DEVELOPMENT OF AN MRV FRAMEWORK FOR THE WASTE SECTOR IN CAMBODIA

SUMMARY ON LESSONS LEARNED AND KEY ACHIEVEMENTS OF THE PROJECT

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Initiative for Climate Action Transparency - ICAT
DEVELOPMENT OF AN MRV FRAMEWORK FOR THE WASTE SECTOR, INCLUDING APPLICATION OF THE WASCAD AND GACMO TOOLS, CAMBODIA

Output K - Summary on lessons learned and key achievements of the project

AUTHORS

H.M. Buddika Hemashantha, Indike Dassanayake, Wasundara Sashenka, Neelni Malsha, Chamara Bandara, Dinukshi Jayasena, Chanchhaya Chhom
ClimateSI

REVIEWERS

H.E. Sum Thy, Sum Cheat, Lun Lido, Doeun Dara, Chheng Tharika, Cheat Meardey, Pich Sokhim

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The Royal Government of Cambodia (RGC) ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1996 and the Paris Agreement in 2017. Cambodia submitted its Intended Nationally Determined Contribution (INDC) in 2015, followed by its latest Nationally Determined Contribution– NDC 3.0– in 2025.

While Cambodia has established Monitoring, Reporting, and Verification (MRV) frameworks across several sectors including forestry (REDD+), energy efficiency (NAMA in garments), renewable energy, and transport, a comprehensive national MRV framework for the waste sector remains absent. Current systems, including the NDC platform, do not yet support the estimation of greenhouse gas (GHG) impacts, leaving focal points reliant on external tools to fulfil this function.

Given that tracking NDC implementation and achievement is a core obligation under the Enhanced Transparency Framework (ETF), the development of a robust MRV system is essential for Cambodia to meet its climate targets in a credible, standardized, and transparent manner. To this end, identifying relevant indicators and addressing existing data gaps are critical first steps towards building an effective MRV system for the waste sector.

In support of this objective, the United Nations Office for Project Services (UNOPS) is providing technical assistance to the RGC through the ICAT project, which aims to design an MRV system for selected mitigation actions within Cambodia's waste sector. A team of National Experts, alongside International Experts from Climate Smart Initiatives (Pvt) Ltd. (ClimateSI), was engaged to deliver this work.

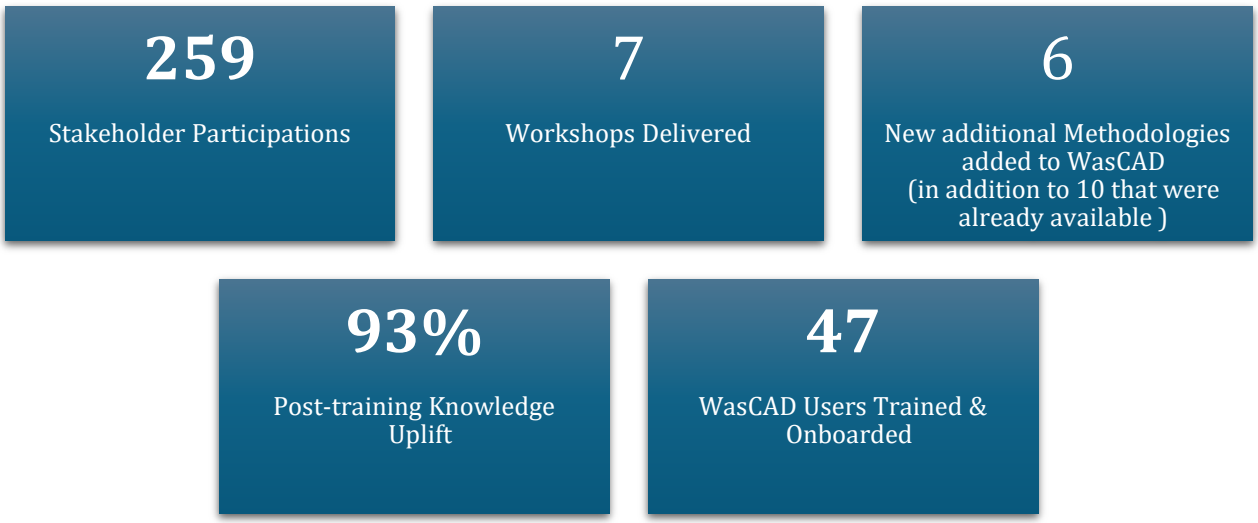
Appreciating the invaluable contribution extended from all stakeholders related to the assignment, we would like to extend our sincere thanks and gratitude to H.E. Sum Thy, Director General of General Directorate of Policy and Strategy (GDPS), Ministry of Environment; Mr. Sum Cheat, Deputy Director of the Department of Climate Change; and Mr. Lun Lido, Head of Office, Department of Climate Change, and other relevant key stakeholders for cooperating and assisting in the execution of this assignment by granting necessary approvals making relevant officers available for participation in the discussions, and providing necessary information.

