

Study on cooperative MRV as a foundation for a potential regional carbon market within ASEAN

Cambodia Country Report



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Regional Collaboration Centre – Bangkok
Promoting Action Against Climate Change



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Table of Contents

TABLE OF CONTENTS	1
ABBREVIATIONS	2
EXECUTIVE SUMMARY	3
1. NATIONAL CLIMATE CHANGE CONTEXT	4
2. ANALYSIS OF NATIONAL MRV SYSTEMS	
2.1 CARBON PRICING STATUS AND OUTLOOK	8
2.2 MRV AT FACILITY LEVEL	8
2.3 SECTORAL AND POLICY-LEVEL MRV	8
2.3 NATIONAL GHG INVENTORY AND MRV PROCESSES	11
2.4 OTHER INITIATIVES AND FUTURE DEVELOPMENTS	12
3. CONCLUDING REMARKS AND FUTURE OUTLOOK	12
ACKNOWLEDGEMENTS	13

Abbreviations

AFLOU	Agriculture, Forestry and Land Use
ASEAN	Association of Southeast Asian Nations
BUR	Biennial Update Report
CAGR	Compound annual growth rate
CDM	Clean Development Mechanism
CNG	Compressed natural gas
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
GHG	Greenhouse gases
GWP	Global warming potential
HFCs	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and product use
LULUCF	Land Use, Land-Use Change and Forestry
MP	Monitoring plan
MRV	Measurement, Reporting and Verification
NC	National Communication
NDC	Nationally Determined Contribution
PFCs	Perfluorinated compounds
QA/QC	Quality assurance / Quality control
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar
V&A	Verification and accreditation

Executive Summary

Cambodia is a small developing country in South-East Asia, located in the strategic sea route between China and India. It is surrounded by Vietnam, Thailand and Laos with a relatively short sea shore along its south-western boundary.

As per Cambodia's Second National Communication to the UNFCCC, their total GHG emissions excluding LUCF is 24 MtCO_{2e}, which is mainly contributed by the agriculture (21 MtCO_{2e}), energy (3 MtCO_{2e}) and waste (0.2 MtCO_{2e}) sectors. However, Cambodia was an overall net carbon sink country as net GHG removals coming from LUCF was 24.5 MtCO_{2e}. Despite being a net carbon sink, its GHG emissions have been increasing over the last decade.

Although the agriculture sector is responsible for the largest GHG emissions, based on past experiences, Cambodia expects their GHG emissions attributed to the energy sector to increase over time. As such, as per its INDC, it has a target of reducing 3.1 MtCO_{2e} from expected baseline emissions of 2030 (11.6 MtCO_{2e}). Cambodia's main strategy to reduce GHG emissions in the energy sector is to increase the share of renewable energy generation (solar energy, hydropower, bio-mass and biogas). It is expected that 60 percent of GHG reductions in the energy sector will come from renewable energy.

While Cambodia has an MRV system for its REDD programme, the country does not have any other established MRV system at the facility, policy, sectoral, or national levels. Cambodia is looking forward to receiving some capacity building and initial guidelines on an MRV system suitable as per the country context. This may help to enhance awareness across national ministries and improve the technical capacities of stakeholders.

Cambodia is not familiar with carbon pricing instruments. However, its experience in CDM and legal provisions to introduce instruments under the draft Environment and Natural Resources Code can be used as a foundation to introduce carbon pricing instruments, such as carbon tax for transport and power sectors, to reduce GHG emissions in the country. Since two of its neighbours, Thailand and Vietnam, are working on introducing carbon pricing instruments, Cambodia can also derive learnings from these initiatives.

1. National Climate Change Context

Cambodia, located on the Indochinese mainland of Southeast Asia, is a land abundant in plains and rivers and is situated amidst critical overland and river trading routes which connect China to India and to Southeast Asia. Cambodia is bordered to the west and northwest by Thailand, to the north-east by Laos, to the east and southeast by Vietnam, and to the southwest by the Gulf of Thailand. The total land area of Cambodia is 181,035 km². As of 2018, its total population was estimated to be 16.2 million¹.

