing an excessive number of new elements. Malawi is a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Paris Agreement, and as such the country is required to implement climate actions including on mitigation in form of Nationally Determined Contributions (NDCs). Overall, implementation of NDCs is guided by several related policies including The Malawi 2063's First 10-Year Implementation Plan (MIP-1) 2021– 2030: Transforming Malawi into a Middle-income Economy; The National Climate Change Management Policy (2016), National Energy Policy (2018), The National Forest Policy (2016); and The National Agriculture Policy (2016).

2.2. Current institutional arrangements and processes

The current institutional arrangement for NDC Tracking in Malawi is described below and there are many institutions that are involved in the tracking of NDCs in Malawi. The main ministry is the Ministry if Natural Resources, which houses the Environmental Affairs Department (EAD). The Department, EAD, is the main player in tracking of NDCs. It coordinates all climate change actions in Malawi (including NDC actions), and advocates for resource mobilisation to implement NDCs. The Department has a designated section on climate change and is responsible for climate change related reporting obligations for Malawi to UNFCCC and Paris Agreement. Non-state actors (NSA), including the private sector and NGOs assist in implementing NDCs as well as in tracking.



Key stakeholders that are providing support for successful implementation of NDC tracking framework include the following:

a) UNDP Climate Promise: Su
b) NDC Partnership: Assists w
c) ICAT: Helps develop M&E systems for mitigation and adaptation**.**

In terms of the implementation processes of NDCs, EAD acts as a Coordinator, supported by international partners like UNDP and the NDC Partnership, using tools like the NDC Capacity Scorecard, while developing systems for Measuring, Reporting, and Verification (MRV) to monitor progress on its ambitious emission reduction and adaptation goals by 2040, focusing on priority sectors like energy and agriculture. Malawi has established an NDC Tracking Framework related to the following elements:

a) **Updated NDC (2021), which is currently undergoing review:** Sets economy-wide targets (6% unconditional, 45% conditional) for emission reductions by 2040, detailing mitigation and adaptation actions.
b) **NDC Implementation Plan:** A guiding document launched in 2022 to align projects with national priorities. Malawi uses tools like the NDC Capacity Scorecard to assess and strengthen national capacity for implementation.
c) **Online Tracking Tool:** An online platform used by sector focal points for consistent data updates and monitoring progress.
d) **Sectoral Focus:** Prioritizes key sectors like Energy, Agriculture, Forestry & Other Land Use (AFOLU), and Waste.
e) **Capacity Building:** Works with partners like ICAT (Initiative for Climate Action Transparency) to build systems for GHG measurement, policy assessment, and data management.
f) **Resource Mobilization:** Focuses on developing project concepts for funding and accessing international climate finance.
g) **Article 6 Framework (Carbon Market Framework):** Developing guidelines to engage in international carbon markets for voluntary cooperation. Among others, Carbon Market Framework unlocks funding from international investment in carbon projects in Malawi thus, facilitates climate action (implementation of NDC measures).

2.3. Limitations of Existing NDC Tracking Indicators

Tracking progress of implementation of Malawi's NDCs is in the form of indicators. The indicators are based on the target of reducing 51% of GHG emissions under baseline scenario in 2040 (equivalent to emission reduction of 17.7 million tonnes of CO2e). Therefore, on a yearly basis, the emissions levels under mitigation scenario (with measures) are to be calculated and compared with emission resulting if there were no measure implemented (BAU emission scenario). The indicators (obtained from NDC Implementation Plan), measuring NDC implementation targets, are presented in the following Tables 2 to 11 for the following sub-sectors: Electricity and Generation Supply; Transport; Buildings; Industry and Manufacturing; Agriculture; Process emissions: Non-metallic mineral industries; Sector-wide; Solid Waste; Waste Water; and Forestry. Gaps in the indicators presented are highlighted. The outcome for the NDC measure implementation is included to enhance understanding of the measure is. However, measuring of the outcome would require another set of indicators.

As it can be seen from Tables 2 to 11, some of the targets are not clear (for example the target inefficient charcoal production) and grid network loss reduction. Thus, it is recommended that the review of NDC-2 should correct these targets. The indicators are somewhat in terms of the final output from a series of processes. For example, for Grid-connected large-scale hydropower measure, indicator "MW of additional grid-connected hydropower capacity" would mean measuring the end of the process (production of electricity) but not processes/activities that lead to production of electricity for example conducting feasibility studies (both technical and financial), hydropower plant design, project appraisal, and securing of financing. Therefore, it is recommended to unpack the high-level indicators so that progress towards achieving the targets is measured easily. Some of the indicators could be qualitative for example, those related to processes to produce an end product.

During the Activity 3 ICAT support, the collection of NDC Tracking data for the indicators was designed to be collected using questionnaires. However, it became clear that it was not easily to collect data using the questionnaire. Direct visitation to data sources and meeting the responsible government officers responsible for data collection proved successful. Some of the data sources were shared by members of the working groups in Agriculture, Transport and Energy. In general, the challenges encountered in data collection were as follows:

a) It was difficult to get data from the private sector despite having clearances from the Government of Malawi through the Environmental Affairs Department to collect data
b) Triangulation of data showed considerable variations in data values from difference sources on the same measure and indicator.
c) Data was available not in the form required to evaluate the indicator directly.
d) It was very difficult to get data for all the years.
e) Some of the measures were not yet implemented as such there was no data to be collected

The sectoral working groups also reviewed the original NDC indicator list to ensure that they were SMART, presented in Tables 2 to 11. Due to time limitations, only mitigation indicators were reviewed because tracking of mitigation NDCs is mandatory.

Table 2: Indicators for NDC measures in the Electricity and Generation Supply sub-sector including targets and outcomes of the implementation of measures

NDC Measure	Target	Indicator	Outcome
Grid-connected large-scale hydropower	Additional 410MW capacity added by 2030	MW of additional grid-connected hydropower capacity	Avoided GHGs from planned coal-fired power stations at Kam'mwamba and Pamodzi, and diesel and HFO generation.
Off-grid small scale solar PV systems	50,000 of additional off-grid PV SHS / lanterns by 2025	Number of new, operational, off-grid solar PV SHS / lanterns	Avoided GHG emissions and fossil fuel use from conventional household lighting sources
Grid connected large scale solar PV	200 MW of additional capacity by 2030	MW of additional grid-connected large-scale solar PV capacity	Avoided GHGs from diesel gensets and fossil fuel-based grid electricity
Grid connected wind power	60 MW of additional capacity by 2030.	MW of additional grid-connected wind power capacity	Avoided GHGs from coal, diesel gensets and HFO-based grid electricity
Grid network loss reduction	Network loss reduction (Tx and Dx) (EE) to industry benchmark of 16% by 2022.	Reduced percentage of network loss rate	Reduced GHGs from fossil fuel use in power generation
Biomass gasification for production of heat and electricity	20 - 40 MW of additional small-scale capacity by 2030	MW of additional small-scale biogas power capacity	Avoided GHGs from diesel gensets and fossil-based grid electricity
Efficient charcoal production	XYZ? kgs of additional efficient charcoal produced by 2025	Kgs of efficient charcoal produced	Reduced GHGs (CH4 and N2O) from more efficient charcoal production
Clean Coal technology - high efficiency coal-fired power plant	One super-critical coal plant at 44% efficiency by 2035	Level of efficiency of coal power generation	Reduced GHGs emissions from avoided use of coal to generate power to meet electricity demand in 2035-2040
Clean Coal technology - Carbon Capture and Storage (CCS)	Over 1 GW of coal power plants capturing CO2 and storing in in-situ coal seams by 2040	Number of coal power plants with CCS technology	Avoided CO2 otherwise emitted to atmosphere, net of additional combustion emissions for capture processes.

Table 3: Indicators for NDC measures in the Transport Sub-sector

NDC Measure	Target	Indicator	Outcome

Modal shift: private transport to public transport	40% share of public transport in overall passenger transport by 2040	Share of public transport in total passenger transport	Reduced GHG emissions from reduced consumption of petrol and diesel in the road transport sector
Modal shift: road to rail freight	Rail transport to account for 50% of total freight transport by 2040	Share of railways in total freight transport	Reduced GHG emissions from reduced consumption of diesel in the road transport sector
Increasing blend of fuel grade ethanol with petrol as a transportation fuel	20:80 blending ratio of ethanol to petrol by 2035 (held constant to 2040)	Blending ratio of ethanol to petrol	Reduced GHG emissions from reduced consumption of petrol in the road transport sector
Blending biodiesel with diesel as a transportation fuel	55 million litres biodiesel production in 2030; 15:85 blending ratio of biodiesel with diesel by 2030	Litres of biodiesel production; Blending ratio of biodiesel to diesel	Reduced GHG emissions from reduced consumption of petrol in the road transport sector

Table 4: Indicators for NDC measures in the Buildings Sub-sector

NDC Measure	Target	Indicator	Outcome
Solar Water Heaters (SWH) in commercial buildings	XYZ% of commercial building stock to have solar water heaters installed and in use by 2030	Percentage of commercial building stock with solar water heaters; XYZ litres solar water heating capacity	Avoided GHGs from displacement of fossil-based electricity of fuels by solar energy
MEPS for electrical appliances in domestic sector	Existence of Minimum Energy Performance Standards (MEPS) for a minimum of 6 domestic electrical appliances (Acs, refrigerators, washing machines, dryers, cookstoves, geysers/boilers) by 2030.	Number of MEPs for domestic electrical appliances	Avoided GHGs from reduced demand for fossil-based electricity and thermal fuels
Fuel switching in rural households	To be determined (X% of households switching to cleaner cooking and heating fuels in rural households by 2030)	Percentage (or number) of rural households using cleaner fuels	Reduced GHG emissions arising from substitution of fossil fuel use by renewable or lower carbon energy sources
Improved charcoal cookstoves - rural households (a)	% of rural households to use efficient charcoal stoves by 2030; Increased efficiency of charcoal cookstoves to 30%	Percentage (or number) of rural households using improved charcoal cookstoves (or number of improved charcoal-cookstoves)	Reduced CH4 and N2O emissions from reduced use of charcoal
Improved firewood cookstoves - rural households (b)	2 million improved firewood cookstoves by 2030; Increased efficiency of firewood stoves to 30%	Percentage (or number) of rural households using improved firewood cookstoves (or number of improved firewood cookstoves)	Carbon sink preservation through reduction in use of unsustainable biomass fuel