Executive summary

This report presents the final Summary on Lessons Learned and Key Achievements of the ICAT Phase 3 Project "Development of an MRV Framework for the Waste Sector in Cambodia," covering the reporting period from June 2025 to May 2026. The project was implemented by the Ministry of Environment (MoE) through its GDPS and Department of Climate Change, with technical support from ClimateSI, and financial and methodological backing from the ICAT Secretariat / UNOPS.

The project addressed a long-standing gap in Cambodia's climate transparency architecture: the absence of a coordinated Measurement, Reporting and Verification (MRV) framework for the waste sector. The waste sector now bears significant ambition under Cambodia's third NDC 3.0, committing to approximately 73.3 $MtCO_2e$ of mitigation by 2035, of which the waste sector alone contributes 5.4 $MtCO_2e$ under the “with conditional” scenario, with a total investment requirement of USD 796 million. This report documents the achievements realised, challenges encountered and addressed, and the lessons learned across the full project lifecycle, serving as an institutional memory document for MoE, the ICAT Secretariat, ClimateSI, and national stakeholders.

Project Performance at a Glance



Key Achievements

Across the seven project activities, the following key achievements were realised;

- The WasCAD tool was fully adapted and deployed in Cambodia, with hands-on training provided on its application for waste sector NDC tracking;
- The inception phase identified the status of Cambodia's waste-sector MRV framework, including critical needs and gaps;
- Capacity building workshops improved the technical capacity of national experts and data providers on ETF requirements, IPCC inventory software, and the UNFCCC reporting tool;
- NDC tracking indicators were identified and the waste sector NDC tracking framework was developed;
- Data protocols, QA/QC procedures, and a roadmap for addressing data gaps were developed;
- Hands-on experience was received on the application of WasCAD and GACMO for GHG impact assessment and NDC tracking;
- At closure, key achievements and lessons learned were documented and the institutional arrangements for waste sector NDC tracking were finalised.

Challenges and Solutions

The project achieved its outputs without significant deviation from the approved workplan.

Four principal challenges were encountered and actively managed:

Data availability and quality constraints	Institutional coordination complexity	Sustained user engagement	Methodology gaps in GACMO
•Sub-national data gaps, absence of weighbridge infrastructure, and incomplete baselines were addressed through standardised estimation guidelines, NIS survey coordination, and ring-fenced infrastructure investment.	•Data dependencies across 10+ ministries and agencies were managed through bilateral consultations, a draft Prakas on waste-sector data reporting, and Terms of Reference for a Waste Sector MRV Technical Working Group.	•A structured post-training support programme (help-desk, office hours, peer network) was established, contributing to a 68% one-week login rate. Quarterly refresher training is planned through 2026.	•Coverage limitations for open burning and post-industrial textile recycling were transparently documented. So, WasCAD was identified as the best tool for NDC tracking in Cambodia.

Key Lessons Learned

Eight key lessons were documented across the project lifecycle.

- Technical training should always anchor in policy context explaining the 'why before how' to drive genuine engagement over rote learning.
- Active participation and bilateral engagement with data holding institutions builds institutional ownership rather than passive compliance.
- Practical tools such as WasCAD and GACMO significantly strengthen institutional readiness when carefully aligned to national sector needs.
- Early stocktaking is essential to identify critical data gaps before tool deployment, allowing targeted responses to be designed from the outset.
- Adapting the tracking framework to Cambodia's national context configuring WasCAD for all seven NDC 3.0 waste-sector measures proved critical to the tool's practical effectiveness.
- Embedded QA/QC functionality within WasCAD shifted quality assurance from a post-submission audit to an integrated part of data entry, improving activity data accuracy and GHG estimate credibility.

