



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

Thailand Country Report

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Abbreviations

ASEAN	Association of Southeast Asian Nations
BUR	Biennial Update Report
CDM	Clean Development Mechanism
CFO	Carbon Footprint for Organizations
CO₂	Carbon dioxide
CO₂e	Carbon dioxide equivalent
EPC	Energy Performance Certificate
ETS	Emissions trading scheme
FiT	Feed-in-tariff
GHG	Greenhouse gases
GWP	Global warming potential
HFC	Hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial processes and product use
LCC	Low Carbon City
LULUCF	Land Use, Land-Use Change and Forestry
MP	Monitoring plan
MRV	Monitoring, Reporting and Verification
NC	National Communication
NDC	Nationally Determined Contribution
NESDP	National Economic and Social Development Plan
ONEP	Office of Natural Resources and Environmental Policy and Planning
PFCs	Perfluorocarbons
PMR	Partnership for Market Readiness
QA/QC	Quality assurance / Quality control
T-COP	Thailand Carbon Offsetting Programme
T-VER	Thailand Voluntary Emission Reductions Scheme
T-VERs	Thailand Verified Emission Reduction units
TGO	Thailand Greenhouse Gas Management Organization
UNFCCC	United Nations Framework Convention on Climate Change
Thailand V-ETS	Thailand Voluntary Emissions Trading Scheme

Executive Summary

In its Third National Communication (TNC), Thailand's reported greenhouse gas (GHG) emissions for 2013 totaled 232.6 MtCO₂e. The energy sector accounted for approximately 74 percent of total gross GHG emissions, with public electricity & heat production, manufacturing industries & construction, and transport being the three major sources of emissions.

Thailand has ratified the Paris Agreement and submitted its Nationally Determined Contribution, where it committed to reduce GHG emissions by 20% in 2030 from the projected business-as-usual scenario with 2005 as the base year. Thailand also added that the level of contribution could increase up to 25 percent, conditional on support provided by the international community in terms of capacity building, technology transfer and financial resources.

Thailand has been exploring carbon market mechanisms since 2010, when it began work on setting emission caps and the institutional structures for an emissions trading system (ETS). This exploratory work resulted in the piloting of the Thailand Voluntary Emissions Trading Scheme (Thailand V-ETS) from 2015 onwards, the establishment of the Thailand Carbon Offsetting Programme (T-COP) and the Thailand Verified Emissions Reductions (T-VERs), a programme similar to the Clean Development Mechanism (CDM) developed under the Kyoto Protocol.

Phase 1 of the Thailand V-ETS (2015-2017) was intended to pilot a Measurement, Reporting and Verification (MRV) framework for the ETS, develop sector-specific MRV guidelines, and design certain ETS features such as cap setting or allowance allocation. Phase 2 (2018-2020) involves getting the participating companies to be familiar with the practice of permit trading through a trading platform. Phase 1 had the participation of the industrial sector, specifically from petrochemicals, cement, iron & steel, pulp & paper, glass, refinery, ceramic, plastic, and food & feed industries. Eleven power generation companies initially joined the pilot; however, they dropped out of the Thailand V-ETS after the first year. Only direct and indirect CO₂ emissions from the consumption of electricity, steam, heating and cooling are covered by the Thailand V-ETS. Almost all participants under the Thailand V-ETS operate under an emissions intensity cap, except for the cement sector which took part in the pilot with an absolute GHG emissions quantity cap.

At the same time, Thailand is also a participant to the Partnership for Market Readiness (PMR) programme of the World Bank, where its goal is the design and implementation of a domestic market mechanism to reduce energy consumption and GHG emissions attributed to the energy and the industrial processes sector. Participation in the PMR programme consists of two main work streams. The first is the establishment of an energy performance certificate (EPC) scheme, which is a voluntary target-and-trade system seeking to increase energy efficiency in energy-intensive manufacturing facilities and buildings. Seven industrial sectors and four building types are targeted. The industrial sectors are: i) food & beverage; ii) cement; iii) ceramics; iv) paper & pulp; v) iron & steel; vi) petrochemical plants; and vii) thermal power plants. Offices, hotels, hospitals and department stores are the building types included in the scheme. The second activity is the Low Carbon City (LCC) programme, which aims to promote sustainable development practices in Thai municipalities and local communities, by bolstering the generation of T-VERs from GHG emission reduction projects developed by municipal entities.

An MRV system was developed for the Thailand V-ETS and it was based on that for the Carbon Footprint for Organizations (CFO) labelling scheme implemented by the Thailand Greenhouse Gas Management Organization (TGO). This MRV framework was developed with assistance from the governments of Japan and the Republic of Korea and is based on international standards, specifically ISO14064-1, 14064-3 and 14065. Detailed guidelines of the MRV framework are not yet available, however this report summarizes the available draft guidelines.

Facilities that participate in the Thailand V-ETS, on a voluntarily basis, are required to submit an emissions report annually based on the emissions of the previous calendar year. This is made with the support of an Excel GHG calculation tool developed by TGO and experts from various academic institutes under the CFO's technical committees. On the other hand, no monitoring plan is required to be submitted by the facilities. Verification is to be conducted by third-party auditors based on the emissions report submitted by the participating entities. Draft verification guidelines are available as part of the Thailand V-ETS pilot project, and from October 2019 all third-party verifiers will have to be accredited by the National Standards Committee. Additionally, as this programme is voluntary, no enforcement or penalties exist.