Table 5: Indicators for NDC measures in the Industry and Manufacturing sub-sector

NDC Measure	Target	Indicator	Outcome
Efficient motors and boiler efficiency	X% improvement in motor and boiler efficiency by 2030; Y% reduction in industrial electricity demand due to improved motor and boiler efficiency by 2030	Percentage improvement in motor and boiler efficiency; Percentage reduction in industrial electricity demand	Avoided GHGs due to reduced fossil fuel use
Power factor correction	Power factor to increase from a	Increase in power factor	Avoided GHGs due to reduced fuel combustion to generated reactive

	minimum of 0.85 to 0.9 by 2025.		power needed at maximum demand customers.
Cogeneration - steam reuse	Reusing low grade steam from power generation for process heat application in industries by 2030.	Number of industries reusing low grade steam from power generation for process heat application	Avoided GHGs from diesel, HFO, biomass boilers or fossil-based grid electricity

Table 6: Indicators for NDC measures in the Agriculture sub-sector

NDC Measure	Target	Indicator	Outcome
Use of efficient barns for tobacco curing	X% reduction in fuelwood demand for tobacco curing by 2030	Percentage reduction in fuelwood demand for tobacco curing	Avoided CH4 and N2O emissions from fuelwood combustion used for tobacco curing.
Conservation tillage within commercial crop farming	Complete 160,000 Ha under conservation agriculture practices (tillage); X% of farms growing annual crops to use conservation tillage by 2030; Y% of farms growing annual crops to use no-till techniques by 2030	Percentage of farms growing annual crops to use conservation tillage; Percentage of farms growing annual crops to use no-till techniques.	Avoided GHG emissions from diesel use in tractors used in ploughing/tilling before crop planting

Table 7: Indicators for NDC measures in the Process emissions: Non-metallic mineral industries Sub-sector

NDC Measure	Target	Indicator	Outcome
Increased use of rice husk ash (RHA) in blended cement	X% reduction in demand for clinker in the construction industry by 2030	Use of rice husk ash (RHA) in cement production	Reduced calcination process CO2 emissions from domestic clinker production.
Earth stabilised blocks (ESBs) as building materials	X% increase in the use of earth stabilised blocks (ESBs) as materials within institutional and domestic building construction projects by 2030	Percentage increase in the use of earth stabilised blocks (ESBs) as materials within institutional and domestic building construction projects	Reduced demand for cement, thereby reducing CO2 emissions related to clinker and cement production.
Alternative low carbon cement processes	X% use of alternative, low-carbon clinker substitutes in cement production by 2030	Percentage use of alternate, low-carbon clinker substitutes in cement production	Reduced CO2 in production process compared to conventional process due to lower temperature requirements.

Table 8: Indicators for NDC measures in the sector-wide

NDC Measure	Target	Indicator	Outcome
Support industries involved in carbon capture and storage (CCS)	X number of industries adopting CCS by 2040	Support industries involved in carbon capture and storage (CCS)	Avoided CO2 otherwise emitted to atmosphere, net of additional combustion emissions for capture processes.

Table 9: Indicators for NDC measures in the Solid Waste sub-sector

NDC Measure	Target	Indicator	Outcome
Landfill gas utilisation	95 GWh landfill gas generation annually by 2030; 3 MW by 2025	GWh of landfill gas generation annually	Reduced CH4 from landfill sites and avoided CO2 from displacement of fossil-based electricity use.
Waste Reduction Practices	X% of waste reduction at household level by 2030; Y% of waste reduction at industrial level by 2030; Z% of waste reduction at institutional level by 2030.	Percentage of waste reduction	Improved organic waste management reduces CH4 emissions. Materials and energy recovery from waste reduces CH4 and CO2 emissions.
Waste to Energy (WtE)	250 GWh of electricity generation annually by ??	GWh of electricity generation annually	Reduced CH4 from landfill sites and avoided CO2 from displacement of fossil-based electricity use.

Table 10: Indicators for NDC measures in the Waste Water sub-sector

NDC Measure	Target	Indicator	Outcome
Waste-water treatment and reuse	Fully operational WWTP in Lilongwe, Blantyre, Mzuzu and Zomba (including faecal sludge treatment systems) by 2030.	Number of fully operational WWTP (including faecal sludge treatment systems)	Reduction of CH4, and N2O emissions from waste-water and sewage.

Table 11: Indicators for NDC measures in the Forestry sub-sector

NDC Measure	Target	Indicator	Outcome
Afforestation: Protective Forests	Production and planting of native Eucalyptus and Pinus trees in 45,000 Ha of areas identified, by 2025 target	Hectares (Ha) of protective forests planted and maintained (Eucalyptus and Pinus)	Increased carbon stock in tree biomass and soil.
Afforestation: Urban Forests	Additional 2,100 Ha of native species and bamboo to be planted within urban riparian zones and wetland borders by 2025 target:	Hectares of urban forests planted and maintained (native species and bamboo)	Increased carbon stock in tree biomass and soil.

NDC Measure	Target	Indicator	Outcome
Agroforestry: Wood, Fruit, and Fodder	Targeted planting of an additional 25 trees/ha on 155,000 Ha of crop fields, equivalent to 20% of total arable land, and 31,784 Ha of village forest areas; and expansion of new fruit area on 27,000 Ha where there is no tree cover to achieve at least a 10% tree cover, by 2025.	Hectares (Ha) of area covered by agroforestry (disaggregated by different tree type)	Increased carbon stock in tree biomass and plants, and in soils from accumulation of organic matter from litter dead wood.
Sustainable Landscape and Forest Management	Production and planting of native trees and bamboo species in conservation and riparian areas, and protection of areas with tree-site matching species for a total of 66,000 ha, by 2030.	Hectares (Ha) of land under sustainable forestry practices (native species and bamboo)	Enhancement of carbon sinks in tree and bamboo biomass and soil (prevented carbon stock loss).

3. Tools for NDC progress tracking

A number of tools are available to support Malawi in tracking progress towards its NDC targets. GACMO has been used under the ICAT programme to support Malawi's GHG projections as part of Activity 2. While primarily designed for estimating emission reductions and abatement costs, GACMO also includes a basic tracking functionality that allows users to:

a) Select mitigation actions from Malawi's portfolio of 119 mitigation options originally configured in the GACMO model. These include measures from agriculture, forestry, energy, transport, and waste.
b) Input anticipated implementation rates for each mitigation measure per year (e.g., hectares of conservation agriculture adopted, biogas digesters installed, LED bulbs disseminated). These anticipated values are based on Malawi's NDC Implementation Plan or sector-specific planning documents.
c) Enter actual implementation rates using the relevant unit of measure. This can be done annually as real-world data becomes available from ministries, departments, agencies or implementing partners.
d) Automatically calculate accumulated implementation progress and percentage progress toward the 2030 target, providing a quick visual reference for performance assessment. See Figure 2 & 3 below, as an example of this).
e) Generate total cumulative estimated GHG reductions per mitigation measure (in $ktCO_2e/yr$), based on the actual implementation inputs.
f) Capture financial progress by recording internal and external financing committed or disbursed toward each mitigation action.

GACMO is therefore a useful tool for tracking GHG-related progress of NDC measures, particularly those with quantifiable emission reduction outcomes (e.g., renewable energy deployment, modal shifts in transport, improved livestock management).

3.1. How GACMO's Tracking Tab Supports Malawi's Monitoring Needs

The structure of the GACMO tracking tab mirrors the mitigation options table used in Malawi's initial GHG projection modelling, which ensures consistency between planning and monitoring. For Malawi, this provides several benefits:

1. Sector-specific monitoring consistent with the NDC

The tool allows the in-country team to filter mitigation options by sector or activity type (e.g., Agriculture Rice Zero tillage). This is especially useful because Malawi's NDC includes a diverse set of NDC measures ranging from land-based interventions to energy efficiency measures.

2. Annual data entry aligned with Malawi's reporting cycle

GACMO enables yearly updates, which aligns with Malawi's existing national reporting processes (e.g., national GHG inventory cycle).

For example, the agriculture sector can input actual annual adoption rates of:

- Zero tillage (ha),
- Cover crops (ha),
- Improved livestock feed technologies,
- Rice water management practices.

This creates a continuous feedback loop between implementation agencies and the national MRV team.

3. Automatic conversion from activity data to emission reductions

Once implementation data is entered, the model automatically converts activity data into estimated GHG reductions. This is particularly valuable for Malawi, because:

- It reduces the technical burden on sector ministries that may have limited sectoral technical knowledge and capacity.
- It ensures that the quantification approach remains consistent with Malawi's long-term mitigation pathways and ICAT modelling assumptions.
- It provides an immediate estimate of the climate impact of real-world interventions.

4. Quick identification of underperforming or high-impact measures

The tab highlights progress toward the 2030 target. Measures with low progress percentages can be flagged for follow-up with Malawi's NDC team. Conversely, interventions delivering significant abatement (e.g., clean cookstoves, solar mini-grids) can be prioritised for scaling or targeted support.

