

Policy-based Greenhouse Gas Mitigation Tracking and Institutional Framework Development under Thailand's NAMAs in Energy Sector

Wongkot Wongsapai^{*.a}, Rongphet Bunchuaidee^b, Natarika Wayuparb^b, Chaichan Ritkrerkkrai^a

^aFaculty of Engineering, Chiang Mai University, 239 Suthep, Muang, Chiang Mai 50200, Thailand

^bThailand Greenhouse Gas Management Organization (Public Organization), The Government Complex Commemorating His Majesty, Chaeng Wattana Road, Laksi, Bangkok, 10210 Thailand
wongkot@eng.cmu.ac.th

The first Thailand's long term greenhouse gas mitigation roadmap, so called Nationally Appropriate Mitigation Actions (NAMAs), was pledged during COP-20. By using 2005 as a base year, this voluntary based NAMAs aimed to reduce national GHG emissions in the range of 7 to 20 % (or 24 to 75 million t of CO₂) below the energy and transport sectors BAU by 2020. This paper described the establishment of multi-ministry institutional framework of GHG emission reduction monitoring structure, for the main purpose of approve and verify the emission reduction results from mitigation policies and measures as stated in NAMAs. The tracking was started from the selection of GHG reduction policies and measures by using multi-level criteria setting. The measuring, reporting, and verification (MRV) methodology and process including the applicable coefficients and emission factors are also investigated and developed by the working group under this framework. From the results, we found that there are five national energy and transport policies and measures have been selected; i.e. (i) renewable energy for electricity from natural energy resources, (ii) renewable energy for electricity from bioenergy resources, (iii) biodiesel consumption in transport sector. (iv) ethanol consumption in transport sector, and (v) supply side energy efficiency improvement in coal fired power plant. We applied the disclosed verified national energy data to calculate the GHG emission reduction and the result shows that 14.34 MtCO₂e (or 3.90 % of roadmap target) have been reduced from all five policies and measures in the year 2013. We can conclude that the MRV processes including monitoring of renewable energy and energy efficiency improvement activities are very important for GHG mitigation tracking. However, the fully accepted and well-establishment of the multi-ministry institutional framework structure are the key for long-term tracking success.

1. Introduction

With reference to the cabinet resolution on November, 25th 2014 that allowed Thai representatives to present intention detail of Nationally Appropriate Mitigation Actions (NAMAs) as well as tentative GHG mitigation figures ranging from 7 % to 20 % in the 20th Conference of Parties or COP-20. It also designated the Ministry of Natural Resources and Environment (MoNRE) to submit the letter of intent to the secretariat of UNFCCC (United Nations Framework Convention on Climate Change) accordingly. NAMAs must be under "Decision 1/CP.13: Bali Action Plan" (UNFCCC, 1997) which referred to "GHG mitigation in developing countries" linked with "Measurement, Reporting and Verification or MRV" and is very important to developing countries for GHG mitigation target setting in various sectors around the world such as the case of Thailand NAMAs CGE model (Thepkhun et al., 2013), Vietnam low carbon model (Zimmer et al., 2015), African NAMAs in various areas (Kojwong and Larwanou, 2015), Brazilian livestock NAMAs (Silva et al., 2015), and Chinese carbon policy impact (Su et al., 2016).

After Thailand proposed letter of intent of NAMAs (UNFCCC, 2014) to the secretariat of UNFCCC, there must be a tracking system to evaluate an amount of GHG reduced from the activities within the country, and to report reduction amount in the Biennial Update Report (BUR) and National Communication Report. Based on the

actual reduced GHG information from governmental and private sector activities, Thailand had to essentially prepare for the tracking and evaluation of national GHG mitigation both in developing organization structure and approach for individual measures as well as tracking and evaluation system in database form.

2. Thailand's NAMAs

The global climate change and GHG mitigation are the key issues especially in the recent days where member nations give attention and priority to be the main topic of the negotiation conference under UNFCCC. COP had an agreement on the actions regarding NAMAs in developing countries and invited the countries to share implementation result of their NAMAs via Decision 1CP1/ CP.13 "Bali Action Plan", Decision 1/ CP.16 "Cancun Agreements" Decision 2/ CP.17 in Durban and Decision 1/CP.18 "Doha Climate Gateway".