In 2016, the Gross Domestic product (GDP) of Cambodia at current prices was USD 19,194 million. Its economy is dominated by three main sectors – namely agriculture (21.7 percent), industry (35.7 percent) and services (42.6 percent). GDP per capita was USD 1,266 in 2016².

Cambodia is highly vulnerable to the impacts of climate change. Rising temperatures are expected to reduce productivity in agriculture, fisheries and forests as well as labour productivity. Changing rainfall patterns and rising sea levels will lead to increased flooding, drought and storms which will also reduce resource productivity, especially in agriculture and fisheries. Increased damage from extreme weather events would affect roads, water supply and other infrastructure facilities.

Table 1 below presents the breakdown of Cambodia's GHG emissions by source in 1994 and 2000, as reported in its Initial National Communication (INC) and second National Communication (SNC) submitted to the United Nations Framework Convention on Climate Change (UNFCCC).

Table 1: National GHG emissions by source

Sector	Emissions (GgCO ₂ e)	
	INC (1994)	SNC (2000)
Energy	1,881	2,767
Industry	50	0
Agriculture	10,560	21,112
LUCF	-17,907	-24,565
Waste	273	229
Total (w/ LUCF)	-5,143	-457
Total (w/o LUCF)	12,764	24,108

Source: Initial and Second National Communication (2002 and 2015)

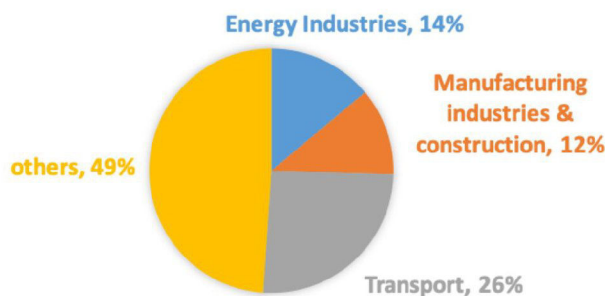
Table 2: Summary of National GHG Inventory for the year 2000

Sector	Sources	GHG Emissions (GgCO ₂ e)	GHG Removals (GgCO ₂ e)
Energy	Energy industries	385	
	Manufacturing industries & Construction	320	
	Transport	709	
	Others	1,354	
Agriculture	Enteric fermentation	3,440	
	Manure management	813	
	Rice cultivation	14,365	
	Agricultural soils	2,364	
	Burning of savannahs	54	
	Field burning of agricultural residue	76	
Waste	Solid waste disposal on land	203	
	Waste water handling	26	
LUCF	Change in forest and woody biomass stocks		-27,208
	Forest and grassland conversion	23,600	
	Abandonment of managed lands		-20,958
Total		47,709	-48,166

Source: Second National Communication (2015)

As per Table 2, Cambodia's GHG emissions were estimated at 47.7 MtCO₂e in 2000 and removals were at 48.2 MtCO₂e. Net emissions after accounting for removals were -0.5 MtCO₂e. Hence, Cambodia remained a net sink country in the year 2000. Land Use Change and Forestry sector is the main contributor to GHG emissions, which represents 49 percent of national GHG emissions in 2000, followed by agriculture (44 percent), energy (6 percent) and waste (less than 1 percent), expressed pictorially in figures 1, 2, and 3.

Emissions from Energy Sector (Figure 1)



Source: Second National Communication (2015)

1 United Nations Population Division, World Population Prospects, 2017.

2 ASEAN Statistical Yearbook 2016/2017.

Cambodia signed the Paris Agreement on April 22, 2016 and ratified it on February 6, 2017³. Its Nationally Determined Contribution (NDC) has a relative emission reduction target, and it aims to reduce 3.1 MtCO₂e from expected baseline emissions of 2030 (11.6 MtCO₂e).

Cambodia is a low emitter but a highly vulnerable country to the negative effects of climate change. Its NDC includes both adaptation and mitigation actions based on these specific national circumstances.

Cambodia is implementing actions in accordance with its sustainable development needs that concurrently address climate change. Cambodia has proposed emission reduction targets for four sectors: energy, manufacturing, transport, and LULUCF as follows:

Energy industries, manufacturing industries, transport, and other sectors

The quantum of emission reduction in these sectors is expected to be a maximum reduction of 3,100 GgCO₂e compared to baseline emissions of 11,600 GgCO₂e by 2030.