Although emissions from transport vehicles have been excluded from the carbon market mechanisms currently being explored, excise taxes are levied on transport vehicles. A clear differentiation in the taxation regime of vehicles based on a carbon emissions factor was implemented on January 1, 2016. This tax differentiation introduces an implicit price on emissions from the transport sector.

Even though several carbon market mechanisms have been explored in Thailand, there has been no announcement yet by the government on the selected carbon pricing instrument. With the conclusion of the piloting of the Thailand V-ETS and the PMR program expected in 2020, further clarity on the way forward can be expected. This would also inform and shape the design of the Climate Change Act, which is expected to be proposed for Cabinet approval in the same year. This could then serve as a basis for the development of a legal framework that mandates high-emitting facilities to conduct the MRV of GHG emissions.

1. National Climate Change Context

Thailand is a country located at the center of the Southeast Asia region, with borders with Cambodia, Lao PDR, Malaysia and Myanmar. The country has a land area of approximately 514,000 km², which includes over 400 islands. As of mid 2016, Thailand's population was estimated at approximately 67.5 million¹. While its population has been generally increasing, the annual growth rate has seen a slow and steady decline².

In 2016, Thailand's GDP at current prices stood at 14,367 billion Thai Baht (approximately 409 billion USD)³, making it the second largest economy in the ASEAN region just after Indonesia. In the 7-year period of 2010 to 2016, Thailand's GDP averaged a 3 percent growth rate, with a year-on-year GDP growth rate fluctuating between 0.8 to 7.2 percent. The services sector makes the highest contribution to the national economy, accounting for 57.6 percent of the GDP in 2016. The significant weight of the tourism sector should be noted, being responsible for close to 20 percent of the national GDP⁴.

The latest official figures for Thailand's GHG emissions are from 2013 and are available in the Third National Communication (NC)⁵ and Second Biennial Annual Report (BUR). In this year, Thailand's net emissions were 232.6 MtCO₂e. This represents an increase of 8.6 percent from year 2000, with net emissions estimated at 214.1 MtCO₂e. However, the growth in net emissions occurred mainly from 2000 to 2004 (with a peak of 261.9 MtCO₂e in that year), after which they decreased to the levels observed in 2013. Over the same period, GHG emissions from the energy, IPPU, agriculture, and waste sectors all increased, albeit at different rates. Emissions from the energy sector grew the fastest, with a 47.2 percent increase from 2000 to 2013⁶.

Table 1 presents the national GHG inventory for 2013. In this year, the energy sector was the largest contributor of GHG emissions, accounting for 74 percent of total gross emissions (i.e. excluding removals from the LULUCF sector).

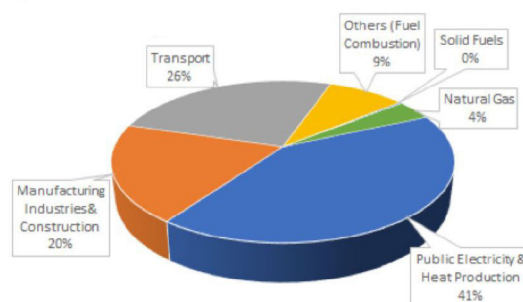
Table 1: GHG emissions by source in Thailand, 2013, in MtCO₂e

Greenhouse Gas Source and Sink Categories	CO ₂ Emissions	CO ₂ Removals	CH ₄ Emissions	N ₂ O Emissions	Total (MtCO ₂ e)
Energy	223.3	-	12.3	1.3	236.9
IPPU	18.6	-	0.2	0.2	19.0
Agriculture	-	-	36.3	14.6	50.9
LULUCF	44.1	-130.6	0.4	0	-86.1
Waste	0.1	-	10.7	1.0	11.8
Total (exc. LULUCF)	242.0	-	59.5	17.1	318.7
Total (incl. LULUCF)	286.2	-130.6	59.9	17.2	232.6

Source: Third National Communication (2018)

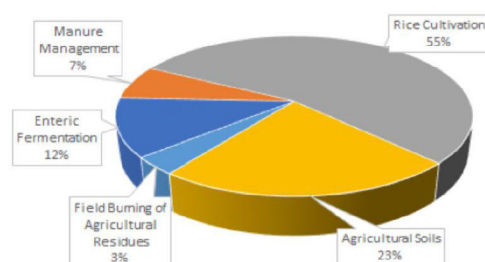
Fig.1 provides a breakdown of emissions from the energy sector. As can be observed, emissions from this sector come largely from fuel combustion activities, with public electricity and heat production being the largest emitting sub-sector in the country, accounting for approximately 31 percent of Thailand's total gross emissions.

Figure 1 – Breakdown of GHG emissions from the energy sector in Thailand, 2013



Source: Third National Communication (2018)

Figure 2 – Breakdown of GHG emissions from the agriculture sector in Thailand, 2013



Source: Third National Communication (2018)

¹ ASEAN Statistical Yearbook 2016/2017.

² Ibid.

³ Ibid. Exchange rate used as of 30 June 2016.

⁴ Thailand's Second Biennial Update Report, 2017.

⁵ Thailand's Third National Communication, 2018.

⁶ Analysis based on GHG inventory data of Second BUR and Third NC.