2.1 NAMAs target

Particularly in the COP-18, the conference emphasized that developing countries will be additionally participate in GHG reduction activities in the future. Developing countries were able to present GHG mitigation result from individual NAMAs as voluntary action to the UNFCCC Secretariat. In case of Thailand, the intention was presented in NAMAs. The Pledge's statement was that Thailand will reduce GHG internally by 7-20 % in energy and transport sectors of the business as usual (BAU) level within year 2020 (UNFCCC, 2014) due to the energy sector including transport energy consumption have emitted around 73 % of total emissions (ONEP, 2015). By using the renewable energy activities and energy efficiency improvement activities from national's Alternative Energy Development Plan (AEDP) (DEDE, 2012), Energy Efficiency Development Plan (EEDP) (EPPO, 2011), and Power Development Plan (PDP) (EPPO, 2012), it should be noted here that the NAMAs target are taken from those plans, with success factor and marginal abatement cost concept (Limmeechokchai, 2015). This also implied that Thailand focus the first GHG mitigation target for only energy related sector (both energy supply and demand), not agricultural, land use change, forest or industrial processes sector have been focused.

The background of the potential mitigation target of 7-20 % in energy and transport sectors by year 2020 came from the study result and approved by National Climate Change Committee (NCCC), where 24 Mt of carbon dioxide equivalents (MtCO_{2e}) in both sectors could be reduced by internal activities and with additional high-investment technology support from other countries 74 MtCO_{2e} would be possibly reduced in both sectors (Misila, et al., 2015). The related detail was presented in Table 1 and Figure 1.

Referring the target to reduce 24-74 MtCO_{2e} from implementing NAMAs, there must be a tracking action, called "NAMAs Tracking Process", as well as the standards for Measurement, Reporting and Verification or MRV that should be for the national level which essentially required participation and coordination from all stakeholders to support implementation of relevant measures and policies.

However, due to the readiness of the data, this paper would focus for only domestic supported NAMAs which means that the GHG tracking on only 7 % (or 24 MtCO_{2e}) target.

2.2 Institutional arrangement for national GHG mitigation tracking

NAMAs tracking process requires the evaluation process which contains two approaches designed for the GHG mitigation tracking process; i.e. (i) top-down approach: the GHG evaluation in policy based scheme, and (ii) bottom-up approach: the GHG evaluation in project based scheme. As from the requirement to BUR, this paper focuses on the top down policy based NAMAs for whole Thailand country while the bottom up project based NAMAs can be found in Tilberg and Bhasin (2014).

2.2.1 Inter-ministry issue

Thailand's developed her NAMAs based on the energy related sector, this means that all NAMAs are based on AEDP, EEDP and PDP which are under Ministry of Energy (MoEn) while the climate change policy is under Ministry of Natural Resources and Environment (MNRE). This means that all results from AEDP, EEDP and PDP, in energy units, would be collected, converted and report to NAMAs in amount of GHG unit. Domestic supported from MoEn would be implemented, then, the GHG tracking by using the widely accepted methodologies would be followed. Hence, the legally collaboration between ministries is the key for implementing and GHG tracking process success.

2.2.2 National Framework

There are two type of climate governance framework which are vertical and horizontal level (Corfee-Morlot et al., 2009) which are both applied in Thai's NAMAs tracking framework. To proceed the tracking process systematically, the structure of NAMAs tracking process must be developed with international acceptance level and the structure would be divided according to related organization's responsibilities. The meeting of NCCC had agreed on the structure of NAMAs Tracking Process as displayed in Figure 1.