In addition, by comparing the anticipated rate of implementation with the actual rate recorded over time against the 2030 target, the GACMO tracking tab allows the Malawi team to quickly identify mitigation actions that are not achieving the expected level of implementation or associated GHG emission reductions. This comparison acts as an early warning system, when a measure falls below its planned trajectory, the responsible ministry or department can be prompted to reassess progress and determine whether specific barriers. Such as limited financing, supply chain constraints, weak community uptake, or insufficient institutional capacity are impeding implementation.

Such insights enable evidence-based problem-solving. Relevant institutions can investigate the underlying causes of slow progress, engage with implementing partners to understand operational challenges, and define corrective actions. These may include adjusting delivery approaches, increasing

technical assistance, reallocating resources, or revising targets if underlying assumptions prove unrealistic. Through this iterative process, the tracking tab strengthens adaptive management and supports Malawi in ensuring that mitigation actions remain aligned with national priorities and on track to contribute meaningfully to the 2030 NDC goals.

5. Basic financial tracking

Although simple, the financial columns within the GACMO tracking tab allow Malawi to:

- Record donor contributions (external finance),
- Track government-allocated resources (internal finance),
- Compare financial inputs with achieved emission reductions.

This offers a starting point for cost-effectiveness assessment and improves transparency in climate finance reporting.

3.2. Limitations of using the GACMO Tracking Tab

While GACMO provides a useful structure for tracking GHG-linked progress, it does not capture the full set of revised indicators taken from Malawi's NDC Implementation Plan. Specifically, GACMO does not:

- Track institutional or process milestones (e.g., "policy drafted," "standards developed," "project preparation studies completed");
- Store information on data sources, availability, or quality;
- Record responsible institutions or implementing partners;
- Track qualitative or capacity-building indicators;
- Manage adaptation-related indicators.

These aspects are better addressed within Malawi's broader NDC Implementation Tracking System and MRV arrangements.

3.3. Malawi NDC Indicators Excel Workbook

To support and complement the NDC tracking taking place in the GACMO tracking tab, the country team has developed an Excel workbook with consolidates the revised mitigation indicators from Malawi's NDC Implementation Plan and links them to the corresponding NDC measures across the priority sectors. It provides a structured template for tracking progress. The tool includes fields for:

a) **NDC measure and sector** (e.g., grid-connected wind power, efficient cookstoves, zero tillage practices)

b) **Relevant indicators** aligned with Malawi's NDC Implementation Plan (e.g., MW of additional wind capacity, percentage of farms adopting conservation tillage)

c) **Targets** and **milestones** drawn directly from the NDC Implementation Plan as well as revised targets from the priority sector ministries

d) Baseline year and **values**

e) **Data availability status** (available, planned, or unavailable)

f) **Annual data entry fields** (2021–2024)

g) Data collection frequency and **units**

h) **Primary and secondary government institutions** responsible for implementation

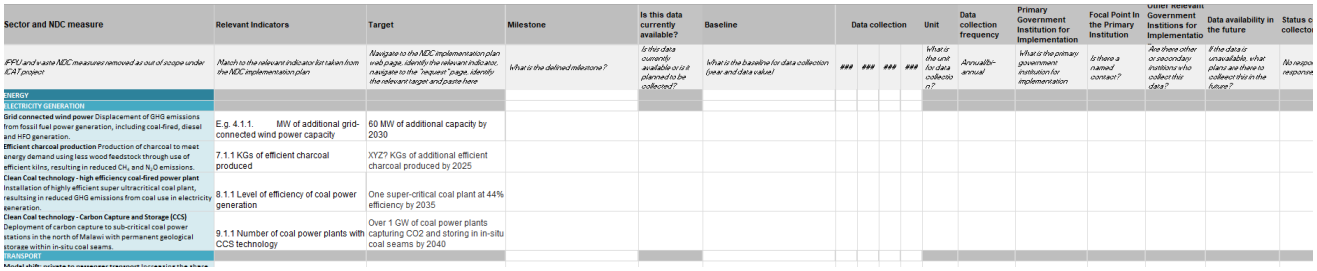
i) **Named focal points** where available

j) **Future data availability** plans

k) **Status updates** for data collectors

This structure allows Malawi to further track progress at a granular level, including whether data exists, who is responsible for collecting it, and what gaps remain. It is particularly useful for monitoring implementation readiness, institutional arrangements, and data flows, elements that are not captured in GHG models.

Figure 2: Screenshot of the excel NDC tracking workbook developed by the Malawi country data collector team, the full tracking framework can be found in Appendix 1.



Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Institions for Implementatio	Data availability in the future	Status c collecto
IPPU and waste NDC measures removed as out of scope under ICAT project	*Match to the relevant indicator list taken from the NDC implementation plan*	*Navigate to the NDC implementation plan web page, identify the relevant indicator, navigate to the "request" page, identify the relevant target and paste here*	*What is the defined milestone?*	*Is this data currently available or is it planned to be collected?*	*What is the baseline for data collection (year and data value)*	###	###	###	###	*What is the unit for data collection?*	*Annual/bi-annual*	*What is the primary government institution for implementation*	*Is there a named contact?*	*Are there other or secondary institions who collect this data?*	*If the data is unavailable, what plans are there to collect this in the future?*	*No respo response*
ENERGY																
ELECTRICITY GENERATION																
Grid connected wind power Displacement of GHG emissions from fossil fuel power generation, including coal-fired, diesel and HFO generation.	E.g. 4.1.1. MW of additional grid-connected wind power capacity	60 MW of additional capacity by 2030														
Efficient charcoal production Production of charcoal to meet energy demand using less wood feedstock through use of efficient kilns, resulting in reduced CH_4 and N_2O emissions.	7.1.1 KGs of efficient charcoal produced	XYZ? KGs of additional efficient charcoal produced by 2025														
Clean Coal technology - high efficiency coal-fired power plant Installation of highly efficient super ultracritical coal plant, resulting in reduced GHG emissions from coal use in electricity generation.	8.1.1 Level of efficiency of coal power generation	One super-critical coal plant at 44% efficiency by 2035														
Clean Coal technology - Carbon Capture and Storage (CCS) Deployment of carbon capture to sub-critical coal power stations in the north of Malawi with permanent geological storage within in-situ coal seams.	9.1.1 Number of coal power plants with CCS technology	Over 1 GW of coal power plants capturing CO2 and storing in in-situ coal seams by 2040														
TRANSPORT																

The Excel workbook is deemed an essential update to Malawi's NDC tracking framework because it captures the full breadth of information required under the Enhanced Transparency Framework (ETF), including non-GHG indicators, institutional responsibilities, and qualitative milestones. By integrating the strengths of both the GACMO tracking tab to align this with the emissions projection activities under Activity 2, along with the Excel NDC tracking workbook, Malawi can establish a comprehensive, transparent, and operational NDC tracking system that supports national planning, ETF reporting, and future NDC enhancement.

4. Further Enhancing Malawi's NDC Tracking Framework

4.1. NDC Tracking Capacity Building Workshops

Experts and stakeholders from relevant ministries and agencies were trained on the application of the GACMO tracking tab, as well as the excel workbook, during the NDC tracking capacity-building workshop held in August 2025 under the Malawi ICAT support programme. The full workshop agenda can be found in Figure 4.

Session Overview

The workshop began with an introduction to why NDC tracking matters, highlighting its role in verifying progress, helps governments identify gaps, evaluate the effectiveness of policies, adjust strategies accordingly and supporting evidence-based climate policy. Participants were provided with an overview of the reporting requirements under the ETF. Following this, the Ricardo team delivered a session on defining SMART indicators and developing sectoral monitoring plans. This included practical guidance on creating indicators that are Specific, Measurable, Achievable, Relevant, and Time-bound, and on linking

these indicators to Malawi's NDC targets. The discussion emphasised the importance of robust data protocols and institutional arrangements to ensure consistency and transparency. The training then presented on tools for tracking NDC implementation, using the GACMO tracking tab for NDC tracking with a live demonstration or practical application.

Dr Suzgo Kaunda then shared NDC tracking lessons learned from Malawi's first BTR submission, offering valuable insights into challenges such as data accessibility, gaps in sectoral reporting, and the need for clear data-sharing mechanisms. This segment helped participants understand how to set up effective data protocols and improve collaboration across ministries and agencies.

To consolidate learning and begin the process of updating and strengthening Malawi's existing NDC tracking framework, led by the sectoral working groups to achieve the objectives of Activity 3, the workshop incorporated two interactive group exercises designed to facilitate practical application of revising the indicators and aligning these with the GACMO tracking tab.

a) Exercise 1: Participants reviewed Malawi's existing NDC tracking indicators, refined them using the SMART criteria, and developed initial sectoral monitoring plans for energy, transport, and agriculture. This exercise also involved identifying data gaps and proposing solutions for improved tracking.

b) Exercise 2: Participants tested the GACMO tracking tab tool using Malawi-specific to simulate progress on selected NDC measures. They assessed what outputs the GACMO tracking tab could provide for reporting and discussed additional data needs, institutional roles, and frequency of data collection.

Key Workshop Outcomes

By the end of the workshop, the sectoral working group participants acquired the following skills:

a) Clear understanding of the importance of NDC tracking and its link to international reporting obligations.
b) Hands-on experience with GACMO and learned how to integrate its outputs into Malawi's NDC tracking system.
c) Practical skills in indicator design and monitoring plan development, including identifying headline and supporting indicators.
d) Built consensus on next steps, including validating GACMO scenarios, finalising indicators, and strengthening institutional arrangements for data sharing.