LULUCF

Cambodia intends to undertake voluntary and conditional actions to achieve the target of increasing forest cover to 60 percent of national land area by 2030. In absence of any actions the net sequestration from LULUCF is expected to reduce to 7,897 GgCO₂e in 2030 compared to projected sequestration of 18,492 GgCO₂e in 2010.

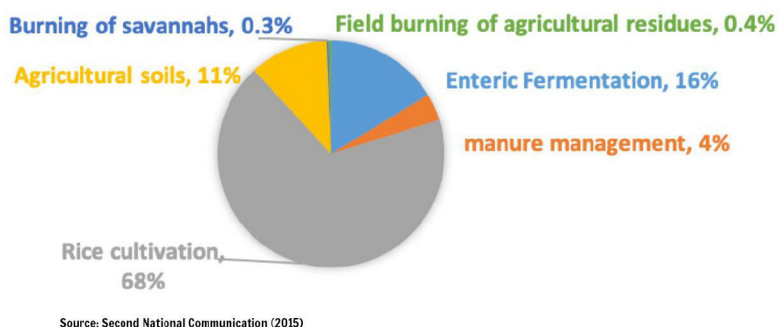
Table 3 presents the mitigation actions proposed in Cambodia's INDC to achieve the aforementioned emission reduction targets.

Table 3: Mitigation actions in key sectors | Aggregate reductions by 2030

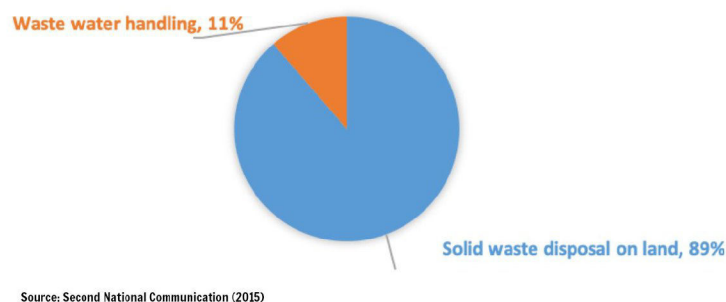
Sector	Priority Actions	GHG reduction in GgCO ₂ e and (%) by 2030 compared to the baseline
Energy industries	Renewable energy generation (solar energy, hydropower, biomass and biogas) and connecting decentralized renewable generation to the grid; Off-grid electricity such as solar home systems and hydro; Promoting energy efficiency by end users.	1,800 (16%)
Manufacturing industries	Promoting use of renewable energy and adopting energy efficiency for garment factories, rice mills and brick kilns.	727 (7%)
Transport	Promoting mass public transport; Improving operation and maintenance of vehicles through motor vehicle inspection, eco-driving and the increased use of hybrid cars, electric vehicles and bicycles.	390 (3%)
Others	Promoting energy efficiency of buildings and more efficient cook stoves; Reducing emissions from waste through use of bio digesters and water filters; Use of renewable energy for irrigation and solar lamps.	155 (1%)
Total saving		3,100 (27%)

Source: Cambodia's Intended Nationally Determined Contribution

GHG Emissions from Agriculture Sector (Figure 2)



GHG Emissions from Waste Sector (Figure 3)



Under the Business-as-Usual (BAU) scenario, total GHG emissions will increase up to 11.6 MtCO₂e by 2030⁴. A Long-range Energy Alternatives Planning (LEAP) model was used to project the BAU scenario for the energy sector, while COMAP was used for LULUCF, as indicated in the Second National Communication (2015). Cambodia's key strategy for emission reduction seems to be increasing the share of renewable energy in the generation mix. Nearly 60 percent of expected emission reduction in Cambodia by 2030 will come from renewable energy generation (solar energy, hydro power, biomass and biogas) and connecting decentralized renewable generation to the grid.

As of 2015, Cambodia's DNA has issued letters of approval for twelve CDM projects, further details of these projects can be found in Table 4. As of 2018, there were ten registered CDM projects at the Executive Board in Cambodia covering mainly energy (renewable energy), industry (waste heat recovery), agriculture, and waste (livestock waste). Most of the CDM project proponents were private companies⁵.