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List of Abbreviations

BAU	Business-as-Usual scenario
BTR	Biennial Transparency Report
CAD	Climate Action Data
CCTWG	Climate Change Technical Working Group
CMA	Conference of Parties serving as Meeting of Parties to Paris Agreement
CTF	Common Tabular Format
ETF	Enhanced Transparency Framework (Article 13, Paris Agreement)
GACMO	Greenhouse Gas Abatement Cost Model
GDPS	General Directorate of Policy and Strategy
GHG	Greenhouse Gas
ICAT	Initiative for Climate Action Transparency
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill Gas
MAC	Marginal Abatement Cost
MoE	Ministry of Environment
MRV	Measurement, Reporting and Verification
MSW	Municipal Solid Waste
MPWT	Ministry of Public Works and Transport
NCSD	National Council for Sustainable Development
NDC	Nationally Determined Contribution
NIS	National Institute of Statistics
RDF	Refuse Derived Fuel
UNFCCC	United Nations Framework Convention on Climate Change
UNOPS	United Nations Office for Project Services
WasCAD	Waste Sector Climate Action Data tool
WtE	Waste-to-Energy

I. INTRODUCTION

1.1. Background

The waste sector is one of the fastest-growing contributors to Cambodia's greenhouse gas (GHG) emissions. Rapid urbanisation, increasing waste generation, and gaps in existing waste management systems have expanded the sector's emission footprint significantly. Cambodia's third Nationally Determined Contribution (NDC 3.0), submitted to the UNFCCC in 2025, sets ambitious targets across key sectors including waste, committing to approximately 73.3 $MtCO_2e$[1] of mitigation by 2035, of which the waste sector alone contributes to 5.4 $MtCO_2e$[1] under "with conditional" scenario.

Despite this ambition, Cambodia has historically lacked a national Monitoring, Reporting and Verification (MRV) framework for the waste sector. Cambodia's National Council for Sustainable Development (NCSD) had established an NDC platform to track progress in implementing its climate commitments. However, the platform did not include provisions to estimate the GHG impacts of NDC-related actions. NDC focal points therefore relied on external tools to assess GHG impacts and manually integrate results, which is a burdensome process prone to inconsistency. This gap highlighted the urgent need for sectoral or national-level tools to systematically assess and monitor GHG impacts of NDCs, enabling more accurate and timely reporting towards Cambodia's NDC targets.

To address this gap, the Initiative for Climate Action Transparency (ICAT) launched its Phase 3 project in Cambodia, focused on the development of an MRV framework for the waste sector. The Waste Sector Climate Action Data (WasCAD) Tool was adapted to support Cambodia's NDC 3.0 waste sector priorities and align with the country's available data and institutional arrangements.

In line with ICAT Phase 3 project requirements, this Lessons Learned and Key Achievements Report has been prepared to document the implementation experience, outcomes, and transferable insights gained throughout the project period. The report captures both the technical and institutional dimensions of establishing Cambodia's waste-sector MRV framework, drawing on evidence from seven structured workshops, bilateral stakeholder consultations, tool deployment experience, and evaluation data collected across the

[1] Cambodia's NDC 3.0; pg 25

project lifecycle. It is intended to serve as an institutional memory document for the Ministry of Environment, the ICAT Secretariat, and implementing partners, while also contributing transferable principles for future MRV initiatives in Cambodia and comparable developing-country contexts.

1.2. Objective

The purpose of this report is to document and summarise the key lessons learned and key achievements of the ICAT Phase 3 Project "Development of an MRV Framework for the Waste Sector in Cambodia," covering the reporting period from June 2025 to May 2026. Specifically, this report aims to:

- Document the **key achievements** realized through the project implementation across all activities and deliverables.
- Present the **challenges encountered** during implementation and the **solutions** applied to address them.
- Synthesize the **lessons learned** and transferable principles derived from the project experience, for application in future MRV initiatives in Cambodia and comparable developing- country contexts.

This report constitutes **Output k** under Activity 5 of the ICAT-supported assessment and will serve as a key technical input for strengthening the waste sector MRV system of Cambodia.