Figure 3: NDC Tracking Workshop Agenda (August 2025)

Time	Session	Lead
08:30 – 09:00	Registration and coffee	Yamikani Idriss
09:00 – 09:15	Welcome: Purpose and objectives	Yamikani Idriss
09:15 – 09:30	Recap: Recap of previous workshops and progress to date	Ricardo
09:30 – 09:45	Introduction to NDC tracking: Why NDC tracking matters and an overview of the reporting requirements	Ricardo
09:45 – 10:00	Tracking NDC Implementation: Defining SMART indicators and a monitoring plan	Ricardo
10:00 – 10:30	Lessons from Malawi's BTR1 submission	Dr. Suzgo Kaunda & Vanessa Nyale
10:30 – 10:45	Tools for tracking NDC implementation: Using GACMO for NDC tracking	Ricardo
10:45 – 11:00	Health Break	
11:00 – 11:45	Group Exercise 1: Develop SMART indicators and a sectoral monitoring plan	Yamikani Idriss and sectoral working group leads.
11:45 – 12:45	Group Exercise 2: Sectoral working groups test the GACMO tool and group discussion on what data can be extracted for NDC tracking.	Yamikani Idriss and sectoral working group leads.
12:45 – 13:00	Final remarks and next steps	Ricardo
13:00 – 14:00	Lunch Break	
14:00 – 16:00	Further adjustments and updates to the GACMO sectoral projections	Yamikani Idriss and sectoral working group leads.

5. Enhancements to Malawi's NDC Tracking Framework

5.1. Enhancing the existing indicator set

Methodology

To assess and enhance the existing indicators within Malawi's NDC Implementation Plan, sectoral working groups (energy, transport and agriculture) undertook a structured, step-by-step process to apply SMART principles and intervention logic to strengthen the national NDC tracking framework. These steps were as follows:

1) **Review sector-specific indicators:** Each group began by examining the table of existing indicators relevant to their sector.
2) **Apply SMART criteria:** Using a SMART checklist, ensuring indicators were Specific, Measurable, Achievable, Relevant, and Time-bound, the sectoral working groups assessed the robustness and clarity of each indicator.
3) **Classify indicators within the results chain:** Indicators were categorised as input, output, outcome or impact to ensure alignment with intervention logic and to clarify their role in tracking progress.
4) **Strengthen or propose revised indicators:** Sectoral working groups proposed improvements to weak indicators and identified where new indicators were needed to more comprehensively capture sectoral progress towards NDC commitments.
5) **Identify headline and supporting indicators:** Sectoral working groups began to differentiate between high-level (headline) indicators that reflect overall sectoral progress and supporting indicators that provide detailed evidence beneath them.
6) **Assess data requirements and identify gaps:** For each indicator, groups evaluated data needs, highlighted gaps or limitations, proposed solutions such as potential data sources, recommended frequency of data collection, and responsible institutions.

Figure 4: SMART indicator checklist provided to sectoral working groups ahead of indicator refinement

SMART Checklist

Criteria	Guiding Questions
Specific	Is the indicator clearly defined? Does it specify what is being measured?
Measurable	Can the indicator be quantified or assessed objectively? What metrics or units are used?
Achievable	Is the target realistic given current resources and capacity? What constraints exist?
Relevant	Does the indicator align with the NDC goal and sector priorities? Is it meaningful for decision-making?
Time-bound	Is there a clear timeframe for achieving the target? Is progress tracked over time?

Additional Guiding Questions

1. How can this indicator be improved to better reflect the NDC measure/target?
2. What is the intended change or result? Does this indicator help to track this change or outcome?
3. Does it provide a full picture of implementation, or are supporting indicators needed?
4. What data is currently available? Who is responsible for collecting and reporting it? Is the current record accurate, or does it need updating?
5. What recommendations can support the development of NDC 3.0 indicators?

Sectoral Working Group Outputs: Agriculture Sector Working Group

The agriculture working group made significant progress in strengthening the existing sectoral indicators, ensuring that they met SMART criteria and more accurately reflected Malawi's agriculture sector priorities. The team refined several existing indicators by clarifying exactly what was being measured and introducing concrete units, such as hectares, percentages and numbers of farmers to improve measurability. They also incorporated time-bound milestones to enable more consistent tracking of annual progress.

A major step forward for the agriculture working group was the introduction of a clearer structure distinguishing headline indicators from supporting indicators. Headline indicators captured the overarching outcomes and impacts the sector aims to achieve, including increases in soil carbon stock and reductions in methane emissions. Supporting indicators were then developed to show the underlying actions contributing to these outcomes, such as *hectares under conservation agriculture*, the *number of farmers adopting the System of Rice Intensification (SRI)*, and the *number of biogas plants installed*.

To strengthen overall coherence, the group categorised indicators along the results chain of inputs, outputs, outcomes and impacts, ensuring each indicator clearly aligned with the intervention logic. Inputs captured essential resources such as training and equipment; outputs represented immediate results such as hectares under conservation agriculture; outcomes reflected behavioural changes like adoption of improved practices; and impacts related to long-term climate and development benefits, including soil health, reduced methane emissions, and enhanced food security.

The team also revised annual milestones for several key indicators, such as the targeted expansion of conservation agriculture by 40,000 hectares per year and the planned growth of biogas installations from 200 units in 2021 to 402 units by 2025.

Discussions on data availability revealed that while many indicators could be populated using existing sources, such as DARS, FAO, NASFAM and Ministry of Agriculture reports, important gaps remained. These included limited gender-disaggregated data, inconsistent data-collection frequency, and challenges verifying whether technologies like biogas plants or mechanisation equipment remain operational. Some indicators also required clearer documentation of underlying methodologies to ensure consistency over time.

To address these gaps and strengthen the NDC tracking system, the agriculture working group proposed several recommendations. These included establishing clear institutional responsibilities for data collection and validation - with the Ministry of Agriculture, LUANAR, and DAHLD identified as key actors - improving coordination across agencies and integrating monitoring tasks into routine sectoral workflows. They also emphasised the importance of better documentation of indicator definitions, data sources, and measurement protocols to support the development of reliable indicators for NDC 3.0. Finally, the group highlighted the need to address equity considerations by ensuring that women farmers and smallholders have equitable access to extension services, mechanisation initiatives, and climate-smart technologies.

Table 12: Agriculture working group output on enhancing the existing sectoral indicators

Sector and NDC measure	Previous Indicator	Suggested Revised or New Indicator	Reason for Revision
AGRICULTURE			
Use of efficient barns for tobacco curing Reduced demand for fuelwood required in tobacco curing from 2025-2040 by use of efficient barns, resulting in avoided CH4 and N2O emissions from fuelwood combustion.	Percentage reduction in fuelwood demand for tobacco curing	**HEADLINE:** Number of efficient barns used in curing tobacco	The indicator was not clear. Number of efficient in use to cure tobacco is the output of the measure
		SUPPORTING: Number of farmers trained in efficient tobacco curing	Supporting indicator added
Conservation tillage within for commercial crop farming Use of conservation or zero tillage farming, resulting in avoided GHG emissions from diesel use in tractors used in ploughing and tilling before crop planting.	Percentage of farms growing annual crops to use conservation tillage;	**HEADLINE:** Hectarage of commercial farms that use conservation tillage	The indicator is unclear, and percentages make it difficult to calculate.
		SUPPORTING: Number of farmers trained in conservation tillage	Supporting indicator added
AGRICULTURE			
CROP MANAGEMENT			
Conservation agriculture: crop residue and rotation Support and implementation of the planned expansion targets for crop residue and crop rotation to improve soil conservation, resulting in increase of soil carbon stock and improved crop yields.	Percentage increase in soil carbon stock	**HEADLINE:** Annual estimated change in soil organic carbon (tC/ha) in areas under conservation agriculture and soil-enhancing practices.	Limited change but uses a measurable unit; focuses on areas under improved management making attribution clearer
Conservation tillage within for commercial crop farming Use of conservation or zero tillage farming, resulting in avoided GHG emissions from diesel use in tractors used in ploughing and tilling before crop planting.	Percentage of farms growing annual crops to use conservation tillage;	**HEADLINE:** Estimated reduction in GHG emissions from reduced tractor fuel use due to increased adoption of conservation and no-till practices.	Captures high-level outcome effectively
		SUPPORTING: Percentage of farms growing annual crops that use conservation tillage, disaggregated by gender of farm manager	No change
	Percentage of farms growing annual crops to use no-till techniques.	**SUPPORTING:** Percentage of farms growing annual crops adopting no-till practices on at least 50% of cultivated land	Adds threshold for adoption

Promotion of efficient fertiliser use and manure management Improved fertiliser management through increased use of organic waste in soil fertilizers and compost manure, increasing carbon stock retention in soils, and reduced N2O emissions from mineral N-fertilizer use.	Percentage of new farmers successfully adopting efficient fertiliser use and manure management practices after being provided with training and tools disaggregated by gender and age	**HEADLINE:** Percentage of trained farmers adopting two efficient fertiliser and manure management practices within 12 months, disaggregated by gender and age	Directly and quantitatively measures behaviour change; captures successful adoption in a measurable and time-bound way
		SUPPORTING: Number of farmers trained in efficient fertiliser and manure management practices, disaggregated by gender and age	Tracks who receives capacity-building and ensures equitable participation
Improved rice management practices Deep organic fertiliser application and improved biomass and fertilizer management in rice and nitrification inhibitors application, resulting in reduced N2O emissions from mineral N- fertilizer use.	Number of hectares of rice farms applying improved fertiliser management and nitrification inhibitors	**HEADLINE**: Percentage reduction in N2O emissions from rice production due to improved fertiliser and biomass management practices	Captures the high level mitigation outcome aligned with the NDC measure (reduced N2O)
		SUPPORTING: Number of hectares of rice farm applying improved fertiliser management and nitrification inhibitors	No change
		SUPPORTING: Percentage of rice farmers implementing improved biomass and water-management techniques (e.g. deep placement of organic fertiliser, controlled flooding)	Captures broader practice change beyond fertiliser use alone.
LIVESTOCK			
Improved livestock husbandry Improved livestock husbandry through expansion of new fodder area under *Brachiaria* and *Napier*, reducing CH4 emissions from enteric fermentation and increasing biomass carbon stock.	Hectarage planted to *Napier* grass	**HEADLINE:** Hectarage planted to Napier grass	No change
		SUPPORTING: Hectarage planted to Brachiaria grass	Addition of tracking of Brachiaria grass
Improved livestock and breed management Improved breeding management to increase meat and milk yields, including through species replacements, encouragement of semi-intensive feeding system and diversification, resulting in reduced CH4 emissions from enteric fermentation.	Number of improved breeds introduced into Malawi	**HEADLINE:** Number of improved breeds distributed annually, with 12-month survival/adoption rates monitored.	Needed clarity on adoption rather than just introduction; survival/adoption reflects real outcomes and improves data usability.
		SUPPORTING: Percentage increase in meat yields (per 1000 animals)	Directly measure the prodcutivity gaisn expected from improved breeds
		SUPPORTING: Percentage increase in milk yields (per 1000 animals)	Directly measure the prodcutivity gaisn expected from improved breeds
Improved farm management Establishing biogas digesters, promotion of collective farms, improved manure management and promotion of slurry systems, resulting in reduced or avoided N2O and CH4 emissions.	Number of farms with biogas plants	**HEADLINE:** Number of operational biogas plants verified annually	Addition of verification stage
		SUPPORTING: Percentage of installed plants functioning 12+ months after installation.	Original indicator counted installations without checking functionality; revision ensures quality, sustainability, and real climate impact.