Table 4: List of CDM projects which received letters of approval from DNA

Name of CDM Project	Type of project	Supplemental Information	Approval Date	Annual emission reduction (tCO ₂ e/yr)
Angkor Bio Cogen Rice Husk Power Project	Biomass	Rice husk	19/01/2006	51,620
T.T.Y. Cambodia Biogas Project	Biogas	Agricultural Waste	4/7/2007	50,036
Methane fired power generation plant in Samrong Thom Animal Husbandry	Biogas	Animal waste	15/10/2007	5,593
Kampot Cement waste Heat Power Generation project(KCC-WHG)	Waste heat/gas utilization	Cement Production line	20/11/2008	17,107
Kamchay Hydroelectric BOT Project	Hydro	New reservoir	20/11/2008	370,496
Biogas project at MH Bio-ethanol Distillery	Biogas	Agricultural Waste	29/06/2009	52,831
W2E Siang Phong Biogas Project	Biogas	Agricultural Waste	3/11/2010	27,121
Lower Steung Russei Chrum Hydro-Electric Project	Hydro	New reservoir	2/11/2011	701,199

Source: Second National Communication (2015)

policy and expenditure would reduce the expected loss and damage from climate change.

The Cambodia Climate Public Expenditure and Institutional Review (CPEIR) was carried out to review expenditure on activities related to climate change, and to assess the extent to which this expenditure is guided by existing policy and institutional responsibilities. The CPEIR focuses both on domestic and external expenditure and covers both recurrent and development expenditure. It aims to help improve the balance and focus on existing climate expenditure, as well as to guide new climate finance that is likely to be available to Cambodia⁷.

Table 5, on the following page, presents a summary of major national climate change policies in Cambodia.

As per Cambodia's INDC, the Cambodia Climate Change Strategic Plan 2014-2023 (CCCSP) is Cambodia's first ever comprehensive national policy document that illustrates not only the country's adaptation needs, but also provide roadmaps for the decarbonisation of key economic sectors, and the enhancement of carbon sinks. Further, Cambodia has developed Green Growth Policy and Roadmap, which sets the path to stimulating the economy through low carbon options, saving and creating jobs, protecting vulnerable groups and improving environmental sustainability⁶.

The Cambodia Climate Change Financing Framework (CCFF) was produced in 2015 and was the first time a study combined the analysis of past climate change expenditure, assessment of adaptation effectiveness, and future financing scenarios into a review of the extent to which planned climate change

⁴ Cambodia's Intended Nationally Determined Contribution, 2015.

⁵ Cambodia's Second National Communication, 2015.

⁶ Cambodia's Intended Nationally Determined Contribution, 2015.

⁷ United Nations Development Programme, 2012.

Table 5: Summary of main national policies on climate change in Cambodia

Type	Name, Sectors & Timeline	Description
Policy	Cambodia Climate Change Strategic Plan (CCCSP) ⁸ All sectors 2014-2023	The Cambodia Climate Change Strategic Plan 2014-2023 has been developed with support from Development Partners (EU, UNDP, Sida and Danida) under the Cambodia Climate Change Alliance (CCCA) to fill the policy gap, complement on-going efforts and meet the emerging challenges of development, environment and climate change.
Policy	National Strategic Plan on Green Growth All sectors 2013-2030	The policy aims at enhancing the well-being and livelihood of all people in harmonization with ecological safety through green growth, basing on green economy, blue economy, environmental protection, social safety nets system and uphold of national cultural identity
Strategy	REDD+ Strategy Forestry ⁹	Forestry related actions would be implemented as part of the national REDD+ Strategy. Cambodia developed an operational National Forest Monitoring System (NFMS), Reference Emission Level to more accurately quantify GHG impacts of actions in this sector.
Policy	Climate Change Action Plan All sectors 2016-2018	The scope of Climate Change Action plan is to promote implementation of strategic objectives of the CCCSP 2014-2023
Strategy	Environment and Natural Resources Code Forestry (all sectors)	The purpose of this Code is to ensure the sustainable development of the Kingdom of Cambodia by protecting the environment and conserving, managing, and restoring natural resources and national heritage.
Strategy	Rectangular Strategy ¹⁰ All sectors (forestry) 2008-2013	The Rectangular Strategy for Growth, Employment, Equity and Efficiency – Phase II is the Royal Government of Cambodia’s main socio-economic policy agenda for the Fourth Legislature of the National Assembly (2008-2013). The Rectangular Strategy contains four growth components which are focused on (i) agricultural development, (ii) infrastructure rehabilitation and development, (ii) private sector development and employment creation, and (iv) capacity building and human resource development. Good governance is at the core of the strategy. The Strategy states key priorities within forestry reform, including law enforcement, effective management of Protected Areas, climate change actions and Community Forestry.