After energy, agriculture is the next largest emitter of GHG, in the form of methane and nitrous oxide, accounting for 16 percent of the gross emissions total. It is useful to note that agriculture makes up approximately 47 percent of the total land use in Thailand⁷. Industrial processes and the waste sector account for approximately 6 percent and 4 percent of the total emissions in Thailand, respectively. The LULUCF sector serves as a net sink for Thailand, removing more emissions from the atmosphere than the sector produces.

Thailand ratified the Paris Agreement on September 21, 2016, while its Intended Nationally Determined Contribution (INDC) was submitted on October 1, 2015⁸. In its pledge, Thailand committed to reducing GHG emissions by 20 percent in 2030 from the projected business-as-usual (BAU) level, with 2005 as the reference year. Thailand also added that the level of contribution could increase to 25 percent, conditional on support provided by the international community in terms of capacity building, technology transfer and financial resources.

In its INDC – which was later converted into an NDC – Thailand acknowledges the large contribution from the energy sector to its total GHG emissions, and has therefore focused its mitigation efforts primarily in this sector. In addition to a focus on cleaner energy generation and energy efficiency, Thailand foresees transportation to play an increasingly important role in its overall GHG emissions and thus is a target area mentioned specifically in its NDC. Recent plans for reducing GHG emissions on energy and transportation are summarized in Table 2.

Following its NDC submission to the UNFCCC, Thailand has developed an NDC Roadmap¹⁰ in which it sets out clear priorities and an action plan for achieving its pledged GHG emission reductions goal. In fact, according to the roadmap, the emission reduction target was revised slightly upwards, to 20.8 percent by 2030 in relation to 2005. The preparation phase of this roadmap started in 2017 and will continue until 2020, while implementation will take place from 2021 to 2030. The NDC Roadmap prioritizes three sectors for GHG emission reduction: energy and transport, waste, and IPPU. The reduction potentials of these sectors are 113 MtCO_{2e}, 2 MtCO_{2e} and 0.6 MtCO_{2e}, respectively. Further details are outlined in Table 3 below:

Table 2: Summary of recent plans on climate change mitigation in the energy and transportation sector in Thailand⁹

Alternative Energy Development Plan (AEDP)	Objective: to increase the share of renewables in power generation from 8% in 2014 to 20% in 2036.
Energy Efficiency Plan (EEP)	Objective: to reduce Thailand's energy intensity by 30% below 2010 levels by 2036.
Power Development Plan (PDP)	Objective: improving the reliability of power systems by: i) reducing dependence on natural gas power generation; ii) increasing the share of coal power generation with the adoption of cleaner coal technologies; iii) importing power from neighbouring countries; and iv) development of renewable energies.
Transport Infrastructure Development Plan	Objective: this is a plan with multiple objectives in the transport sector, which will focus on concepts such as green transportation and transport efficiency.

Table 3: Summary of mitigation actions, per sector, as part of the NDC roadmap¹¹

Sector	Sub-sector	Measures	GHG Reduction Potential (MtCO _{2e})
Energy	Power generation	Energy efficiency Renewable energies	24.0
	Manufacturing industry	Energy efficiency Renewable energies	43.0
	Transportation	Energy efficiency Renewable energies	41.0
	Buildings	Energy efficiency	1.0
	Residential	Energy efficiency Renewable energies	4.0
IPPU	Cement industry	Clinker substitution	0.6
	Halocarbons and sulfur hexafluoride	Substitution of refrigerant substances	
Waste	Solid waste	Solid waste management	2.0
	Wastewater	Methane recovery from industrial wastewater Cleaner technologies Management of municipal wastewater	

⁷ Thailand's Second Biennial Update Report, 2017.

⁸ Thailand's Intended Nationally Determined Contribution, 2015.

⁹ Ibid.

¹⁰ Thailand's NDC Roadmap, 2017.

¹¹ Thailand Third National Communication, 2018.

In Thailand there are three main organizations tasked with dealing with climate change issues at the national level:

National Committee on Climate Change Policy (NCCC): established in 2007 by the Office of the Prime Minister, the Committee was set to formulate and oversee major climate change policies and to provide advice on national positions with respect to international treaties and forums.

Office of Natural Resources and Environmental Policy and Planning (ONEP): established under the Ministry of Natural Resources and Environment, has the mandate of developing policy and planning for the management and conservation of the natural resources, as well as for tackling climate change issues in Thailand. ONEP is Thailand's national focal point to the UNFCCC.

Thailand Greenhouse Gas Management Organization (Public Organization) (TGO): established in 2007 to support Thailand's GHG mitigation actions and low carbon development, including the promotion of CDM activities and the establishment of carbon markets. TGO serves as the Designated National Authority of Thailand for CDM projects.

2. Analysis of National MRV Systems

2.1 Carbon pricing status and outlook

Thailand recognizes the role that carbon pricing and market-based mechanisms can play to support the country in meeting its GHG emission reduction goals. Policy decisions setting out the national direction on carbon pricing instruments are found in the National Economic and Social Development Plans (NESDPs), for 2012-2016 and 2017-2021, and the Climate Change Master Plan (CCMP).