		SUPPORTING: Percentage of farms adopting improved manure management practices	Previous indicator only focused on number of biogas plants installed without capturing wider range of improved manure-management practices.

Sectoral Working Group Outputs: Energy Sector Working Group

The Energy and Transport teams made progress in strengthening their indicators to ensure they met SMART criteria and more accurately reflected Malawi's NDC implementation priorities. During the review, many existing indicators were clarified to specify exactly what was being measured, with clear units such as megawatts installed, percentages, and counts of technologies deployed. Time-bound milestones were introduced to support consistent annual tracking.

A key improvement was the development of a structured hierarchy of headline and supporting indicators. Headline indicators now capture the overarching outcomes and impacts of sector interventions, for example, increases in installed renewable energy capacity or shifts in ethanol–fuel blend ratios, while supporting indicators provide detail on the enabling actions and intermediate results that contribute to these outcomes, such as the number of signalled solar home systems or progress in hydropower plant development. To strengthen alignment with intervention logic, the teams categorised indicators across the results chain, inputs such as financing, training, and equipment; outputs including off-grid solar PV installations and changes in fuel blending; outcomes such as the increased share of renewables in the national energy mix; and long-term impacts relating to reduced methane emissions and improved energy security.

Discussions on data availability highlighted that information for several indicators is accessible from key development partners, such as the World Bank's power sector initiatives. However, important gaps remain, particularly around the availability of annually disaggregated data, inconsistencies between data from different sources, and limited clarity on methodologies used for specific indicators. To address these challenges and strengthen the basis for future NDC reporting, the teams recommended establishing clearer institutional roles for data collection and validation—particularly for the Department of Energy, the Ministry of Transport and Public Works, and the Directorate of Road Traffic and Safety Services. They also emphasised the need for enhanced coordination across agencies and better integration of monitoring activities into routine sectoral workflows. Finally, the teams highlighted the importance of improving documentation of indicator definitions, data sources, and measurement protocols to support the development of more robust indicators for NDC 3.0.

Table 13: Energy & Transport working group output on enhancing the existing sectoral indicators

Sector and NDC measure	Previous Indicator	Suggested Revised or New Indicator	Reason for Revision
ENERGY			
ELECTRICITY GENERATION			
Grid connected wind power Displacement of GHG emissions from fossil fuel power generation, including coal-fired, diesel and HFO generation.	MW of additional grid-connected wind power capacity	**HEADLINE:** MW of additional grid-connected wind power capacity per year	No change - tracks infrastructure deployment and investment progress
		SUPPORTING: Total electricity generated from wind power (MWh/year)	Needed to calculate avoided fossil generation and GHG savings
		SUPPORTING: Number of wind projects achieving key development milestones (feasibility, PPA signed, construction, commissioning)	Allows tracking of pipeline capacity, not just installed MW
Efficient charcoal production Production of charcoal to meet energy demand using less wood feedstock through use of efficient kilns, resulting in reduced CH4 and N2O emissions.	KGs of efficient charcoal produced	**HEADLINE:** KGs of charcoal produced from efficient kilns per year	The measure is about a charcoal production process to reduced GHGs (CH4 and N2O). Therefore, the indicator must measure the output from the efficient process. Improves the original indicator by clarifying unit, timeframe, and kiln type
		SUPPORTING: KGs of wood required per KG of charcoal produced (conversion efficiency)	Direct indicator of efficiency, lower ratios result in better kilns
Grid-connected large-scale hydropower	MW of additional grid-connected hydropower capacity	**HEADLINE:** MWh of additional grid-connected hydropower capacity	Fossil energy reduction is the output; thus, units of the indicator must be energy units
		SUPPORTING: Total electricity generated from hydropower plants (MWh/year)	Required to calculate avoided fossil-fuel generation and GHG savings
Off-grid small scale solar PV systems	Number of new, operational, off-grid solar PV SHS / lanterns	**HEADLINE:** kWh of additional off-grid solar PV systems	Fossil energy reduction is the output; thus, units of the indicator must be energy units
		SUPPORTING: Number of new, operational and off-grid solar PV systems installed each year	Measures deployment
Grid connected large scale solar PV	MW of additional grid-connected large-scale solar PV capacity	**HEADLINE:** MWh of additional grid-connected large-scale solar PV capacity	Fossil energy reduction is the output; thus, units of the indicator must be energy units
		SUPPORTING: Electricity generated from grid-connected solar PV (MWh/year)	Required to estimate avoided fossil-fuel generation and GHG savings

TRANSPORT			
Modal shift: private to passenger transport Increasing the share of passenger transport from around 10% at present to around 30% in 2040, reducing GHG emissions from gasoline and diesel use.	Share of public transport in total passenger transport	**HEADLINE:** Share of total passengers transported using public transport	The indicator is not clear because the output is passengers transported using public transport.
		SUPPORTING: Number of new buses added to the public transport fleet each year	Measures system capacity to accommodate increasing passenger demand
Modal shift: road to rail freight Increased use of rail under the National Transport Master Plan, resulting in reduced diesel consumptions and GHG emissions from road freight transport.	Share of railways in total freight transport	**HEADLINE:** Total tonnes of freight transported via rail annually	The indicator is not clear because the output is freight transported using rail transport.
		SUPPORTING: Number of scheduled freight train services operating per week	Reflects operational capacity and service reliability
Increasing ethanol blending with gasoline as a transportation fuel Achieving an average national blend rate of 20% ethanol, resulting in reduced GHG emissions from gasoline consumption in road transport.	Blending ratio of ethanol to petrol	**HEADLINE:** National average ethanol blending ratio (% ethanol in gasoline) achieved annually	Improvement of original indicator with clear measurement
		SUPPORTING: Total volume of ethanol supplied to fuel depots for blending	Tracks supply capacity and consistency
Blending biodiesel with diesel as a transportation fuel Commercial production of biodiesel fuel reaching 55 million litres and resulting in reduced GHG emissions from diesel consumption in road transport.	Litres of biodiesel production	**HEADLINE:** Total litres of biodiesel produced annually	Improves time dimension of original indicator
		SUPPORTING: Total litres of biodiesel-blended diesel (e.g. B5 - B20) distributed through fuel stations.	Measures market penetration and real-world adoption
BUILDINGS			
Improved charcoal cookstoves - rural households (a) Deployment of efficient charcoal cookstoves to urban households; increasing from 20% to 30% efficiency thereby reducing demand for charcoal and CH4 and N2O emissions.	Percentage (or number) of rural households using improved charcoal cookstoves (or number of improved charcoal cookstoves)	**HEADLINE:** Percentage (or number) of rural households using improved charcoal cookstoves (or number of improved charcoal cookstoves)	No change
		SUPPORTING: Percentage reduction in charcoal use among households using improved charcoal cookstoves	Connects behavioural change to GHG reductions
Improved firewood cookstoves - rural households (b) Introduction of 2 million improved high efficiency stoves, resulting in carbon sink preservation through reduction in use of unsustainable biomass fuel.	Percentage (or number) of rural households using improved firewood cookstoves (or number of improved firewood cookstoves)	**HEADLINE:** Percentage (or number) of rural households using improved firewood cookstoves (or number of improved firewood cookstoves)	No change
		SUPPORTING: Percentage reduction in firewood use among households using improved stoves.	Links efficiency gains to avoided forest extraction

5.2. Using the GACMO tracking tab for NDC tracking

During the NDC tracking capacity-building workshop that took place in August 2025 (see Section 4), sector teams were introduced to the GACMO tracking tab and were guided on entering both planned and actual implementation data for selected measures. The sectoral working groups piloted the tool by inputting real implementation data for relevant measures.

The agriculture team entered implementation measure details for rice crop CH_4 reduction, including their anticipated annual targets as set out in sector plans, alongside the actual implementation rates achieved between 2018 and 2025. By doing so, the agriculture sector was able to observe accumulated progress, identify actions where uptake was slower than expected, and quantify the resulting GHG reductions directly within the model. This hands-on exercise demonstrated that the tool is practical and user-friendly when sector-specific data is available. Sectoral working groups were encouraged to continue adding their remaining measures into the GACMO NDC tracking tab, ensuring that all relevant planned and actual implementation data, units, and financial information are entered consistently to support accurate and transparent monitoring of progress toward the 2030 targets.