⁸ Cambodia Climate Change Strategic Plan, 2013

⁹ Cambodia National REDD+ Strategy 2017 – 2026, 2017

¹⁰ “Rectangular Strategy” for Growth, Employment, Equity and Efficiency Phase III

2. Analysis of National MRV System

2.1 Carbon pricing status and outlook

Cambodia has one of the lowest GHG emissions in the world. Apart from registered CDM, VCS and Gold Standard projects (details in tables 6, 7, and 8), the country is not familiar with carbon pricing instruments. As per the Environment and Natural Resources Code of Cambodia¹¹, the country is planning to develop legal instruments on economic measures in support of sustainable development, environmental protection, and the conservation, management, and restoration of natural resources and cultural heritage, in accordance with various specific laws and legal instruments on tax and procurement. This may also open the door towards the establishment of carbon pricing instruments in Cambodia to reduce GHG emissions.

In addition to the registered renewable energy projects, the hydroelectricity department under the Ministry of Mines and Energy in Cambodia has indicated that it has 10 GW hydro power potential¹². Since Cambodia aims to achieve 60% of its reduction target for the energy industry by increasing the share of renewable energy in the generation mix, it can promote hydropower development in the country, and further sell excess hydroelectricity to its neighboring countries (Thailand, Vietnam) via an interconnected grid. To begin with, Cambodia can use emission reduction units attributed to new hydropower plants to meet its own NDC commitments. Surplus emission reduction units can then be used to support neighbouring countries to meet their NDCs via regional cooperation on carbon pricing.

Table 6: : List of VCS projects of Cambodia recorded in VERRA Database¹³

Project ID	Project Name	Project Proponent	Sectoral Scope	Estimated Annual Emission Reduction (tCO ₂ e)	Status
1650	Reduced Emissions from Deforestation and Degradation in Keo Seima Wildlife Sanctuary	Royal Government of Cambodia (RGC), Ministry of Environment	Agriculture, Forestry, Land Use	1,426,648	Verified, under verification
904	Reduced Emissions from Deforestation and Degradation in Community Forests – Oddar Meanchey, Cambodia	Royal Government of Cambodia, Forestry Administration	Agriculture, Forestry, Land Use	204,792	Verification approved
1689	Tumring REDD+ Project	Royal Government of Cambodia, Forestry Administration	Agriculture, Forestry, Land Use	378,434	Validation approved
181	Fuel-Wood Saving with Improved Cookstoves in Cambodia	GERES (Gpe Energies Renouvelables & Environnement)	Energy demand	192,600	-

2.2 MRV at facility level

Cambodia currently does not have any facility level MRV system. Registered CDM projects have MRV systems at project level.

2.3 Sectoral and policy-level MRV

While Cambodia has an MRV system for its REDD programme, it does not have any other sectoral or policy level MRV system established. However, it has developed a guidebook for the transport sector using IPCC guidelines to measure GHG emissions in the sector using a bottom-up approach. Though there is no sectoral or policy level MRV, there are few programs and initiatives that can be utilized as a foundation to develop sectoral and policy level MRV systems for Cambodia.

¹¹ Environment and Natural Resources Code of Cambodia, 2019.

¹² Government of Cambodia, Ministry of Mines and Energy, Hydropower Plan.

¹³ VERRA Project Database.

Energy and Industry Sector

Energy Efficiency NAMA in the Garment Industry

The Ministry of Industry and Handicraft and UNDP MDG Carbon have developed a NAMA on Energy Efficiency in the Garment Industry in Cambodia¹⁴. The overall objectives of this NAMA are to: (i) support Cambodia's energy efficiency policy; (ii) improve efficiency in the industrial sector; and (iii) to build capacity in the field of energy efficiency. The introduction of efficient sewing, washing, drying machines, and compressors will improve energy efficiency in motor driven systems leading to reduction of GHG emissions. NAMA interventions for energy efficiency in the garment industry will comprise: efficient biomass boiler system; efficient sewing, washing, drying machines and compressors; and efficient lighting applications.