The Eleventh NESDP¹², which covers the five-year period from 2012 to 2016, makes specific reference to the development of tools to deal with climate change. Among these, the use of fiscal measures for environmental management, such as taxes on pollution and "emissions quotas", and the establishment of a carbon fund as a buying source for domestic carbon credits and offsets. In addition, the Eleventh NESDP puts forth clear provisions for the establishment of a robust MRV system in Thailand, both at the national and project levels. This involves the development of a national registry system, databases, and reporting frameworks to support the measurement of GHG emissions. The five-year plan also provides directions for the assessment of opportunities for linkages with international carbon markets, including a study on the feasibility of establishing a carbon market within the ASEAN Economic Community.

The Twelfth NESDP (2017-2021)¹³ focuses on the development of mechanisms to reduce GHG emissions in all sectors, including carbon markets and carbon taxes. The Climate Change Master Plan of 2015¹⁴ is a policy document that aims to support Thailand in achieving sustainable low-carbon growth and climate change resilience by 2050. It is based on three pillars: i) GHG mitigation and low-carbon development, ii) adaptation to climate change, and iii) capacity building. Among the activities proposed under the low-carbon development pillar is an assessment of the cost effectiveness of different GHG mitigation measures, including the introduction of a carbon tax, financial and fiscal incentives, a cap-and-trade mechanism, and the establishment of a domestic carbon market with the potential for linkages with other jurisdictions.

¹² The Eleventh National Economic and Social Development Plan (2012-2016).

¹³ The Twelfth National Economic and Social Development Plan (2017-2021).

¹⁴ Climate Change Master Plan (CCMP), 2015-2050.

As can be seen, there is a strong policy basis for the introduction of carbon pricing and market-based instruments in Thailand. This has set the ground for the development of three schemes or programmes, which are as follows:

Thailand Voluntary Emission Reductions (T-VER) scheme

Thailand Carbon Offsetting Program (T-COP)

Thailand Voluntary Emissions Trading Scheme (Thailand V-ETS)

The T-VERs scheme is a domestic GHG crediting mechanism that is similar to the Kyoto Protocol's Clean Development Mechanism (CDM). For instance, the project development cycle is similar to that of the CDM (i.e. development of a project design document, project approval by a designated national authority, third party verification, etc.) and most GHG emission reduction methodologies are based on those approved by the UNFCCC. However, the T-VERs generated can only be traded domestically. These credits can be used for corporate social responsibility initiatives of private companies, as well as in the form of voluntary carbon offsets under the T-COP programme. The Thailand V-ETS is a pilot cap-and-trade mechanism developed and operated by TGO – mainly through its own financial and technical resources – involving a number of industrial sectors. This scheme is analyzed in detail on the following page.

Thailand is also a participant to the Partnership for Market Readiness (PMR) programme of the World Bank¹⁵. This initiative provides support to countries in the preparation and implementation of climate change mitigation policies for scaled up mitigation action, including the design and introduction of carbon pricing instruments. In the context of this partnership, Thailand's overarching goal is to design and implement a domestic market mechanism to reduce energy consumption and GHG emissions in the energy sector.

This is a targeted approach to reduce energy sector emissions which, as observed in Section 1, accounted for 74% of Thailand's gross emissions in 2013.

The above-noted programmes pertain to mechanisms that explicitly put a price on GHG emissions. However, implicit carbon prices have been in existence in Thailand for a number of years, in particular in the form of feed-in-tariff (FiT) schemes and on excise taxes that differentiate environmentally - friendlier vehicles from others which are less so.

Thailand was the first country in ASEAN to introduce a FiT in 2007, and an adjusted version of the original scheme is currently in place to support achievement of the the goals laid out in the Power Development Plan and Alternative Energy Development Plan (see Table 3). FiTs allow electricity generated by renewable sources to obtain tariffs higher than the average tariff price, factoring in their lower level of technological maturity, higher power generation costs, and the environmental benefits of harnessing a cleaner form of energy, including a reduction in GHG emissions. In short, these FiTs enable renewable sources of electricity to compete with conventional sources¹⁶.

In 2017, Thailand's Ministry of Finance introduced new excise tax rebates on four vehicle types:

i) hybrid passenger vehicles; ii) battery-electric passenger vehicles; iii) double cab pickup trucks using hybrid-powered engines; and iv) passenger pickup vehicles using hybrid-powered engines.

The first two will have their taxes cut by 50 percent while the latter two will see their rates drop from 10 to 2 percent¹⁷. These rebates aim to make such green-er vehicles more attractive to consumers and hence provide an incentive for a switch from conventional fossil fuel-based vehicles.

¹⁵ Thailand Final Market Readiness Proposal, March 2014.

¹⁶ ASEAN Feed-In Tariff (FiT) Mechanism Report, ASEAN Centre for Energy (ACE) and China Renewable Energy Engineering Institute (CREEI), 2018.

¹⁷ Tunmuntong, S., New Auto Tax Rewards Greener Cars, Thailand Development Research Institute, 2017.

Thailand V-ETS

Thailand initiated experiments with an ETS in the early 2010s, with initial work being on scope definition and the establishment of the necessary institutional structures. In 2013, it commenced work on developing MRV guidelines for each industrial sector, in consultation with the industries targeted and international experts. This ETS – which functions on a voluntary basis and hence its designation as such – was intended as a pilot system to assess the suitability of an ETS in the country and to identify gaps and opportunities for the development of MRV guidelines. A part of the MRV framework for the Thailand V-ETS was developed in 2013-2014 with the assistance of the governments of Japan and the Republic of Korea (further details are provided in Table 5, Section 2.2).