1.3. Scope

This report covers the full lifecycle of the ICAT Phase 3 Project in Cambodia, from inception through final closure activities. The scope encompasses:

- All seven project activities (Activity 0 through Activity 6) and their associated outputs and deliverables.
- All major waste-sector emission sources, mitigation actions, and enabling systems relevant to Cambodia's NDC 3.0, as classified under the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (Volume 5: Waste).
- Both solid waste and wastewater sub-sectors, including upstream waste prevention and reduction, downstream treatment and disposal processes, and cross-cutting institutional and data management systems.

- The deployment and adaptation of the principal analytical tool WasCAD for systematic data collection, GHG impact assessment, NDC tracking, cost benefit analysis and CTF-aligned reporting in the waste sector.
- Stakeholder engagement encompassing more than 25 institutions, including Ministry of Environment, line ministries, sub-national administrations (Phnom Penh, Siem Reap, Sihanoukville, Battambang, Kampong Cham), development partners, and relevant private-sector waste operators.

II. KEY ACHIEVEMENTS

This section consolidates the project's principal achievements across all seven activities, drawing from project workshop evaluations, progress reports, and stakeholder engagement data. Achievements are presented by activity to maintain traceability to the original work plan, followed by cross-cutting highlights.

The WasCAD Tool was adapted to support Cambodia's NDC 3.0 waste sector priorities and align with the country's available data and institutional arrangements. The Tool was initially developed with 10 waste sector methodologies, of which five existing methodologies were identified as applicable for Cambodia's implementation. With technical guidance from ClimateSI, these methodologies were assigned to Cambodia's formal WasCAD account by ICAT. ClimateSI also worked closely with Cambodia' s MoE to establish the country application workflow, including the setup of user accounts, institutions, and institutional roles required for data collection, quality control, and NDC coordination. Relevant NDCs and climate actions were configured in the Tool, and test user accounts were created to support workflow implementation and testing. During the GHG impact data request assessment process, practical implementation needs and country specific requirements identified by the Cambodian team highlighted gaps in the existing methodology coverage. As a result, ClimateSI developed and integrated six additional waste sector methodologies into the WasCAD Tool to fully support Cambodia's NDC 3.0 waste sector application. These methodologies were deployed on UNOPS servers in coordination with the UNOPS IT team and subsequently assigned to Cambodia's account by ICAT. Following deployment, GHG impact data request assessments were completed and data collection workflow was facilitated by enabling institutions to receive, manage, and assign data requests through the Tool. This country application process provided important practical insights that contributed to improving the

WasCAD Tool, including enhancements to methodology coverage. Overall, the implementation ensured that Cambodia's waste sector climate actions under NDC 3.0 were fully operationalized within WasCAD, enabling institutions to submit data consistently, supporting the generation of credible GHG mitigation estimates for reporting and decision-making purposes.

Table 1 : Overview of the key achievements

Activity	Key achievements	Methods that assisted in reaching the achievement
Activity 0: Inception phase	✓ Identified the status of the MRV framework for the waste sector in Cambodia, including needs and gaps	✓ Conducted a comprehensive review of existing waste-sector MRV arrangements, policies, institutional mandates, and reporting practices in Cambodia. ✓ Engaged key stakeholders from relevant ministries, municipalities, and waste-sector institutions ✓ Validated the findings through technical discussions to ensure consistency and practicality of identified gaps and needs.
Activity 1: Provide training workshops on ETF requirements and tools Capacity building on the ETF and various tools for the government officials and other stakeholders	✓ Improved technical capacity of national experts and data providers on ETF requirements, IPCC inventory software, and UNFCCC reporting tool.	✓ Provided practical guidance on the application of IPCC software, and QA/QC procedures for waste-sector GHG inventories. ✓ Introduced participants to UNFCCC reporting tool ✓ Conducted refresher training on Transport sector Climate Action Data tool (TraCAD) to provide an idea on how ICAT's CAD tools work.