The baseline scenario consists of two components: GHG emissions reduction baseline; and Sustainable Development (SD) baseline. An MRV system to assess progress in the achievement of emission reductions and sustainable development benefits is proposed as part of the NAMA. Table 9 summarizes the MRV procedures for the GHG emissions reduction component of this NAMA.

Table 7: List of CDM projects of Cambodia recorded in CDM Database (UNFCCC)¹⁵

Registered	Project Name	Other Parties	Methodology	Emission reductions in metric tonnes of CO ₂ e per annum	Reference Number
10-Aug-06	Angkor Bio Cogen Rice Husk Power Project	Japan Sweden	AMS-I.A. ver. 7 AMS-III.E. ver. 7 AMS-I.D. ver. 18	51,620	363
3-Sep-08	TTY Cambodia Biogas Project	-	AM0022 ver. 4	50,036	1653
3-Dec-08	Methane fired power generation plant in Samrong Thom Animal Husbandry, Cambodia	Japan	AMS-III.D. ver. 13 AMS-I.A. ver. 12	5,593	1832
17-Apr-09	Kampot Cement Waste Heat Power Generation Project (KCC-WHG)	Denmark	AMS-III.Q. ver. 2	17,107	2379
7-Apr-11	W2E Siang Phong Biogas Project Cambodia	-	AMS-III.H. ver. 14 AMS-I.F. AMS-I.C. ver. 17	26,592	4267
16-Feb-12	Biogas Project at MH Bio-Ethanol Distillery, Cambodia	-	AMS-III.H. ver. 16 AMS-I.C. ver. 18	58,146	5804
21-Aug-12	Lower Stung Russei Chrum Hydro-Electric Project	Switzerland	ACM0002 ver. 12	701,199	7056
14-Dec-12	Stung Tatay Hydroelectric Project	Netherlands	ACM0002 ver. 12	563,074	8761
19-Dec-12	Cambodia Stung Atay Hydropower Project	Sweden	ACM0002 ver. 12	266,472	8903
8-Oct-13	Kamchay Hydroelectric BOT Project	Netherlands	ACM0002 ver. 13	281,348	9752

Table 8: List of Cambodian Gold Standard projects recorded in Markit Registry¹⁶

Project Name	Project Type	Status	Developer
Accelerating Clean Cooking Solutions in the Greater Mekong Region	Energy Efficiency – Domestic	Listed	Nexus-Carbon for Development
International water purification programme	Energy Efficiency – Domestic	Registered	Swiss Carbon Assets Ltd.
National Biodigester Programme Cambodia	Biogas – Heat	Issued	MAFF/National Biodigester Programme
Production and dissemination of Ceramic Water Purifiers by Hydrologic, in the Kingdom of Cambodia	Energy Efficiency – Domestic	Issued	Hydrologic Social Enterprise Company Ltd
Waste to energy using biomass Gasification in South East Asia LDCs programme of activities	Biomass or Liquid Biofuel-Electricity	Registered	Nexus-Carbon for Development

¹⁴ Energy Efficiency NAMA in the Garment Industry in Cambodia, UNDP, 2015.

¹⁵ CDM Database.

¹⁶ IHS Markit Registry.

Table 9: MRV System for Energy Efficiency NAMA in the Garment Industry in Cambodia¹⁷