Table 1: Implementation target of Thai's NAMAs (energy and transport sector) (UNFCCC, 2014)

Type of NAMAs	Measure (from which plan)	CO ₂ Reduction in 2020 (ktCO ₂)	Remark
Domestically Supported NAMAs	RE Power (AEDP)	2,568	Electricity generation from renewable energy
	EE Industry sector (EEDP and PDP)	2,762	Efficiency improvement in industrial sector in both demand and supply side
	Building Energy Code (EEDP)	5,909	Efficiency improvement in building sector.
	Ethanol (AEDP)	5,069	Ethanol production replacing benzene
	Biodiesel (AEDP)	5,022	Biodiesel production replacing diesel
	Domestic Total	23,330 (6.35 %)	≈ 24 MtCO ₂
Internationally Supported NAMAs	RE Power (AEDP)	13,456	Electricity generation from renewable energy
	EE Industry sector (EEDP and PDP)	9,743	Efficiency improvement in industrial sector
	Biodiesel (2 nd)+ CBG (AEDP)	14,459	Production of Biodiesel and compressed biogas
	Sustainable Transport (Transport plan)	12,000	Sustainable transport master plan
	Inter. Total	49,658 (13.51 %)	≈ 50 MtCO ₂
	Dom. + Inter. Total	72,988 (19.86 %)	≈ 74 MtCO ₂
Total Emission in 2005		192,724	
Total Emission in 2020		367,437	

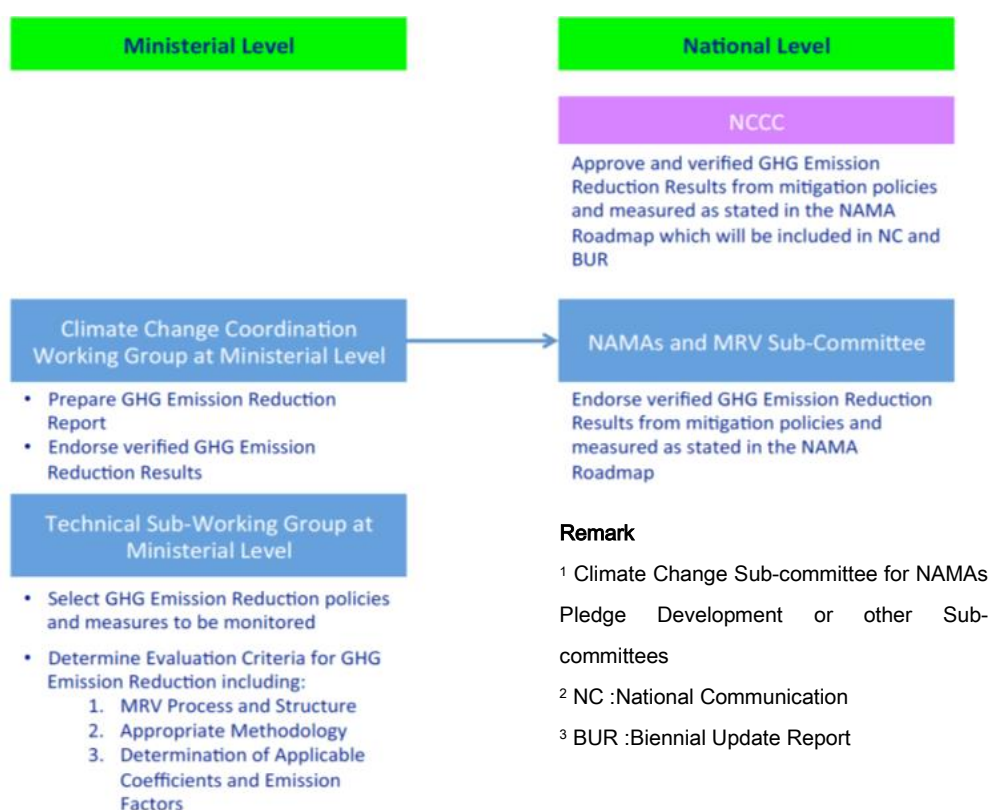


Figure 1: Structure of NAMAs tracking process

3. GHG mitigation tracking process

NAMAs is the long-term planning which consists of the GHG mitigation measures that drive by policy. Hence, the GHG mitigation tracking on the renewable energy or energy efficiency conducted on project basis and focus on the policy measures and implementation result. The detail of GHG reduction tracking and evaluation process from implementation of policy/measure was presented in the diagram on Figure 2.