After a preliminary assessment stage of preparations and consultations which ran from 2010 to 2014, a two-phase pilot period was initiated in October 2014. Phase 1, which went on from 2015 to 2017, had as objectives to pilot the MRV framework, develop sector-specific MRV guidelines, and design specific ETS features (e.g. cap setting, allowance allocation, etc.). This phase was conducted without the trading of allowances. Phase 2 (2018-2020) of the Thailand V-ETS pilot is now under implementation. This phase aims at getting participating companies familiarized with the practice of permit trading through a trading platform¹⁸. Activities tested include the development of a registry system for clearing and transferring allowances, and establishing linkages with a banking system for payment methods¹⁹. Other design elements of the V-ETS are also under consideration, such as the use of flexibility mechanisms, for example in the form of offset credits originating from the T-VER scheme.

In the Thailand V-ETS, the emissions cap of covered industries is set in relation to their emissions intensity, which was determined based on the average carbon intensity of these industries for the baseline years (2012 and 2013). This decision was made following a consultation process as, for these facilities, a carbon intensity cap provides more operational flexibility than an absolute target. This is due to the fact that such type of target allows facilities to manufacture their products with a focus on energy efficiency improvements, which is directly related to a decrease in carbon intensity, rather than on directly limiting total GHG emissions²⁰. An exception is, however, the ceramics industry, which chose an absolute emissions cap instead of an emissions intensity target. Nonetheless, the units to be traded through the system will be expressed in tCO₂e.

Being a pilot phase, all allowances were distributed for free to participating facilities. Another important feature of the Thailand V-ETS is that it covers both direct and indirect emissions from the use of energy (scopes 1 and 2, respectively). Table 4, on the following page, summarizes the scope and coverage of the Thailand V-ETS.

¹⁸ At the time of writing this report, TGO was still having discussions concerning the institution that would host the trading platform for the exchange of allowances.

¹⁹ Based on presentation delivered by TGO representative in a validation workshop held on November 22 and 23, 2018.

²⁰ Usapein, P., Chavalparit, O., A start-up MRV system for an emission trading scheme in Thailand: A case study in the petrochemical industry, *Journal of Cleaner Production*, 142 (2017), 3396-3408.

Table 4: Scope and coverage of the Thailand Voluntary Emissions Trading Scheme (V-ETS)²¹

Scope and coverage of the Thailand Voluntary Emissions Trading Scheme (V-ETS)	
a) Gases covered	>> CO ₂ only;
b) Sectors covered	>> In 2015: Power Generation Industry (11) & Petrochemicals (7). However, the facilities in the power industry dropped out of the Thailand V-ETS after the first year of piloting; >> In 2016: Cement (4), Iron & Steel (4) & Pulp & Paper (4); >> In 2017: Glass (2), Refinery (2), Ceramics (3), Plastic (6), and Food & Feed (8); >> The participating facilities will each go through this pilot phase for 3 years; (Numbers in brackets refer to the number of facilities in that industry initiating their participation in the Thailand V-ETS on that year).
c) Threshold for included enterprises	>> All facilities that took part in the Thailand V-ETS emitted more than 20,000 tCO ₂ equivalent annually.
d) Target	>> An emissions intensity target based on the average carbon intensity of baseline years (2012 & 2013) ²² . For example, for the petrochemicals industry, the target for GHG emissions reductions in 2015 was set as a 2% decrease in carbon intensity from the base year within 3 years; >> Target determined in consultation with pilot facilities and their respective industrial associations; >> All industries chose an intensity target, except the ceramics industry which chose an absolute target. ²³
f) GHG emission sources	>> Restricted to the boundaries of the facility (direct emissions and indirect emissions from fuel consumption); >> Based on the operational control approach of ISO 14064-1.
e) GHG accounting boundary	>> Scope 1: Direct Emissions: company facilities and company vehicles; >> Scope 2: Indirect Emissions: purchased electricity, steam, heating & cooling for own use ²⁴

Activities under the Partnership for Market Readiness (PMR)

Thailand's objectives under the PMR programme are two-pronged. The first goal is to design and implement a domestic market mechanism that supports reducing energy consumption and GHG emissions in the energy sector, with plans to transition this into a domestic ETS in the future. The second objective is to pursue sustainable development and low carbon society goals by supporting municipalities and local communities to implement GHG mitigation actions via a domestic market mechanism²⁵.

An Energy Performance Certificate Scheme (EPC) was the instrument selected to support achieving the first objective under the PMR. The EPC is a voluntary target-and-trade scheme that aims to support the uptake of energy efficiency practices in energy-intensive manufacturing facilities and buildings. Each entity covered by the scheme is assigned an energy consumption target: participants meeting or performing below the target are rewarded, while those failing to meet their respective targets are not imposed any penalties due to the voluntary nature of the scheme. The EPC scheme is expected to lay out the core components of a national ETS that could be established in Thailand in case the government decides to do so in the future²⁶.

With regard to the EPC scheme, as of September 2017 three work streams were underway. Firstly, work was carried out to review existing MRV processes and procedures in consultation with industrial stakeholders. Secondly, sector-specific studies were conducted for each of the eleven sectors targeted by

²¹ Sumetchoengprachya, S., Carbon Pricing Initiatives & MRV in Thailand, Thailand Greenhouse Gas Management Organization (Unpublished report).