Measurement/Monitoring	<p>Cambodia's national stakeholders have agreed to prioritize the following technical interventions to develop the MRV framework for GHG emission reductions associated with the NAMA:</p> <ul style="list-style-type: none"> i) Efficient Biomass Boiler System ii) Sewing, washing and Drying Machines and Compressors iii) Lighting Application
1. Efficient Biomass Boiler System	<p>Methodology Clean Development Mechanism (CDM) approved “Small-scale Methodology: AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user, Version 06.0” (UNFCCC, 2014).</p> <p>Data requirement</p> <ul style="list-style-type: none"> • Technical specification of old equipment (efficiency, capacity, technical lifetime, date of installation, annual operating hours, expected remaining lifetime) • Technical specifications of new equipment (efficiency, capacity, estimated annual operating hours, technical lifetime, registration number) • Installation date • Information on entity receiving the equipment (including company registration, location etc.) • Quantity of thermal energy generated by each new biomass boiler • Use of agricultural waste stream as fuel input
2. Sewing, Washing and Drying Machines and Compressors	<p>Methodology Clean Development Mechanism (CDM) approved “Small-scale Methodology: AMS-I.E.: Switch from non-renewable biomass for thermal applications by the user, Version 06.0” (UNFCCC, 2014).</p> <p>Data requirement</p> <ul style="list-style-type: none"> • Technical specification of old equipment (efficiency, capacity, technical lifetime, date of installation annual operating hours, expected remaining lifetime) • Technical specifications of new equipment (efficiency, capacity, estimated annual operating hours, technical lifetime, registration number) • Installation date • Information on entity receiving the equipment (including company registration, location etc.)
3. Lighting Application	<p>Methodology CDM methodology “Small-scale Methodology AMS-II.N: Demand-side energy efficiency activities for installation of energy efficient lighting and/or controls in buildings”(UNFCCC, 2013).</p> <p>Data requirement</p> <ul style="list-style-type: none"> • Number, type and wattage of project fixtures/lamps/ballasts/ballast factors installed under the NAMA, identified by the manufacturer and model numbers and the date of supply for each facility • The number and specifications of replaced fixtures/lamps/ballasts • Data to identify unambiguously the location of the equipment distributed under the NAMA
Reporting	<p>NAMA Implementing Entities (NIEs) will be responsible to prepare reports to the National Climate Change Committee(NCCC)/ NAMA Coordinating Authority(NCA)/donors in coordination with the technical and financial implementation on the use of funds, project types and the number of items of equipment installed. Two specialized NIEs will manage their respective areas, the financial NIE will manage the financial flows from the funding entities to the beneficiaries and the technical NIE will manage the technical implementation of the NAMA (inter alia, checking eligibility of interventions, summarizing monitoring data etc.).</p>
Verification	<ul style="list-style-type: none"> • Checking the monitoring and its management system • Checking a representative sample of all devices, at least once every two years (biennially) to determine if they are still operating; those devices that have been replaced before and independently from the verification survey by an equivalent in-service device can be counted as operating • Revising default values as explained above

This NAMA is not active as of October 2018 as per the communications held with UNDP Cambodia during the country visit in October 2018.

The UNEP-DTU Partnership via the ICAT initiative is supporting Cambodia to develop an MRV system for the energy sector. A study on renewable energy is being carried out as part of this support by the UNEP DTU Partnership. Additionally, GIZ has also extended support to develop an MRV system, but no formal engagement has been established as of February 2019.

Waste Sector

Waste Water NAMA in Cambodia

The Institute for Global Environmental Strategies (IGES) has supported Cambodia to conduct a study on establishing MRV for the development of Nationally Appropriate Mitigation Action (NAMA) in wastewater sector during the period July 2012 to February 2013. The objective of the wastewater NAMA was to establish an MRV procedure for GHG emission reduction in the sector with a specific focus on high to medium organic strength wastewater and domestic or municipal wastewater sources in Cambodia.

2.4 National GHG inventory and MRV procedures

Cambodia has submitted two national communications to UNFCCC: Initial National Communication (1994); and Second National Communication (2000). However, the country did not have a formal data collection mechanism to prepare previous GHG inventories.

The Department of Climate Change (DCC) under the General Secretariat of National Council for Sustainable Development/Ministry of Environment (MoE) is leading the preparation of third national communication (TNC) for year 2005. As part of the TNC, DCC has identified experts from relevant sectors to collect and quantify GHG emissions for each sector. Each respective ministry is responsible for providing relevant data for the quantification of GHG emissions while the DCC under the MoE will consolidate collected data and prepare the national GHG inventory with the support of sectoral experts.

The national inventory for the year 2000, which is part of the latest national communication submitted by Cambodia to the UNFCCC, estimated anthropogenic emissions for the following three gases by sources and removals by sinks: carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O).

