

Euroconsult Mott MacDonald

European Commission

EuropeAid/127404/C/SER/Multi

Service contract No
21.040100/2009/SI2.539350/SER/C1

Developing countries, monitoring and
reporting on greenhouse gas emissions,
policies and measures

Country Report Thailand



Euroconsult Mott MacDonald
in association with:

- ECN (The Netherlands)
- Ecoprogresso (Portugal)

December 2010



A project funded by the European Union. The views expressed in this report are those of the consultants and do not represent the views of the Project Partners or European Commission

Developing countries, monitoring and reporting on greenhouse gas emissions, policies and measures

Final Country Report Thailand

December 2010

Issue and revision record

Revision	Date	Originator	Checker	Approver	Description
6	17 december 2010	Alejandro.Saenz-Core P. Tonsuwonnont	Gonçalo Cavalheiro	Caroline La Chapelle	Submitted to client

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Content

Chapter	Title	Page
	Executive Summary	i
1.	About MRV in this report	1
2.	Brief Overview: Thailand, MRV and Mitigation	3
3.	Findings: Gaps, barriers and needs	6
4.	Needs, Gaps, Barriers and the Way Forward	9
4.1	Way forward	9
4.2	Proposed concrete action	9
5.	Current and planned actions in Thailand	18
5.1	Thai initiatives, barriers and existing actions	18
5.2	Donor activities related to climate change mitigation in Thailand	18
	Appendices	22
	Appendix A. Background Report	23
A.1.	Introduction to the country	23
A.2.	Current Climate Change Policies	30
A.3.	GHG Inventories and implementation of mitigation	32
	Appendix B. List of interviewed stakeholders	35
	Appendix C. Summary report from the interview minutes	37
	Appendix D. Report and list of participants of the Thailand workshop organized by the European Commission on 1st September, 2010	44
D.1.	Measuring, Reporting and Verification: EU's Perspective	46
D.2.	National Circumstances - Presentations introducing the climate change situation from the players in Thailand, such as Government Officials, Academia, and NGOs	46
D.3.	Project Results in Thailand	48
D.4.	Memo with gaps and barriers findings for discussion	48
D.5.	Results from the workshop discussion - Mitigation Opportunities	49
D.6.	Annex 1 - Agenda	49
D.7.	Annex 2 – List of Workshop Participants	50
D.8.	Annex 3 – Memo for discussion	53
D.9.	Annex 4: Comments to the Memo for discussion (Annex 3) from the audience at the Workshop.	57
	Appendix E. Summary and list of participants of the Thai workshop organized by TGO in Thai language on September 23rd 2010	62
E.1.	The EU Project on GHG MRV:	62
E.2.	Assessment of MRV capacity and gaps	63
E.3.	List of participants - Meeting on Measurement, Reporting and Verification of GHG emissions - 23 September 2010, organized by TGO	70

Executive Summary

The identification of capacity barriers, gaps and recommendations for the monitoring and reporting of GHG emissions and mitigation policies and measures in Thailand, has been a process of in-country intensive stakeholder consultations and iterative thinking made from June to September 2010.

This Report contains an assessment of Thailand's capacity building needs to plan mitigation policy (Low Emission Development Strategies – LEDS – and Nationally Appropriate Mitigation Action – NAMAs) and to measure, report and verify domestic GHG emissions as well as GHG related impacts of domestic policies and measures with a view to strengthen those capabilities in Thailand.

The following steps were taken to derive the findings of this final country report:

1. development of a first report on national circumstances, based on secondary information. See Appendix A for preliminary country report;
2. first in-country mission: consultation with stakeholders and summarisation of findings. During the first visit, stakeholders from the energy and industrial sectors, Research Institutes, Non-Profit Organizations and Donors were interviewed. Approximately 17 meetings were held with more than 30 key stakeholders in relation to GHG monitoring, reporting and verification activities such as creating inventories, energy planning and climate change programmes, green investment funds, industrial processes and performance of government agencies. See Appendix B for the list of interviewed stakeholders and Appendix C for the summary report from the interview minutes;
3. second in-country mission: consultation with stakeholders, country workshop and summarisation of findings. During the second mission further interviews with stakeholders (see Appendixes B and C for details) were undertaken. The country workshop took place in an International Hotel Conference Room in Bangkok on September 1st, 2010. More than 50 representatives from government Ministries and National Agencies, the private sector, civil society and the international community attended the workshop. The objectives set for the workshop were to validate preliminary findings, to gather more information about barriers, gaps and recommendations, and to identify key work areas for a MRV capacity building project.
4. TGO repeated the country workshop discussion in Thai language with other stakeholders on September 23rd, to extend the validation of the findings made in the September 1st workshop, improving their focus (this was needed as there were only a few participants left in the afternoon workshop on Sept. 1st, 2010 and it was identified that holding discussions in English could constitute a barrier for wider participation). See Appendix E for September 23rd 2010 - workshop brief and list of participants;
5. Preparation of the final country report. This report aims to analyze the process of planning, design, implementation and evaluation of nationally appropriate mitigation actions and low emission development strategies in Thailand. It also includes existing instruments and processes for monitoring and reporting such as GHG inventories and National Communications to the UNFCCC.