²² Details on the emission reduction targets that were set for the petrochemicals, cement, paper & pulp, and iron & steel can be found in the report: [Thailand Voluntary Emissions Trading Scheme Pilot Implementation Project, 2017](#).

²³ This could be due to the maturity of the ceramic industry. Other industries are expected to grow and thus prefer an intensity target over an absolute target.

²⁴ Scope 2 emissions are included primarily to account of GHG emissions from electricity, as the power generation sector eventually dropped out from the scheme.

²⁵ PMR Project Implementation Status Report, 2017.

²⁶ Ibid.

the scheme to analyze sector-specific energy usage patterns, potential improvements to reduce energy consumption, and the assessment of GHG emissions from these activities. Thirdly, work related to the verification of energy consumption data of the participating sectors had also begun, enabling the definition of a baseline and the identification of energy and GHG emission reduction opportunities.

The eleven sectors targeted by the EPC scheme consist of seven industries and four building types. The seven industrial activities are:

i) food & beverage; ii) cement; iii) ceramics; iv) paper & pulp; v) iron & steel; vi) petrochemical plants; and vii) thermal power plants.

Offices, hotels, hospitals and department stores are the four types of buildings that are part of the scheme²⁷.

Three additional activities are planned as part of the first objective of the PMR programme, and they are as follows:

i) review and analysis of policies, laws and institutional arrangement for the EPC; ii) finalization of target-setting methods; and iii) analysis of incentives and pricing mechanisms for the EPC.

The second objective under the PMR is to be achieved through the Low Carbon City (LCC) Programme. This programme aims to promote sustainable development in Thai municipalities and local communities through the generation of T-VERs from projects developed by the municipalities themselves. Activities considered as part of the LCC consist in assessing GHG emissions in the various municipalities, identifying potential GHG emission reductions options, and developing local GHG abatement plans and guidelines for the municipalities.

In addition to the activities noted above, as part of PMR a study was being conducted to model through econometric methods the impacts to the economy of different carbon pricing instruments. This study is due for completion in early 2019, and will make recommendations on the most suitable instrument(s) for Thailand.

The findings of this study will also inform the plans for coming up with a Climate Change Act for approval of the Cabinet in 2020. This would then serve as the basis for the development of a legal framework that mandates high-emitting facilities to conduct MRV.

2.2 MRV at facility level

A facility-level MRV framework has been under development for the Thailand V-ETS programme. Its MRV requirements are based on those developed for the Carbon Footprint for Organizations (CFO) programme implemented by TGO. The CFO is a GHG reporting programme developed by TGO to promote GHG emission MRV at the organizational level, with a view of supporting them to identify actions and measures for emission reductions²⁸.

In a similar fashion to the CFO scheme, the MRV framework for the Thailand V-ETS is based on international standards, namely ISO14064-1, 14064-3 and 14065. It is based on the principles of relevance, completeness, consistency, transparency and accuracy of emissions. Detailed guidelines have not yet been prepared for the MRV framework of the Thailand V-ETS. On the other hand, draft Monitoring, Reporting and Verification guidelines are available, a summary of which is presented in Table 5 on the following page.

The Thailand V-ETS is a pilot programme, and a number of activities/components is still in the workings. Among these, the development of the online reporting platform and trading platforms, as well as the preparation of laws and regulations for the reporting of GHG emissions.

²⁷ Ibid.

²⁸ The CFO has a significantly wider GHG coverage than the Thailand V ETS. The CFO programme covers CH₄, N₂O, SF₆, NF₃, HFCs and PFCs in addition to CO₂. It also includes scope 1, 2 and 3 activities. Scope 3 emissions are indirect emissions that arise from activities that occur upstream and downstream to the activities of the reporting facility.

²⁹ Other references are the Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard, and the National Guideline Carbon Footprint for Organizations.

Table 5: MRV requirements at the facility level for participants to the Thailand V-ETS³⁰**Measurement and monitoring of emissions****a) GHG emissions****quantification methods/
approaches**

Two methods can be used for GHG emission quantification:

- o **Direct measurement:** GHG emissions are measured at the point of release, e.g. through a Continuous Emissions Monitoring System (CEMS).
- o **Calculation approach:** GHG emissions are calculated with the application of appropriate methodologies, using activity data and an emissions factor.

The sources of GHG emissions responsible for less than 0.5% of the total emissions of the organization are defined as “de minimis sources”, and shall not be counted in the total amount of GHG emissions.

b) Data requirements**Level of accuracy of activity data³¹**

Type	Fuel type	Quantity (X)	Required Accuracy
Scope 1: Solid Fuel	Coal, Bagasse	X ≥ 1,000 t 100t ≤ X < 1000t X < 100t	Accuracy ±2.0% Accuracy ±3.5% Accuracy ±5.0%
Scope 1: Liquid Fuel	Heavy oil, Diesel	X ≥ 5,000 kl 100kl ≤ X < 5000kl X < 500kl	Accuracy ±2.0% Accuracy ±3.5% Accuracy ±5.0%
Scope 1: Gas Fuel	LPG (Gas)	X ≥ 1,000 t 100t ≤ X < 1000t X < 100t	Accuracy ±2.0% Accuracy ±3.5% Accuracy ±5.0%
Scope 2: Electricity	Electricity	X ≥ 1,000 t 100t ≤ X < 1000t X < 100t	Accuracy ±1.0% Accuracy ±2.0% Accuracy ±3.5%
Scope 2: Heat	Steam, Hot water, Cold water	No classification	Accuracy ±3.5%