The inclusion of the GACMO tracking tab proves exceedingly valuable, as its results can be directly transferred to the relevant sectors for completion of the CTF tables for Malawi's BTR.

See the agriculture working group screenshot of the NDC tracking tab in the GACMO model in Figure 5.

Figure 5: Screenshot of the tracking tab in the GACMO model showcasing the key columns and cells for the user to input highlighted in yellow (agriculture working group).

Step 9 - Tracking progress

Select sector/type for

Malaw

The Tracking progress sheet is used by the user to monitor the progress made in implementing each mitigation action. The Tracking progress sheet is thus used ex-post, that is, once the mitigation options are under implementation or have been implemented, to estimate and monitor the effective reductions of GHG emissions.

The sheet includes a table with a structure similar to the table found in the Mitigation Options sheet. The table includes the 119 mitigation options (Reduction options in column C) grouped by category or activity types (Type in column B). All 119 mitigation options are shown by default. If the user wants to see only the mitigation options for a specific group of category or activity types, the user can select the corresponding category/ies or activity/ies by clicking the button "Select sector/type for Tracking input" in the upper part of the sheet.
Please refer to the Guidance for further details on how to use the Tracking progress sheet

In this sheet the country will follow the implementation of the GHG reduction options in the mitigation option sheet									Implemented mitigation options/units									
Type	Reduction option	Sub-type unit	2025 plan	2030 plan	2035 plan	2050 plan	Total planned by 2030	2017 Base year	2018 Actual	2019 Actual	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Actual	Accumulated	Progression towards 2030
Agriculture	Rice crop CH4 reduction	Rice crop CH4 red.(1000 ha)	30	35	40	45	35	5	2	4	4	5	4	2	4	3	33	94%
	Zero tillage	1000 ha	0	0	0	0	0										0	
	Cover crops	1000 ha	0	0	0	0	0										0	
	Nitrification inhibitors (100	1000 ha	0	0	0	0	0										0	
	Covering slurry stores (1 slu	1 slurry store	0	0	0	0	0										0	
	Fat supplementation in rum	%DM fat added	1	2	2	3	2										0	
	Tobacco curing	100 t tobacco/yr	0	0	0	0	0										0	

5.3. Supplementary Excel Tracking Tool

Although it is suggested that the primary tracking tool will continue to be the GACMO tracking tab, the team identified the need to further consolidate the quantitative indicator data, therefore a complementary Excel tool has been created to collate this information and serve as an updated and central tracker for ongoing NDC data collection and monitoring.

Components of the supplementary tracking framework for NDC PAMs, as collected by ICAT data collectors, are detailed in Appendix 1. The framework includes tracking elements such as: NDC measure; relevant indicator; target; milestone; data availability; baseline; data collection; unit; data collection frequency; primary government institution; focal point; other relevant government institutions; data availability in the future. Inclusion of GACMO tracking tab was useful because the results from there

would be transferred to relevant sectors if the CTF Tables of the BTR.

Sources of data on the listed indicators were found to be diverse. Data collection was affected by lack of clear office that is responsible for sharing data. Secondly, the approval process for data sharing was somewhat lengthy. Data from private sector, for example on ethanol/petrol blend ratio was the most difficult to get and was not available by the time of survey. For indicators where data was from public institutions and the focal points was involved in this survey, collection of this data was relatively easy for example on indicators involving large-scale grid connected hydropower, and solar PV grid-based installation, as well as those in the agriculture sector.

6. Validation of NDC Tracking Enhancements and Further Recommendations

6.1. Validation of the NDC tracking framework

The proposed additions to the NDC tracking framework were validated during a workshop held in December 2025, where the sectoral working groups reviewed and tested the structure and functionality of the new NDC tracking elements. The workshop confirmed that these enhancements represent meaningful progress toward establishing a more effective and coherent national NDC tracking system. However, several gaps remain before full integration can be achieved, notably the need to further populate the GACMO tracking tab across all sectors and all PAMs, as only a limited subset has been incorporated to date. Nonetheless, the exercises under Activity 3 have significantly strengthened in-country capacity, enabling sectoral working groups to take ownership of the frameworks continued development and positioning the sectoral working groups to further advance and refine the NDC tracking system moving forwards.

6.2. Further recommendations for NDC tracking in Malawi

The activities described in this Activity 3 report have focused on strengthening Malawi's indicator set, utilising the GACMO tracking tab and improving related data collection for NDC tracking. Building on this foundation, the following recommendations outline further steps to enhance the overarching NDC tracking approach and ensure alignment with international transparency requirements, as presented in Table 14.

Table 14: Overview of initial recommendations for enhancing Malawi's NDC tracking system

Topic	Recommendations
Linkages to other elements of Malawi's national transparency system	• There is a need to continue strengthening the capacity of key government ministries and agencies responsible for NDC implementation tracking. This includes improving coordination between sectors and embedding clear roles for data collection and validation within institutional frameworks. • Future policies, strategies, and frameworks developed under the NDC 3.0 process should integrate both mitigation and adaptation

	indicators to improve trackability and ensure consistency with Biennial Transparency Report (BTR) requirements.
Filling data gaps	• While progress has been made in defining indicators, data availability remains a challenge. Many datasets rely on estimates rather than measured values, which limits accuracy and confidence in reporting. • Priority actions include establishing systematic data collection protocols, improving frequency of reporting, and addressing gaps such as gender-disaggregated data, operational status of technologies, and sector-specific baselines. Strengthening partnerships with research institutions and leveraging existing national surveys can help close these gaps.
Adaptation monitoring	• Due to resourcing limitations on the project, adaptation tracking is currently less developed than mitigation monitoring. There is an opportunity to strengthen adaptation monitoring, reporting, and review processes by defining clear indicators for resilience-building measures and integrating these into sectoral plans. This will ensure that adaptation actions receive equal attention and are reflected in future BTR submissions.
Enhancing institutional arrangements for NDC tracking	• To build confidence among stakeholders, Malawi should define regulatory measures and formalise institutional arrangements for data access, ownership, and disclosure. This includes clarifying responsibilities for data validation and quality assurance and establishing mechanisms for inter-ministerial coordination. A robust governance framework will improve transparency, reduce duplication, and support timely reporting.

6.3. Good Practices for NDC tracking

To ensure Malawi's NDC tracking framework further develops into a robust, transparent and sustainable system, the following good practices should be considered. These practices provide guidance for strengthening processes and structures over time.

- Consider and develop the NDC tracking processes and structures as an integral part of the country's national Transparency System under the UNFCCC, thus ensuring gaps and/or duplications in structures and processes and that other elements of the system can feed into the NDC tracking framework (e.g. national GHG inventory data) and can draw from it (e.g. Biennial Transparency Reporting process, process for the development of the subsequent NDC)
- Ensure all relevant stakeholders from all sectors and adaptation areas are involved in the NDC tracking process, e.g. through interministerial committees, sectoral working groups, etc.
- Adopt a phased approach by starting with key elements of the NDC tracking process, such as indicators for the most critical NDC targets, and gradually expand the system over time. Build on existing structures, processes and data sources such as national statistics, GHG inventory compilation to reduce costs and accelerate implementation. Building on existing structures, processes and data to the extent feasible (e.g. statistics, national GHG inventory compilation, policy evaluation and updating processes)
- Prioritise simple and customisable tools for data collection, evaluation and reporting. Readily adaptable tools such as Excel templates can be more practical and cost effective than complex software solutions, which often require specialised skills and high maintenance costs. Advanced systems should only be introduced once needs are clearly defined.
- Ensure data for NDC tracking is collected regularly using the same data sources and assumptions, to

ensure consistent indicator data (GHG inventory compilers can share experiences with regards to time-series consistency)

- Establish strong archiving and documentation practices across all institutions involved. This will safeguard institutional memory and minimise disruptions caused by staff turnover. From the outset, store NDC tracking data in a central backed up repository accessible to authorised staff to prevent data loss and improve efficiency.
- Design the tracking process to include evaluation of indicators and policy feedback loops. Beyond compiling data, the system should generate actionable insights for policymakers, such as identifying sectors where climate action needs to be scaled up or measures that are underperforming.
- Ensure the system is future proof by enabling tracking of both the current NDC and subsequent updates. This forward-looking approach supports long term climate planning and positions Malawi to meet evolving international reporting requirements.

Tracking of NDCs implementation of one of the important aspects of ETF for all countries that are Parties to Paris Agreement, like Malawi. However, there is considerable challenges regarding development of tracking tools and coordination of key players involved at all levels including ministries, departments, agencies and sectors. This activity has created framework for enhancing NDC Tracking in Malawi. It includes processes, data sources, linking all key players in tracking NDC implementation hence collaboration among key players being one of the successful elements to enhance NDC tracking in Malawi. Characterisation of already existing NDCs according to SMART criteria and their sources data will help inform NDC-3 review, as well as other reporting obligation on climate change actions in Malawi. It is hoped that this report will be useful guide to enhance NDC tracking in Malawi.