Through this in-country stakeholder consultation process described above, this report allowed to identify capacity needs, barriers, and gaps in relation to existing regulations and climate change measures and related policies in Thailand; and to make recommendations on a way forward and of specific capacity building actions.

From the communication with the country stakeholders and their perspective, the project team included and analysed what was discussed, consolidating a clear listing of the potential activities that can be used to

identify and prioritize future work to be undertaken with or without support and, in the first case, to approach donors.

From donors perspective, it allows them to have a comprehensive view of the necessary capacity building activities needed and to increase the efficiency and effectiveness of support avoiding the overlapping of actions and promoting synergies.

This report starts with an introduction of the country including relevant issues in relation to the subject of MRV followed by an overall presentation of the main findings on gaps and barriers in the third Item. The fourth item focuses on seizing the opportunities of low emission development measures and activities. Finally an analysis of the gaps and barriers is presented, concentrating on how to move forward while seizing the opportunities a low emission economy provides.

Below is a brief summary of the Thailand Climate Change decisions made until present, including the identification of key players and overall policy framework.

Ministry/Agency in charge of Climate Change Policy:

- The “Office of the Permanent Secretary” under Ministry of National Resources and Environment (MoNRE), was named as Thailand’s Designated National Authority (DNA) for the CDM;
- In 2004, this responsibility was transferred to the Office of Natural Resources and Environmental Policy and Planning (ONEP) of MoNRE;
- In 2007, the National Board on Climate Change Policy (NBCCP) was established. Chaired by the Prime Minister and vice-chaired by the Minister of MoNRE, includes 16 other government agencies and departments, has defined requirements to be met by CDM projects in Thailand¹. At present, the NBCCP is managing climate change policy supported by technical and negotiation subcommittees.
- in 2007, MoNRE set up the Thailand GHG Organization (TGO) as its DNA Office;
- In 2008, TGO and the National Metal and Materials Technology Center (MTEC) have established a verification process and issuance of Carbon Footprint to products. The Life Cycle Inventory (LCI) in Thailand has presently more than 500 baselines of metals and materials. The verifiers are required to register with TGO. It is designed to be a similar process as ISO issuance system which has been implemented in Thailand for more than 20 years.
- The greenhouse gas (GHG) information network was formulated by TGO in 2009. The training workshops have been conducted to introduce the data collection for GHG Inventory. The network is however limited to only government agencies and it is not a mandatory process.

Agency in charge of Climate Change planning and Adaptation projects: ONEP since 2004
ONEP/MoNRE is the Thailand’s Focal Point of the UNFCCC;

Agency in charge of mitigation projects and programmes (CDM): Thailand Greenhouse Gas Management Organization (TGO) (2007). It is also the Thailand DNA since its creation;

Key climate change policies, instruments and decisions in Thailand:

¹ Based on information contained in cd4cdm.org/Asia/Fifth%20Regional%20Workshop/CDM-Thailand.ppt and <http://www.unep.org/dec/PDF/Casestudies/CCThailanddraft.pdf>