Emission factors:³²

Must be set using one of the following methods:

- o Value calculated from component analysis performed by the organization;
- o Default value provided by TGO.³³

If none of the above two can be applied, the organization can select secondary data to calculate emission factors or published emission factors from “acceptable organizations” or reliable sources as listed below in the order of the most to the least reliable:

- o Thai Life Cycle Inventory Database by the National Metal and Materials Technology Center;
- o Data from peer-reviewed publications such as theses & research studies;
- o Commercial LCA software or database for the specific sector;
- o Data published by international organizations such as IPCC, UN organizations.

Heating Value:³⁴

Must be set using one of the following methods:

- o Facility/Organization’s own measured data;
- o Data provided by suppliers;
- o Net Calorific Value (NCV) taken from the “Thailand Energy Situation Report” published annually by the Department of Alternative Energy Development and Efficiency (DEDE).

c) Monitoring plan

No monitoring plan is required.

d) Support tools

An Excel GHG calculation tool was developed by TGO and experts from various academic institutes.

Reporting of emissions**a) Reporting system and
format**

The key element of the reporting system is the submission of an **emissions report**; The emissions report needs to be submitted to TGO annually by each participating facility; An emissions registry is currently being developed in-house under the IT unit of TGO.

b) Reporting procedures

The **emissions report** must follow a certain format, which is defined in the Monitoring & Reporting guidelines, and include the following elements:

- o Total GHG emissions disaggregated into Scope 1 and Scope 2, including indication of calculation method;
- o Monitoring points and patterns, including accuracy level of measurement systems;
- o Data management procedures;
- o Uncertainty analysis conducted in line with TGO requirements;
- o Accuracy of data activities.

c) Reporting period

Calendar year during which the direct GHG emissions are measured (1 January to 31 December).

d) Reporting timing

Not Applicable.

³⁰ Sources: Sumetchoengprachya, S., and Usapein, P. and Chavalparit, O., Ibid.

³¹ Sumetchoengprachya, S., Ibid.

³² Ibid.

³³ Available here

³⁴ Ibid.

Table 5: MRV requirements at the facility level for participants to the Thailand V-ETS**Verification of emissions**

a) Responsible institutions	TGO is currently responsible for accrediting third-party verifiers through a three-stage process; By October 2019, all third-party verifiers will have to be accredited by the National Standards Committee; Currently there are 12 third-party verifiers accredited by TGO, which includes both international companies (e.g. Bureau Veritas, SGS, Lloyds) and locally based (e.g. universities).
b) QA/QC and uncertainty assessment	An uncertainty assessment is required as part of the emissions report. A formula is provided as part of the Monitoring and Reporting guidelines to calculate uncertainty levels; No specific QA/QC are included as part of the guidelines.
c) Enforcement and penalties for non-compliance	The Thailand V-ETS is a voluntary scheme, and thus no enforcement or penalties exist for non-compliance.
d) Verification requirement procedures	Third-party verifiers will verify the emissions report submitted by the participating facilities and organizations; Verification steps include the following: i) contact review, ii) data collection, iii) risk assessment, iv) formulation of a verification plan, v) evaluation of results, vi) forming an opinion, vii) making a report, and viii) submitting a report.

2.3 Sectoral and policy-level MRV

The focus of this study, as well as all country reports prepared under it, is on sectors that are more suited to the introduction of a carbon pricing instrument, which include the energy, industry and transport sectors. As discussed above, the MRV of major emitters in the energy and industrial sectors is under development in the scope of the PMR programme and will build on experiences gained from the Thailand V-ETS piloting and the CFO programme.

Nonetheless, emissions from the **transport sector** are excluded from these initiatives. In order to factor in the negative impacts of GHG emissions from this sector, excise duties are levied on transport fuels and vehicles. Since January 1, 2016, tax rates on vehicles are determined based on a carbon emissions factor rather than the vehicle capacity³⁵, effectively introducing a price on emissions from transport vehicles.

In addition to the activities carried out in the scope of the PMR programme and the Thailand V-ETS, there are other initiatives in the energy sector which provide an opportunity for introducing MRV at the facility-level. For instance, as part of the Energy Conservation Promotion Act³⁶, designated buildings and factories have to submit energy consumption and conservation data to the Department of Alternative Energy Development and Efficiency, Ministry of Energy, alongside an audit and analysis of energy conservation targets proposed. Designated buildings and facilities are defined as those with: i) an installed power meter of more than or equal to 1,000 kW; or ii) a total transformer capacity of more than or equal to 1,175 kVa; or iii) have an annual calendar-year energy consumption of more than or equal to 20 TJ.

2.4 National GHG inventory and MRV processes

The preparation of national GHG inventories is a process led and coordinated by the Office of Natural Resources and Environmental Policy and Planning (ONEP). Five main stages are identified in the inventory preparation³⁷:

- i) Collection of data (i.e. “activity data”) from local government and the private sector;
- ii) The data owner(s) in the various agencies check and verify the input data (QA/QC);
- iii) ONEP and the lead agencies for the five IPCC sectors compute the GHG emissions based on the activity data;
- iv) Submission of the GHG emission computations to five working groups – which consist of appointed representatives of the five IPCC sectors – which check the quality, validity, completeness and accuracy of the data by reviewing the methodology applied for the GHG emissions estimation;
- v) Data verification by the Climate Change Knowledge and Database Sub-Committee.