MINISTRY OF NATURAL RESOURCES & CLIMATE CHANGE

Appendix 1: Complimentary NDC Tracking Excel Framework

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
IPPU and waste NDC measures removed as out of scope under ICAT project	*Match to the relevant indicator list taken from the NDC implementation plan*	*Navigate to the NDC implementation plan web page, identify the relevant indicator, navigate to the "request" page, identify the relevant target and paste here*	*What is the defined milestone?*	*Is this data currently available or is it planned to be collected?*	*What is the baseline for data collection (year and data value)*	*2021*	*2022*	*2023*	*2024*	*What is the unit for data collection?*	*Annual/bi-annual*	*What is the primary government institution for implementation*	*Is there a named contact?*	*Are there other or secondary institutions who collect this data?*	*If the data is unavailable, what plans are there to collect this in the future?*	*No response, pending response, completed*
ENERGY																
ELECTRICITY GENERATION																
Grid connected wind power Displacement of GHG emissions from fossil fuel power generation, including coal-fired, diesel and HFO generation.	MW of additional grid-connected wind power capacity	60 MW of additional capacity by 2030	2021 - Large-scale, grid-connected, wind power component of Malawi IRP updated 2022 - New and additional resources mobilized for project preparation 2023 - Project preparation studies for priority grid-connected wind power projects initiated 2024 - Project preparation studies for priority grid-connected wind power projects completed 2025 - New and additional funding for priority grid-connected wind power projects secured		Need from Government of Malawi							Malawi Energy Regulatory Authority (MERA)				
Efficient charcoal production Production of charcoal to meet energy demand using less wood feedstock through use of efficient kilns, resulting in reduced CH4 and N2O emissions.	KGs of efficient charcoal produced	XYZ? KGs of additional efficient charcoal produced by 2025	2021 - Five-year charcoal plan prepared and value-chain developed 2022 - ??? KGs of improved, efficient charcoal produced, distributed, and supplied 2023 - ??? KGs of improved, efficient charcoal produced, distributed, and supplied 2024 - ??? KGs of improved, efficient charcoal produced, distributed, and supplied 2025 - ??? KGs of improved, efficient charcoal produced, distributed, and supplied	Available	Need from Government of Malawi		5000	42300 was produced and 40,179 was used	59114.5 was produced and 31,745 was used. by 2025 the total of 156,720 has been produced.	Kilograms	annually/biannual	Ministry of Energy & Ministry of Natural Resources and Climate Change	Department of Forestry and ministry of Energy (Mr Thokozani Malunga)	Ministry of Local Government and Ministry of Energy & Ministry of Natural Resources and Climate Change	Yes. The development of energy support system by the NDC support centre will help to ensure the easy availability of data.	Completed

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
Clean Coal technology - high efficiency coal-fired power plant Installation of highly efficient super ultracritical coal plant, resulting in reduced GHG emissions from coal use in electricity generation.	Level of efficiency of coal power generation	One super-critical coal plant at 44% efficiency by 2035	2021 - Briefing paper commissioned 2022 - Briefing paper published 2023 - Technology and funding needs assessment commissioned 2024 - Technology and funding needs assessment published 2025 - Inclusion of efficient coal technologies in NDC re-evaluated in 2025 NDC update		33% efficiency coal power plant							Ministry of Energy Malawi Energy Regulatory Authority (MERA)	Department of Energy Affairs	Department of Mines		
TRANSPORT																
Modal shift: private to passenger transport Increasing the share of passenger transport from around 10% at present to around 30% in 2040, reducing GHG emissions from gasoline and diesel use.	Share of public transport in total passenger transport	40% share of public transport in overall passenger transport by 2040	2021 - Notifications issued for institutional and regulatory reforms recommended by NTMP 2022 - Progress report on reforms recommended by NTMP to show 100% completion of reforms 2023 - New and additional resources mobilized for project preparation 2024 - Project preparation studies and appraisals for priority public transport projects initiated 2025 - Project preparation studies and appraisals for priority public transport projects completed	No, but data collection is planned	10% share of public transport in overall passenger transport	Notifications for institutional and regulatory reforms were issued	No progress report was produced	Resource Mobilized	Initiation of project preparation studies and appraisals	Number of passengers transported and % of total passengers transport	monthly and quarterly	Ministry of Transport and Public Works and Ministry of Local Government and Rural Development, Lilongwe City Counsil Directorate of Road Traffic and Safety Services (DRTSS)	Mr Jason Mwatsika and Ms Melony Maziyaya	Passenger Associations and Bus Operators' Associations, Public Transport Operators, Local Government	Planned to be collected	Completed
Modal shift: road to rail freight Increased use of rail under the National Transport Master Plan, resulting in reduced diesel consumptions and GHG emissions from road freight transport.	Share of railways in total freight transport	Rail transport to account for 50% of total freight transport by 2040	2021 - Notifications issued for institutional and regulatory reforms recommended by NTMP 2022 - Progress report on reforms recommended by NTMP to show 100% completion of reforms 2023 - New and additional resources mobilized for project preparation 2024 - Project preparation studies and appraisals for priority public transport projects initiated 2025 - Project preparation studies and appraisals for priority public transport projects completed	No, but data collection is planned	Rail accounts for less than 30% internal and less than 10% international freight						annually	Ministry of Transport and Public Works Directorate of Road Traffic and Safety Services (DRTSS)	Mr Jason Mwatsika and Ms Melony Maziyaya	Road Transporters Association and Railway Operator, MERA, Roads Authority, CEAR	The Access to Information bill was gazetted which allows stakeholders to access this data for planning purposes	Completed
Increasing ethanol blending with gasoline as a	Blending ratio of ethanol to	20:80 blending ratio of ethanol to petrol by 2035 (held	2021 - Notifications issued for institutional and regulatory reforms recommended by	No	9:91 blending ratio of ethanol to							Ministry of Transport and	Ministry of Energy Mr Thoko	Malawi Energy Regulatory Authority	Planned to be collected	Completed

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
transportation fuel Achieving an average national blend rate of 20% ethanol, resulting in reduced GHG emissions from gasoline consumption in road transport.	petrol	constant to 2040)	NTMP 2022 - Progress report on reforms recommended by NTMP to show 100% completion of reforms 2023 - New and additional resources mobilized for ethanol-petrol blending scale-up 2024 - Ethanol-petrol blend increased to 12% (12:88 ratio) 2025 - Ethanol-petrol blend increased to 15% (15:85 ratio)		petrol							Public Works	Malunga, MERA Mr Geofrey Chilenga	(MERA),		
Blending biodiesel with diesel as a transportation fuel Commercial production of biodiesel fuel reaching 55 million litres and resulting in reduced GHG emissions from diesel consumption in road transport.	Litres of biodiesel production	55 million litres biodiesel production in 2030; 15:85 blending ratio of biodiesel with diesel by 2030	2021 - Notifications issued for institutional and regulatory reforms recommended by NTMP 2022 - Progress report on reforms recommended by NTMP to show 100% completion of reforms 2023 - New and additional resources mobilized for biodiesel-diesel blending scale-up 2024 - Biodiesel production raised to 500,000 litres; blend increased to 10% (10:90 ratio) 2025 - Biodiesel production raised to 1 million litres; blend increased to 12% (12:88 ratio)	No	150,000 litres biodiesel production (baseline year: 2016); 9:91 blending ratio of biodiesel with diesel						Ministry of Transport and Public Works	Mr Chilenga	Malawi Energy Regulatory Authority (MERA), Ministry of Agriculture, NOCMA	Planned to be collected	Completed
BUILDINGS																
Improved charcoal cookstoves - rural households (a) Deployment of efficient charcoal cookstoves to urban households; increasing from 20% to 30% efficiency thereby reducing demand for charcoal and CH4 and N2O emissions.	Percentage (or number) of rural households using improved charcoal cookstoves (or number of improved charcoal cookstoves)	% of rural households to use efficient charcoal stoves by 2030; Increased efficiency of charcoal cookstoves to 30%	2021 - Programme design completed (including charcoal cookstoves) 2022 - Resources mobilized 2023 - ??? Number of households covered by the fuel-switching and improved cookstove programme 2024 - ??? Number of households covered by the fuel-switching and improved cookstove programme 2025 - ??? Number of households covered by the fuel-switching and improved cookstove programme	No	% of rural households use efficient charcoal stoves (ask government); 20% efficiency of charcoal stoves			2730 71		Number of cookstoves distributed	Not regularly	Ministry of Energy and Ministry of Natural Resources and Climate Change	Joana Thaundi, Ministry of energy	GIZ,Self Help Africa,UPEnergy,Dziwani Investments,Burn Manufacturing Company,ENER-G Africa, District Energy Offices and District Forestry Offices	Plans to collect data in 2026 as per MTF schedule	Completed
Improved firewood cookstoves - rural households (b) Introduction of 2 million improved high efficiency stoves, resulting in carbon sink	Percentage (or number) of rural households using improved firewood cookstoves (or	2 million improved firewood cookstoves by 2030; Increased efficiency of firewood stoves to 30%	2021 - Programme design completed (including firewood cookstoves) 2022 - Resources mobilized 2023 - ??? Number of households covered by the fuel-switching and improved cookstove programme 2024 -	Available	% of rural households use efficient firewood stoves (ask government); 10% efficiency of	2,539 ,128	3,034 ,660	1,348 ,500	1,941,80 7	Number of Improved firewood cookstoves distribute	Annually	Ministry of Energy	Joana Thaundi, Ministry of energy	Department of Energy Affairs, Ministry of Natural Resources, Dziwani Investiments, GIZ, UP Energy, Self Help Africa		Completed

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
preservation through reduction in use of unsustainable biomass fuel.	number of improved firewood cookstoves)		??? Number of households covered by the fuel-switching and improved cookstove programme 2025 - ??? Number of households covered by the fuel-switching and improved cookstove programme		firewood stoves					d						
INDUSTRY AND MANUFACTURING																
Power Factor Correction Reduced generation of reactive power at power plants resulting in avoided GHG emissions from reduced fossil fuel fuel combustion to generate reactive power.	Increase in power factor	Power factor to increase from a minimum of 0.85 to 0.9 by 2025.	2021 - ? 2022 - ? 2023 - ? 2024 - ? 2025 - ?	No	Need form Government of Malawi							Department of Factory Inspectorate and MERA	Mr Chilenga, Mr Mkayenda	Electricity Supply Corporation of Malawi	Yes, after sensitization and awareness meetings at all levels	Completed
AGRICULTURE																
Use of efficient barns for tobacco curing Reduced demand for fuelwood required in tobacco curing from 2025-2040 by use of efficient barns, resulting in avoided CH4 and N2O emissions from fuelwood combustion.	Percentage reduction in fuelwood demand for tobacco curing	X% reduction in fuelwood demand for tobacco curing by 2030	2021 - Targeted tobacco curing barns and suppliers identified; baseline firewood use measured 2022 - Resources mobilized 2023 - ?? Number of tobacco curing barns covered under the initiative 2024 - ?? Number of tobacco curing barns covered under the initiative 2025 - ?? Number of tobacco curing barns covered under the initiative		Need from Government of Malawi											
Conservation tillage within for commercial crop farming Use of conservation or zero tillage farming, resulting in avoided GHG emissions from diesel use in tractors used in ploughing and tilling before crop planting.	Percentage of farms growing annual crops to use conservation tillage;	Complete 160,000 Ha under conservation agriculture practices (tillage); X% of farms growing annual crops to use conservation tillage by 2030; Y% of farms growing annual crops to use no-till techniques by 2030														
AGRICULTURE																