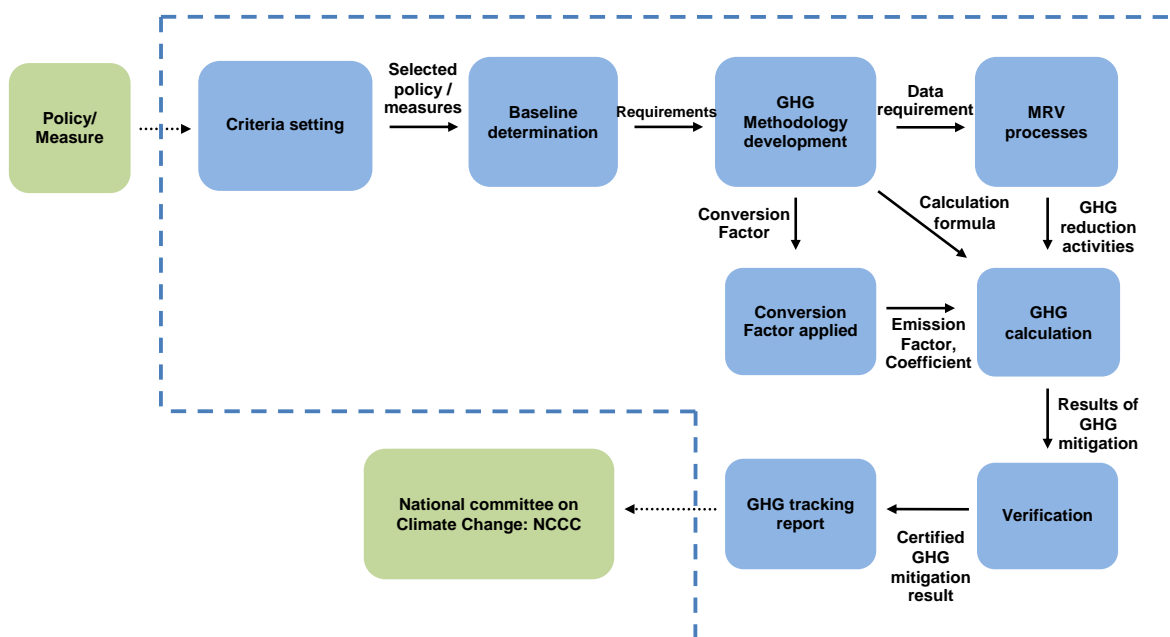


Figure 2: GHG reduction tracking and evaluation process in policy/measure level

Starting with criteria setting for policy which based on the GHG mitigation impact and official data availability of each policy and measures, then, the baseline and methodology covering the data flow system would then be developed by the Sub-working group level (in figure 1). After that, the relevant operational organization to each policy or measures would be carried out their response activity data as “measuring” process and have to publish those measuring data officially. Then, the sub-organization authorizing the policy or measures would “report” the measuring data in energy and GHG mitigation unit by using the methodology created by Sub-working group level. Finally, all results will go to “verification” process for validity by department level or equivalent, as shown in figure 3. It should be noted here that each policy or measures have to follow this MRV process individually and the appointed organization, sub-organization or department would be specifically selected based on each policy which have to be tracked.

4. Results of GHG mitigation tracking

The result of GHG mitigation measures amounted in reduce 14.34 MtCO₂e of GHG illustrated in Table 4. GHG reduction evaluation result from five potential measures could be briefly stated that by 2013 could reduce GHG by 14.34 MtCO₂e in total (or 3.90 % of roadmap target).

Table 2: Implementation target of NAMAs (Source: UNFCCC (2014))

GHG reduction measures in energy sector	GHG Reduction (MtCO ₂ e)
Renewable energy for electricity: Solar, Wind, Small Hydro	0.98
Renewable energy for electricity: Biomass, Biogas, Waste	8.04
Biodiesel in transport sector	2.83
Ethanol in transport sector	2.07
Supply side energy efficiency in “Mah Moh” Coal fired Power plant of EGAT	0.42
Total	14.34