Activity 2: NDC tracking framework for the waste sector	✓ Identified NDC tracking indicators for NDC 3.0 waste sector measures ✓ Developed waste sector NDC tracking framework	✓ Reviewed Cambodia's existing NDC targets and waste-sector mitigation measures; ✓ Conducted stakeholder consultations and technical discussions with relevant ministries, institutions, municipalities, and data providers; ✓ Carried out data collection and assessment using specific templates; ✓ Collaborative coordination among national experts to strengthen technical inputs.
Activity 3: Set up and Implement Waste Sector Climate Action Data (WasCAD) tool for the NDC tracking in the waste sector	✓ Deployed fully adapted WasCAD tool to Cambodia ✓ Received hands-on experience on application of WasCAD for NDC tracking in waste sector.	✓ Identified methodologies to assess GHG impacts of NDC 3.0 measures in waste sector; ✓ Developed Cambodia–specific methodologies in WasCAD tool to assess GHG impacts; ✓ Added 6 new methodologies to WasCAD tool; ✓ Created Cambodia user accounts; ✓ Provided virtual and in-person hands-on training on the application of WasCAD tool for waste sector NDC tracking; ✓ Fully adapted and deployed WasCAD tool in Cambodia.

Activity 4: Integrate NDC tracking framework for the waste sector into the national MRV framework Arrangements for NDC tracking framework	✓ Developed data protocols, QA/QC procedures and roadmap for addressing data gaps	✓ Finalized a comprehensive set of waste-sector NDC tracking indicators in consultation with relevant technical experts ✓ Developed standardized data protocols and procedures for data collection ✓ Developed a practical roadmap for addressing data gaps
Activity 5: GACMO as the aggregation tool for NDC tracking	✓ Received hands-on experience on application of GACMO for GHG impact assessment ✓ Finalized the institutional arrangement for waste sector NDC tracking	✓ Provided participants with introductory training on the use of GACMO tool for calculating emission reductions in supported technical areas. ✓ Prepared exercises to provide hands-on experiences for users.
Activity 6: Closure	✓ Identified key achievements and lessons learned from the project.	✓ Feedback from workshop evaluation

Cross-Cutting and Overarching Achievements

- **Stakeholder reach**

259 individual participants across six structured workshops, MoE, engaging 25+ institutions spanning 10+ line ministries (MISTI, MME, MPWT, MoWRAM, MAFF, MRD, MoH, MLM UPC, MoP, NIS), MoE departments, five sub-national administrations, development partners, and six private-sector waste operators.

Figure 1 summarises participant counts per workshops held prior to the validation workshop, while Figure 2 disaggregates the average institutional composition.