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
CROP MANAGEMENT																
Conservation agriculture: crop residue and rotation Support and implementation of the planned expansion targets for crop residue and crop rotation to improve soil conservation, resulting in increase of soil carbon stock and improved crop yields.	Percentage increase in soil carbon stock	Complete 80,000 Ha under conservation agriculture practices (crop residue and rotation)	2021 - Complete identification of target locations in different agro-ecological zones 2022 - Complete 40,000 Ha of conservation agriculture + training 2023 - Complete 40,000 Ha of conservation agriculture + training 2024 - Complete 40,000 Ha of conservation agriculture + training 2025 - Complete 40,000 Ha of conservation agriculture + training	Available	Need from Government of Malawi	5806	3225	5570	4154	Hectares	Bi-annual	Ministry of Agriculture	Mr Nthara	LUANAR and other agriculture research institutions	Yes, after sensitization and awareness meetings at all levels	Completed
Conservation tillage within for commercial crop farming Use of conservation or zero tillage farming, resulting in avoided GHG emissions from diesel use in tractors used in ploughing and tilling before crop planting.	Percentage of farms growing annual crops to use conservation tillage;	Complete 160,000 Ha under conservation agriculture practices (tillage); X% of farms growing annual crops to use conservation tillage by 2030; Y% of farms growing annual crops to use no-till techniques by 2030	2021 - Complete identification of target locations in different agro-ecological zones 2022 - Complete 40,000 Ha of conservation agriculture + training 2023 - Complete 40,000 Ha of conservation agriculture + training 2024 - Complete 40,000 Ha of conservation agriculture + training 2025 - Complete 40,000 Ha of conservation agriculture + training	Yes the data, is currently availabe	Need from Government of Malawi	Identification of target locations for conservation tillage, 6 agro-ecological zones were Identified	5,806 Hectares	3,225 Ha	4,154 Ha	Hectares, number trained, Hectares of land under CA	Monthy and Quarterly	Ministry of Agriculture-Department of Land Resources	Ministry of Agriculture, Macpherson Nthara	Department of Energy Affairs, Conservation Agriculture Trust	Yes	Completed
	Percentage of farms growing annual crops to use no-till techniques.	Complete 160,000 Ha under conservation agriculture practices (tillage); X% of farms growing annual crops to use conservation tillage by 2030; Y% of farms growing annual crops to use no-till	2021 - Complete identification of target locations in different agro-ecological zones 2022 - Complete 40,000 Ha of conservation agriculture + training 2023 - Complete 40,000 Ha of conservation agriculture + training 2024 - Complete 40,000 Ha of conservation agriculture + training 2025 - Complete		Need from Government of Malawi							Ministry of Agriculture	Ministry of Agriculture	Department of Energy Affairs	Planned to be collected	Completed

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
		techniques by 2030	40,000 Ha of conservation agriculture + training													
Promotion of efficient fertiliser use and manure management Improved fertiliser management through increased use of organic waste in soil fertilizers and compost manure, increasing carbon stock retention in soils, and reduced N2O emissions from mineral N-fertilizer use.	Percentage of new farmers successfully adopting efficient fertiliser use and manure management practices after being provided with training and tools disaggregated by gender and age	50% of new farmers successfully adopting efficient fertiliser use and manure management practices after being provided with training and tools	2021 - Strategic interventions to meet goals of both the National Agriculture Investment Plan and National Climate Change Investment Plan identified as government and donor priorities 2022 - Existing activites on fertilizer use and manure management expanded and scaled up 2023 - Implementation and M&E continued 2024 - Implementation and M&E continued 2025 - Implementation and M&E continued	Available	Need from Government of Malawi	425982	689011	1029617	1500000	Hectares	Bi-annual	Ministry of Agriculture	Mr Nthara	LUANAR and other agriculture research institutions	Yes, after sensitization and awareness meetings at all levels	Completed
Improved rice management practices Deep organic fertiliser application and improved biomass and fertilizer management in rice and nitrification inhibitors application, resulting in reduced N2O emissions from mineral N- fertilizer use.	Number of hectares of rice farms applying improved fertiliser management and nitrification inhibitors	Application of improved fertiliser management and nitrification inhibitors on 90,000 ha of rice farms by 2040; 60,000 Ha by 2025	2021 - Complete identification of target locations in different agro-ecological zones 2022 - Complete 30,000 Ha of improved rice management measures / year (+ training) 2023 - Complete 10,000 Ha of improved rice management measures / year (+ training) 2024 - Complete 10,000 Ha of improved rice management measures / year (+ training) 2025 - Complete 10,000 Ha of improved rice management measures / year (+ training)	Available	Need from Government of Malawi	12500	16000	20300	18700	Hectares	Bi-annual	Ministry of Agriculture	Dinala Zalinga and Ida Mwato	LUANAR and other agriculture research institutions	Yes, after sensitization and awareness meetings at all levels	Completed
LIVESTOCK																
Improved livestock husbandry Improved livestock husbandry through expansion of new fodder area under *Brachiaria* and *Napier*, reducing CH4 emissions from enteric fermentation and increasing biomass carbon stock.	Number of hectares with new fodder cultivation of Brachiaria and Napier	New fodder area under Brachiaria and Napier to reach targeted 200,000 ha to feed 1,700,000 cows by 2040; 50,000 Ha by 2025	2021 - Complete identification of target locations in different agro-ecological zones 2022 - Complete 20,000 Ha under improved fodder grass cultivation (+ training) 2023 - Complete 10,000 Ha under improved fodder grass cultivaton (+ training) 2024 - Complete 10,000 Ha under improved fodder grass cultivaton (+ training) 2025 - Complete 10,000 Ha under improved fodder grass												

Sector and NDC measure	Relevant Indicators	Target	Milestone	Is this data currently available?	Baseline	Data collection				Unit	Data collection frequency	Primary Government Institution for Implementation	Focal Point In the Primary Institution	Other Relevant Government Intuitions for Implementation	Data availability in the future	Status column for data collectors
			cultivaton (+ training)													
Improved livestock and breed management Improved breeding management to increase meat and milk yields, including through species replacements, encouragement of semi-intensive feeding system and diversification, resulting in reduced CH4 emissions from enteric fermentation.	Percentage increase in meat yields (per 1000 animals) 94.1.2. Percentage increase in milk yields (per 1000 animals)	Introduction of 40,000 new heads of improved breeds of cattle by 2025	2021 - Complete identification of farmers participating in the improved breed programme 2022 - Introduce 10,000 new and improved heads of cattle (cows) + complete training 2023 - Introduce 10,000 new and improved heads of cattle (cows) + complete training 2024 - Introduce 10,000 new and improved heads of cattle (cows) + complete training 2025 - Introduce 10,000 new and improved heads of cattle (cows) + complete training	Available	Need from Government of Malawi	6059 1000 1303 4200 0	66169 000 15498 9000			KGs and Litres	Annual	Ministry of Agriculture	Sugzo Chapa	LUANAR ana other agriculture research institutions	effortys to internalize GHG related data into data capturing template of APES	Completed
Improved farm management Establishing biogas digesters, promotion of collective farms, improved manure management and promotion of slurry systems, resulting in reduced or avoided N2O and CH4 emissions.	Percentage of farms adopting improved manure management practices 95.1.2. Number of new biogas digestors	800 farms (including combined farm locations) to have improved manure management facilities installed such as biogas digesters.	2021 - Complete identification of farmers participating in the improved manure management programme 2022 - Install biogas digesters and manure mangement facilities on 200 farms (+ training) 2023 - Install biogas digesters and manure mangement facilities on 200 farms (+ training) 2024 - Install biogas digesters and manure mangement facilities on 200 farms (+ training) 2025 - Install biogas digesters and manure mangement facilities on 200 farms (+ training)												
FORESTRY AND LAND USE																
Afforestation (protective forests, woodlots and urban forests) Production and planting of native Eucalyptus and Pinus trees in 45,000 Ha of areas, with potential to be scaled-up to 600,000 Ha with international support, based on NFLRS targets.	Hectares (Ha) of protective forests planted and maintained (Eucalyptus and Pinus)	Production and planting of native Eucalyptus and Pinus trees in 45,000 Ha of areas identified, by ??; 2025 target:	2021 - Complete identification of target locations 2022 - Complete ??? Ha of tree planting and maintenance, + training 2023 - Complete ??? Ha of tree planting and maintenance, + training 2024 - Complete ??? Ha of tree planting and maintenance, + training 2025 - Complete ??? Ha of tree planting and maintenance, + training	Available	Need from Government of Malawi	4342.4	2950.68	2704.27	2423.86	Hectares	Annual	Ministry of Natural Resources and Climate Change	Rodgers Tumba and Violet Mtaza		The Department is in intends to develop data management system that will be managed by the National Monitoring Unit (NMU).	Completed