- 1992, after ratification of the UNFCCC, the Royal Thai Government set up the National Climate Change Committee (NCCC)² and the Climate Change Expert Committee (CCEC) to prepare the country's response to climate change;
- 1992, conservation and enhancement of the Environmental Quality Act was issued, including a 20-year Natural Resource and Environmental Policy and 5-year Action Plan;
- 1997, the first 20-year Policy and Prospective Plan for Enhancement and Conservation of National Environmental Quality (20-Year Environment Plan) was created, complementing the 5-year National Economic and Social Development Plan;
- 2000, Thailand's first National Communication to the UNFCCC was submitted, which included a national GHG inventory for year 1994 (with LULUCF);
- Thailand is currently operating under the 10th National Economic and Social Development Plan. The National Strategy on Climate Change (2008 - 2012) was issued in 2007, including Climate Change Mitigation Dimensions of Energy Policy Framework. The policy set goals to improve energy security, promote alternative energy, supervise energy pricing and safety, promote energy conservation and efficiency and protect the environment;
- In 2007, the National Board on Climate Change Policy (NBCCP) and the Thailand Greenhouse Gas Management Organization (TGO) were established
- 2008, the Thai Energy Policy identifies a set of concrete voluntary targets by 2022 to increase the proportion of renewable energy in total energy consumption up to 20%, at the same time those measures will produce a significative reduction of energy sector GHG emissions by that year.;
- 2008 ONEP has commissioned the preparation of the Second National Communication (SNC), including a GHG inventory (data collection, preparation of estimates, updating emission factors, compilation of the GHG inventory). A draft report has been submitted to ONEP and was recently approved by the Steering Committee for the National Communication. TGO has commissioned the preparation of the Mitigation policy including GHG abatement cost Study
- Feb 2009 – WB's Forest Carbon Partnership Facility (FCPF), includes a Review of the Forest Law Framework, Forest Conservation Programme and REDD strategy. Readiness Plan Idea Note (R-PIN);
- 2010 - MRV for project – based activities has been under preparation by TGO during fiscal year of 2010. It is identified to be an essential tool to develop Domestic Voluntary Carbon Market which is in TGO's Low Carbon City Program and Pilot Project of Voluntary ETS in Industrial Estates. Development of domestic methodologies and MRV are under technical assistance from various sources, such as JICA, KEMCO, universities and consultants.
- Oct 2010 – The Thai Cabinet agreed on 26 October 2010 to back the Copenhagen accord, however the Thailand official position related to the Copenhagen Accord will be known after the Parliament ratification which is expected before the International Climate Change meeting in Cancun, Mexico on 10 December 2010³;

² Formerly established in June 1993 in response to the ratification of UNFCCC but later abolished during the governmental restructuring in 2000. The Cabinet Resolution dated 1 July 2003 has re-established NCCC as one of the sub-committees under national Environmental Board (NEB), however after restructuring the climate change agencies in 2006/2007, and with the establishment of the NBCCP and TGO, NCCC was again diactivated.

³ <http://www.nationmultimedia.com/home/apps/print.php?newsid=30142851>

1. About MRV in this report

MRV stands for Measuring, Reporting and Verification. This concept was first introduced by the “Bali Action Plan” – BAP (Decision 1/CP.13) under the United Nations Framework Convention on Climate Change (UNFCCC). The BAP foresees MRV of nationally appropriate mitigation commitments or actions for developed countries, MRV of nationally appropriate mitigation actions (NAMAs) for developing countries and MRV of financial and technical support for NAMAs.

Later, the Copenhagen Accord provided a broad vision of the overall scope and main goal of the MRV procedures to be created.

"Non-Annex I Parties to the Convention will implement mitigation actions, including those to be submitted to the secretariat by non-Annex I Parties in the format given in Appendix II by 31 January 2010, for compilation in an INF document, consistent with Article 4.1 and Article 4.7 and in the context of sustainable development. (...). Mitigation actions subsequently taken and envisaged by Non-Annex I Parties, including national inventory reports, shall be communicated through national communications consistent with Article 12.1(b) every two years on the basis of guidelines to be adopted by the Conference of the Parties. Those mitigation actions in national communications or otherwise communicated to the Secretariat will be added to the list in appendix II. Mitigation actions taken by Non-Annex I Parties will be subject to their domestic measurement, reporting and verification the result of which will be reported through their national communications every two years. Non-Annex I Parties will communicate information on the implementation of their actions through National Communications, with provisions for international consultations and analysis under clearly defined guidelines that will ensure that national sovereignty is respected. Nationally appropriate mitigation actions seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support. Those actions supported will be added to the list in appendix II. These supported nationally appropriate mitigation actions will be subject to international measurement, reporting and verification in accordance with guidelines adopted by the Conference of the Parties."

The general terms of the Copenhagen Accord as described above do not provide a clear understanding of how the MRV system will function and how its requirements will be implemented. It allows, however, to narrow down the key issues one must address when thinking ahead and start preparing for the establishment of an MRV system for climate policy.

The European Commission is implementing a scoping study aimed at understanding and exploring the needs of developing countries as regards enabling activities related to mitigation – focusing on MRVing emissions, the preparation of National Communications, Greenhouse Gas Inventories, and planning and development of NAMAs. The European Commission is in particular interested in understanding the needs related to capacity building in these areas.