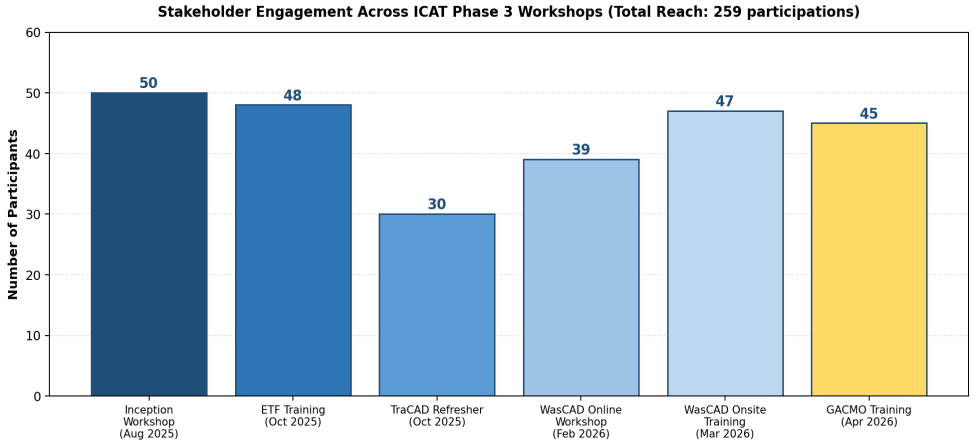

Figure 1: Number of participants across the workshops

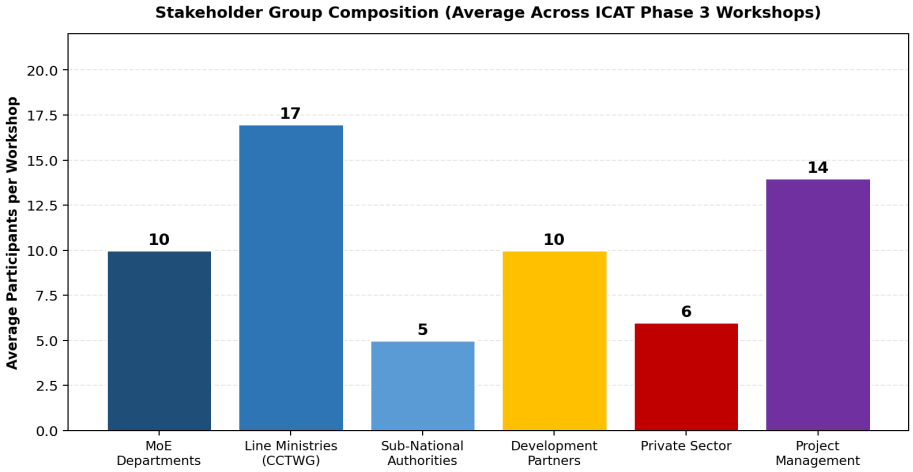

Figure 2 : Average composition of participants by institutional category

- **Regional positioning**

Cambodia is now positioned as an ASEAN reference for waste-sector MRV, completing a coherent three-sector MRV architecture (renewable energy, transport, and waste) that provides a model for South-South knowledge exchange.

- **Capacity-Building Outcomes**

Table 2 below consolidates the capacity-building metrics across the project. The principal observation is that the WasCAD onsite training delivered the strongest outcomes on every measured dimension of knowledge uplift, anticipated regular use, and overall satisfaction, while the GACMO training, although well-received, produced more moderate outcomes.

Table 2 : Capacity-building metrics across the workshops

Capacity -Building Event	Date	Participants	Knowledge Uplift (Average <)
Inception Workshop	25 Aug 2025	50	n/a
ETF Onsite Training	8–9 Oct 2025	48	Very Good 14% Good 50% Average 36%
TraCAD Online Refresher	23 Oct 2025	~30	Good 57% Average 43%
WasCAD Online Workshop	17 Feb 2026	~39	Good 42% Average 58%
WasCAD Onsite Training	13 Mar 2026	47	Very Good 7% Good 40% Average 53%
GACMO Training	21 Apr 2026	45	Good 46% Average 46%

- **Gender integration:**

Female participation across the WasCAD onsite training reached 20%, a figure that the project candidly identifies as parity targets, but which has nonetheless been used to define gender-responsive recruitment commitments for any follow-up phase.

- **Private-sector engagement:**

Six private-sector waste operators (CINTRI, Mizuda, Chip Mong Eco cycle, 800 Super-GAEA, Khmer Beverages, Sarom Trading) brought a notable result into the project ecosystem, given the historical reluctance of private operators to share commercially sensitive data.

III. CHALLENGES AND SOLUTIONS

The project achieved its scheduled outputs without significant deviations from the approved workplan. Nonetheless, a number of implementation challenges were encountered and managed during the project period. This section documents them transparently together with mitigation actions taken and residual risks that will require continued management beyond project closure.

a) Data Availability and Quality Constraints

Challenge

As data entry operators began entering real data into WasCAD during April 2026, the gaps that had been identified during the scoping study became more concrete: sub-national waste collection coverage is incomplete; open-burning rates are not systematically captured anywhere in the country; informal-sector recycling volumes are largely unmeasured; many provinces rely on volume-based estimates due to the lack of weighbridges; and historical baseline data (2020–2024) is incomplete for several indicators. These constraints are not unique to Cambodia but are characteristic of developing-country waste-sector data environments.

Mitigation Actions Taken

1. Coordination was established with the National Institute of Statistics (NIS) to integrate waste-related questions into the next round of household and socio-economic surveys, providing a sustainable channel for indicator updates.

b) Institutional Coordination Complexity

Challenge

The waste-sector MRV system depends on data inputs from at least 10 ministries and agencies, 5 sub-national administrations, and 6 private-sector operators, each with different reporting cycles, formats, and institutional priorities. As of project closure, formal coordination protocols have been drafted but not yet codified through a Prakas. Without such a formal instrument, data flows continue to depend on individuals, and the institutional momentum generated during training events which is acceptable as a transitional state, but not as a steady state.