³⁵ Thailand's Third National Communication, 2018

³⁶ Guidelines for the Implementation of Energy Conservation as Prescribed in the Energy Conservation Promotion Act B.E. 2535 For Designated Building and Designated Factory, Department of Alternative Energy Development and Efficiency, Ministry of Energy, Royal Thailand Government, April 2005.

³⁷ Thailand's Second BUR, 2017.

The compilation of the 2013 inventory was made applying a combination of Tier 1 and 2 methodologies and conversion values. Tier 1 methodologies with default IPCC emission factors were used for the energy and IPPU sectors. The three other sectors used a combination of tiers 1 and 2, i.e. with a combination of default IPCC and country-specific emission factors. In addition, GWP values used in the preparation of this inventory were based on IPCC's Second Assessment Report³⁸.

The table below indicates the agencies responsible for data collection ("data owners") and those responsible for converting activity data into GHG emissions ("lead agencies")³⁹.

Table 6: Activity Data Owners per IPCC Sector for the Preparation of National GHG Inventories

IPCC Sector & Lead Agency	Data Owner
Energy Lead Agency: 1) Energy Policy & Planning Office 2) Office of Transport & Traffic Policy & Planning	Electricity and Fuel: - o Department of Energy Business (DEB) - o Department of Alternative Energy Development and Efficiency (DEDE) - o Electricity Generating Authority of Thailand (EGAT) - o Energy Policy & Planning Office (EPPO) - o Provincial Electricity Authority (PEA) Transportation: - o Civil Aviation Authority of Thailand (CAAT) - o Department of Mineral Fuels (DMF) - o Port Authority of Thailand (PAT) - o State Railway of Thailand (SRT)
Industrial processes and product use Lead Agency: Department of Industrial Works	- o Department of Energy Business (DEB) - o Department of Industrial Works (DIW) - o Department of Customs (DOC) - o Department of Primary Industry and Mines (DPIM) - o Industrial Estate Authority of Thailand (IEAT) - o Iron and Steel Institute of Thailand (ISIT) - o Office of Industrial Economics (OIE) - o Petroleum Institute of Thailand (PTIT)
Agriculture Lead Agency: Office of Agri-Economics	Livestock: - o Department of Livestock Development (DLD) Cultivation: - o Department of Agricultural Extension (DAE) - o Department of Agriculture (DOA) - o Land Development Department (LDD) - o Office of Agricultural Economics (OAE) - o Rice Department (RD)
LULUCF Lead Agency: Department of National Parks, Wildlife and Plant Conservation	- o Department of National Parks, Wildlife and Plant Conservation (DNP) - o Department of Marine and Coastal Resources (DMCR) - o Geo-Informatics and Space Technology Development Agency (GISTDA) - o Rubber Authority of Thailand (RAOT) - o Royal Forest Department (RFD)
Waste Lead Agency: Pollution Control Department	- o Department of Alternative Energy Development and Efficiency (DEDE) - o Department of Environmental Quality Promotion (DEQP) - o Department of Industrial Works (DIW) - o Department of Local Administration (DLA) - o Department of Highways (DOH) - o Pollution Control Department (PCD)

³⁸ Second Assessment Report of the IPCC, 1996.

³⁹ Thailand's Second BUR, 2017

Concluding remarks and future outlook

Thailand is currently in the later stages of developing a carbon market mechanism. It has been exploring various instruments such as the establishment of a domestic ETS, an energy certificate scheme and a domestic offset mechanism. While there is a potential for synergies and complementarities among these initiatives, some of them appear to overlap somehow. For instance, the EPC scheme is targeting some of the same industries as the Thailand V-ETS pilot while both have similar objectives: to foster GHG emission reductions and gains on energy efficiency. This suggests that Thailand is experimenting with different options in parallel, with the experiences gained serving as a springboard for well-informed decision-making.

The government of Thailand has not made a decision yet on the carbon pricing instrument it will adopt. On the other hand, by 2020 – with the conclusion of the PMR programme and the Thailand V-ETS piloting – it may be expected further clarity on the way forward. In particular, the outcomes of these projects could shape the Climate Change Act, which is expected to be proposed for Cabinet approval in 2020.

Nevertheless, regardless of the chosen market mechanism by Thailand, a common foundation and operating requirement of these various mechanisms would be the development of an MRV framework. This framework is necessary for Thailand to implement and operate the chosen market mechanism. To this end, and considering the current work on MRV, a detailed and comprehensive set of guidelines on MRV could be expected in Thailand in the coming years. Nonetheless, a key success factor will be institutional coordination, so as to ensure that the different experiences with carbon-market mechanisms can result in a seamless and well-integrated MRV framework.

The potential for Thailand linking a carbon pricing instrument with those of other jurisdictions is still unclear. Thailand would first need to announce its own instrument and then allow the domestic participants to gain familiarity with it before moving forward with cross-jurisdiction linking. In addition, further studies on the compatibility of the pricing instrument selected by Thailand with those of other jurisdictions would need to be undertaken in order to better understand the opportunities and challenges of linking.

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