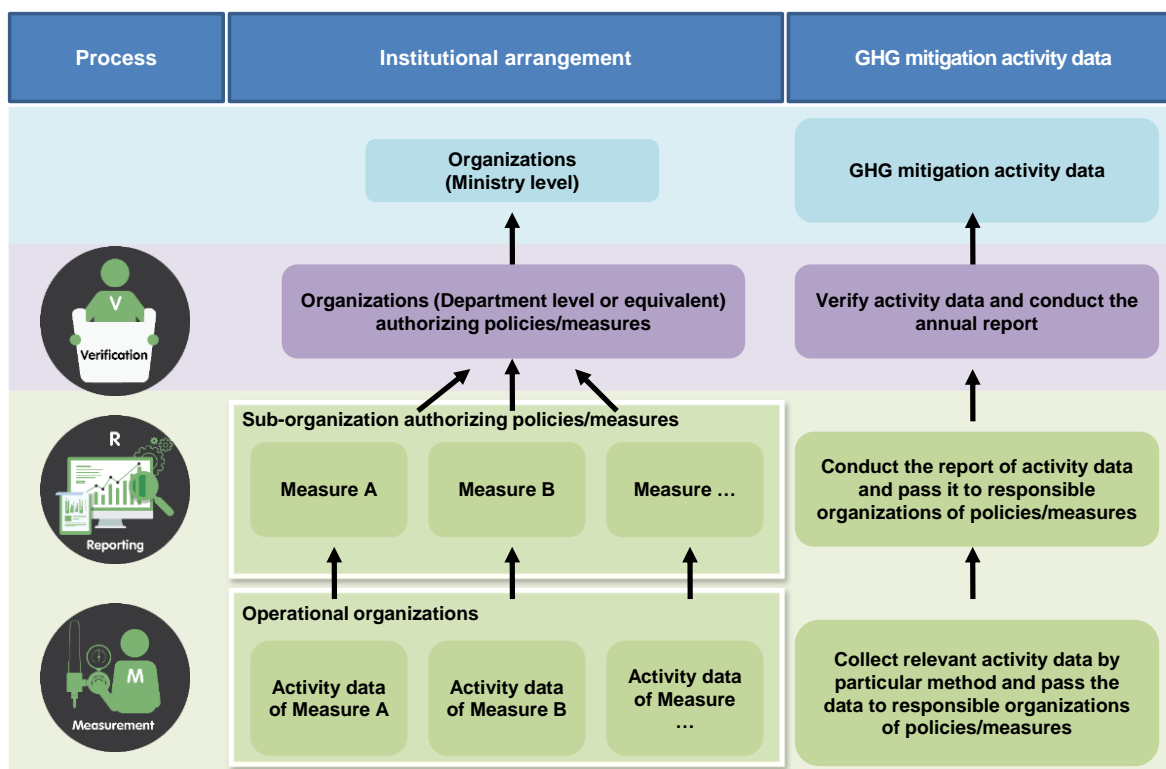


Figure 3: Institutional arrangement for MRV process of activity data

5. Conclusions

Thailand's Nationally Appropriate Mitigation Actions (NAMAs), was pledged during COP-20 which aimed to reduce national GHG emissions in the range of 7 to 20 % (or 24 to 75 Mt of CO₂) below the energy and transport sectors BAU by 2020. Starting with the establishment of multi-ministry institutional framework structure for the main purpose of approve and verify the emission reduction results from mitigation policies and measures as stated in NAMAs. The tracking was started from the selection of GHG reduction policies and measures by using multi-level criteria setting. The MRV methodology and process including the applicable coefficients and emission factors are also investigated and developed. From the results, we found that there are five national energy and transport policies and measures have been selected; i.e. (i) renewable energy for electricity from natural energy resources, (ii) renewable energy for electricity from bioenergy resources, (iii) biodiesel consumption in transport sector. (iv) ethanol consumption in transport sector, and (v) supply side energy efficiency improvement in coal fired power plant. We applied the disclosed verified national energy data to calculate the GHG emission reduction and the result shows that 14.34 Mt of CO₂ (or 3.90 % of roadmap target) in the year 2013. We can conclude that the MRV processes including monitoring of renewable energy and energy efficiency improvement activities are very important for GHG mitigation tracking. However, the fully accepted and well-establishment of the multi-ministry institutional framework structure are the key for long-term tracking success.

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