Mitigation Actions Taken

1. Bilateral consultations were conducted with each major data-holding institution (November–December 2025) to map roles and reporting obligations.
2. Institutional roles and data-reporting responsibilities for each participating ministry, sub-national administration, and private operator were defined and configured within WasCAD, and the respective focal points were engaged and trained on their data-contribution responsibilities through coordination led by the MoE Department of Climate Change under the National Council for Sustainable Development (NCSD).

c) Sustained User Engagement

Challenge

Initial WasCAD adoption is encouraging with 68% of trained users active within one week of training, and 73% expected regular or daily use. However, sustaining engagement over time is a known challenge in MRV system implementation. Staff turnover, competing institutional priorities, and declining motivation as the novelty fades can lead to irregular data entry and, in the worst case, system abandonment a recurring pattern in the history of MRV implementation in developing countries.

Mitigation Actions Taken

1. A structured ongoing support programme was established: a dedicated helpdesk under MoE's Department of Climate Change, office hours, peer network, and all such information was communicated during the training itself.
2. Active data contributors across line ministries, sub-national administrations, and private operators were engaged, informed, and trained on their data-contribution roles through sustained coordination under the MoE Department of Climate Change and the NCSD, reinforcing institutional ownership of WasCAD reporting responsibilities.

d) Methodology Gaps in GACMO

Challenge

The GACMO mapping exercise revealed that the GACMO tool does not currently cover all NDC 3.0 waste-sector measures: open burning of waste (NDC Measure 2.3) and post-industrial textile recycling (NDC Measure 6.1) are not directly addressable. For NDC Measure 1 (solid waste reduction), GACMO's landfill-gas-flaring option provides only partial coverage. These gaps do not invalidate the use of GACMO but constrain its application and mean that MAC curves generated will not reflect the full NDC waste-sector portfolio.

Mitigation Actions Taken

1. The mapping exercise was documented transparently in the GACMO training to set realistic expectations among users.
2. WasCAD tool was identified as an appropriate approach to overcome constraints of using GACMO tool.

IV. LESSONS LEARNED

This section synthesises the lessons learned across the project lifecycle. The lessons are anchored in observable evidence such as workshop evaluations, participant feedback, attendance data, and operational experience during implementation, and conclude with a transferable principle applicable to future MRV initiatives.

Lesson 1 — Anchor Technical Training in Policy Context ("Why Before How")

Training workshops on ETF requirements, IPCC software, UNFCCC reporting tools, WasCAD, TraCAD, and GACMO successfully enhanced the technical capacities of national experts and data providers. The most consistently praised design choice across both the WasCAD onsite training and the GACMO training was the opening session on Cambodia's NDC 3.0 framework. participants understood why each data field exists and how their entries feed into national reporting, producing active engagement rather than rote learning. This "why before how" sequencing is now a documented project standard.

Transferable principle: Always sequence policy and analytical context first, with tool mechanics second. Allocate at least 20–30 minutes at the start of any technical training to the strategic frame.

Lesson 2 —Active Participation Strengthens Commitment

Sustained and active participation from ministries, agencies, technical experts, and private-sector operators strengthened institutional commitment towards improving waste-sector transparency and NDC tracking. Rather than relying solely on group workshops, bilateral consultations were conducted with all major data-holding institutions to map roles, obligations, and reporting expectations.

Transferable principle: Meet individually with each organization that holds important data, rather than relying only on group workshops.

Lesson 3 - Practical Tools Strengthened Institutional Readiness

The introduction and application of WasCAD tool significantly strengthened institutional readiness for NDC tracking, mitigation assessment, and transparency reporting under the ETF. WasCAD provides a systematic platform for data collection, action tracking, CTF-aligned reporting, cost effectiveness analysis and MAC curve generation. WasCAD forms an analytical workflow that Cambodia's institutions can sustain and build upon beyond the project period.

Transferable principle: Practical analytical tools can significantly strengthen institutional readiness when carefully aligned with national sector needs. Articulate a clear operating logic using WasCAD as the system of data collection, GHG emission reduction calculation and reporting.

Lesson 4 — Early stock taking identified key gaps

The stocktaking exercise and indicator assessment conducted at project inception identified critical data gaps and institutional needs at an early stage. This early diagnosis

allowed the project team to design targeted responses including standardized estimation guidelines for data-scarce provinces, coordination with the National Institute of Statistics (NIS) for future survey integration, rather than discovering these constraints mid-implementation when corrective action becomes harder and more expensive.

Transferable principle: Conduct a thorough stocktaking and data gap assessment at the very start of the project, before implementation begins. Use the findings to plan targeted solutions early such as estimation guidelines and data-sharing arrangements so that problems are addressed proactively rather than reactively.