The following sectors are covered in the inventory: Energy, Agriculture, Land Use Change and Forestry, and Waste.

Cambodia's SNC in 2000 adopted a Tier 1 approach. The SNC has made extensive use of IPCC default emission factors and in some cases default activity data. Cambodia's GHG Inventory for the Year 2000 was developed following the revised 1996 IPCC Guidelines and UNFCCC software was used to calculate and estimate emissions (Version 1.3.2, 28 January 2007).

The inventory was carried out by the National Technical Committee (NTC). Members of the NTC are representatives from the Ministry of Environment; Ministry of Agriculture, Forestry and Fisheries; Ministry of Public Works and Transport; Ministry of Water Resources and Meteorology; Ministry of Industry, Mines and Energy; and the Royal University of Phnom Penh.

There were a number of data gaps during the preparation of the national GHG inventory under the SNC. Main constraints were related to the lack of reliable data and information, and the lack of expertise in the respective sectors. Due to the lack of availability of relevant data, assumptions have been made and data has been obtained from secondary sources. The following challenges have been encountered in preparing the GHG inventory:

- Lack of activity data and local emission factors (general IPCC default values were used) - For example: data related to cement factories was taken from CDM projects; power sector data was extracted from Energy Balance Sheets.
- Data classification different from IPCC Guideline categories, in particular for LUCF
- Lack of sustainable GHG inventory system
- Insufficient financial support for regular inventory preparation
- Lack of national experts for GHG inventory preparation

There is currently no formal QA/QC procedure established to check the quality of activity data.

2.5 Other initiatives and Future Developments

- There are nine climate change mitigation activities for the transport sector under the Climate Change Action Plan - reduce emissions via driving behavioural changes, shift from long road vehicles to railway, improve the railway network linking Cambodia and Thailand, promote mass public transportation, develop guidebook using IPCC guidelines, and improve operation and maintenance of vehicles through motor vehicle inspection and eco-driving.
- Initially Cambodia had only one vehicle inspection station, but now they have fifteen vehicle inspection stations while there are three mobile stations.
- A Memorandum of Understanding (MoU) has been signed with the ministry to install CO₂ and CH₄ measuring technologies into the vehicle inspection stations.
- A Draft decision has been put in place to provide tax exemption for electric vehicles.
- Under the Energy and Petroleum section of the Climate Change Action Plan, eleven projects were started in 2007 to promote low carbon technology for the electricity sector.
- According to the Master Plan for the power sector, fuel oil will be removed from the energy generation mix by 2025.
- Some developments have also been made to revise the Master Plan 2017-2030 in order to add Liquefied Natural Gas (LNG) to the system by replacing coal and fuel oil.
- Solar PV project of 8MW capacity was constructed in cement factories.

3. Concluding remarks and future outlook

Cambodia is urgently seeking to develop MRV systems at facility, policy, sectoral, and national levels given the absence of MRV systems at the aforementioned level with the exception of having a MRV system for its REDD programme. Since Cambodia is at very early stage of MRV development, there is interest in receiving capacity building support and initial guidelines on MRV system that could be appropriate for the Cambodian context. This may help enhance awareness across national ministries and the technical capacities of stakeholders.

Experience gained by the country in developing MRV components of CDM projects and NAMA can also support the design of a national MRV system. Additionally, existing institutional arrangements and data collection mechanisms for preparing the national GHG inventory will also be useful to design national MRV systems.

While Cambodia does not have carbon pricing instruments, its experience in CDM and existing legal provision to introduce instruments under the draft Environment and Natural Resources Code can be used as a foundation to introduce carbon pricing instruments in the country such as a carbon tax for the transport and power sectors.

Since Cambodia has a large hydropower potential and interconnected electricity grid with neighbouring countries, it can explore the development of further hydropower projects and supply the surplus to neighbouring countries. This will not only help Cambodia achieve its NDC target for the power sector but also support neighbouring countries to achieve their NDCs. Furthermore, Cambodia can connect with the carbon pricing instruments and market of the neighbouring countries and supply surplus carbon credits to cooperate within a potential regional mechanism.

Since Cambodia is at early stage of the development of CPIs and MRV, support could potentially consist of assistance in developing MRV guidelines that can be used while simultaneously developing a sectoral MRV system for the country.

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