Lesson 5 —Contextual adaption improved tracking practicality
Adapting the tracking framework to Cambodia's national context improved its practicality and effectiveness. WasCAD was configured with a dedicated NDC tracking indicator set for each of Cambodia's seven NDC 3.0 waste-sector measures, which was the single largest configuration effort of the project. Without this context-specific adaptation, the tool would have been formally available but practically unable to support Cambodia's NDC 3.0 reporting.

Transferable principle: Choose pre-developed tools based on how well they align with the country's NDC structure and reporting needs and invest in configuring them as needed. Where gaps remain, adapt the framework to the national context and clearly document tool limitations during implementation and reporting.

Lesson 6 —QA/QC in WasCAD improved activity data accuracy
Identifying NDC tracking indicators supported the assignment of responsible entities for each NDC action and clarified accountability across ministries. QA/QC functionality directly embedded within WasCAD improved activity-data accuracy, shifting quality assurance from a post-submission audit to an integrated part of data entry, reducing error rates and strengthening the credibility of GHG estimates.

Transferable principle: Build QA/QC protocols into the MRV tool itself, not as external validation layers. Pair indicator identification with explicit assignment of responsible entities and reporting timelines, codified in a formal instrument (e.g. a Prakas) so accountability is institutional rather than personal.

V. RECOMMENDATIONS AND WAY FORWARD

The following actions fall beyond the ICAT Phase 3 implementation period (which closes in May 2026) and are recommended to sustain, institutionalise, and build on the waste-sector MRV system established under the project. Responsibility for these actions rests with MoE and national stakeholders:

Codify a Prakas on waste-sector data reporting. Formalise the coordination protocols drafted during the project through a Prakas, giving data-reporting roles and timelines a legal basis and reducing dependence on individual officers.

Institutionalise periodic refresher training. Incorporate WasCAD and GACMO refresher sessions into MoE's annual capacity-building plan to maintain skills and absorb staff turnover.

Formalise recognition of active data contributors. Building on the stakeholder coordination already delivered under DCC/NCSD, introduce formal recognition (e.g. listing of active contributors in MoE and CCTWG communications) and integrate WasCAD reporting duties into job descriptions and performance evaluations where institutional flexibility allows.

Close priority data gaps. Pursue targeted investment in measurement infrastructure (weighbridges, waste-composition analysis), reconstruct 2020–2024 baselines, and integrate waste indicators into upcoming NIS survey rounds.

Sustain inter-ministerial coordination. Maintain coordination across the 10+ contributing ministries, sub-national administrations, and private operators through the NCSD/DCC mechanism and a standing waste-sector MRV technical working group.

VI. CONCLUSION

The ICAT Phase 3 Project has successfully delivered on its core mandate: establishing a functional, institutionally grounded MRV framework for Cambodia's waste sector. Over the project period from June 2025 to May 2026, the initiative moved Cambodia from a position of having no national waste-sector MRV system to one where a fully adapted analytical tool is deployed, a comprehensive NDC tracking indicator set is in place, and over 259 stakeholders across 25+ institutions have been trained and engaged.

The adaptation and deployment of the WasCAD tool represents the project's most significant technical achievement. By configuring the tool to Cambodia's seven NDC 3.0 waste-sector measures, developing six new country-specific methodologies, and embedding QA/QC protocols directly into the data entry workflow, the project has provided the Ministry of Environment with a platform capable of supporting systematic data collection, analysis of GHG impact and cost effectiveness, and CTF-aligned reporting well beyond the project lifecycle. The complementary introduction of GACMO further strengthens Cambodia's analytical capacity. Institutionally, the project has laid important groundwork through bilateral consultations with all major data-holding institutions.

Looking ahead, Cambodia is now positioned as a regional reference point for waste-sector MRV among ASEAN peers, completing a three-sector MRV architecture that spans renewable energy, transport, and waste. The lessons documented in this report from the value of onsite training and bilateral engagement to the importance of early stocktaking and context-specific tool adaptation offer transferable principles that extend well beyond Cambodia's borders. They constitute a practical guide for any developing country embarking on the construction of a transparent, effective, and nationally owned MRV system under the Paris Agreement's Enhanced Transparency Framework.