The project, implemented by Euroconsult Mott MacDonald with Ecoprogresso and the Energy research Centre of the Netherlands (ECN), seeks to provide concrete recommendations on the structure and elements for a capacity building programme to be implemented between 2010 and 2013-2014 with a view to assist developing countries in implementing MRV requirements of a future climate change agreement. This capacity building programme will be designed based on and with a view to addressing institutional, procedural and methodological issues, relating in particular to data gathering, barriers, needs, constraints and opportunities, identified during this scoping study through an intensive in-country interactive stakeholder engagement and consultation process.

The following document is the result of a process of stakeholder consultations and iterative thinking that took place from May to September 2010. The process was aimed at identifying capacity barriers, gaps and recommendations for the monitoring and reporting of GHG emissions and mitigation policies and measures in Thailand.

This report is structured following a logical sequence starting with an introduction of the country's circumstances relevant to the subject of measuring and reporting of GHG emissions and mitigation policies and measures (MRV); followed by an overall presentation of the main findings on gaps and barriers for MRV.

The third section focuses on overall recommendations for a way forward that sets MRV as an important need for seizing the opportunities for a low emission economy.

Section fourth focuses on the analysis of gaps and barriers for the development of GHG Inventories and National Communications as key instruments for measuring and reporting.

Finally section fifth gives a more detailed overview of barriers. Despite the fact that the energy, transportation and forest sectors are the ones more significant and were chosen as focus of the study, in the Thai case the recommendations are not so directed, since some basis have to be addressed, namely the data availability and the institutional framework, as well as the policy design and implementation, in a cross sectoral way. However, those sectors were selected for this study based on the following criteria: contribution to GHG emissions and reduction/ avoidance potential, mitigation initiatives and NAMAs, and priority areas for present and future development.

2. Brief Overview: Thailand, MRV and Mitigation

General Information

Thailand is located in the south-eastern region of the Asian mainland and is bordered by Myanmar, Laos, Cambodia and Malaysia. The total land area of the country is approximately 513 thousand square kilometres. The population is approximately 65.5 million people living in 76 provinces.

Located in the monsoon region, the climate is dominated by three distinct seasons: hot, wet, and cool. Average annual precipitation is 1,630 mm, although rainfall exceeding 2,000 mm is common in the Southern peninsula of the country.

The country is divided into five regions: North, Northeast, Central, East and South. The North is generally mountainous, with altitudes rising over 2000 meters above sea level. A large part of the Northeast is on a high plateau and is largely dry. The land in the central region is flat and relatively fertile. The East is dominated by fertile land suitable for tree crops and a long coastal line. The Southern Peninsula constitutes most of the 2,500 km coastline of the country. The topographical nature, soil characteristics and climate conditions influence agricultural specialization and socio-economic development in each region.

The political structure in Thailand is a constitutional monarchy with King Bhumibol, the head of state. Since December 2008, the Democrat Party has been in power. The government is headed by Prime Minister Abhisit Vejjajiva.

Even considering the Asian financial crisis in 1997, Thailand is still one of East Asia's best performing economies, averaging more than 6%/y real gross domestic product (GDP) growth in 2002-04, mainly through exports and tourism. The Thai economy is export-dependent, with exports of goods and services accounting for over 70% of GDP in 2007. The key economic driver is exports, where the growth from January 2005 to November 2008 averaged 17.5%/y (Source; CIA, 2008).

Climate Change and GHG Emissions

Climate change threatens all important sectors of Thailand's economy: agriculture, tourism, industry and trade. This is in theory the main reason why climate change related policies should form an integral part of Thailand's environmental and economic development agenda. These policies should serve to strengthen Thailand's domestic sustainable development future, such as improving energy security and environmental protection through the promotion of alternative energy and energy efficiency measures. However, Thailand is yet to fully succeed, as in most developing countries, in ensuring effective policy coordination in such a manner as to gain widespread understanding of challenges and opportunities from implementing low emission development strategies.

The country's current contribution to global Greenhouse Gas (GHG) emissions is less than 1%. However, Thailand shows an accelerated and continuous economic growth that is currently linked to GHG emissions growth.

Greenhouse gas emissions amounted to about 241 Mt CO₂ in 1994. Due to carbon sequestration from reforestation activities and the re-growth of natural vegetation on abandoned lands, however, net CO₂ emissions were estimated at 202 Mt CO₂. Unlike previous GHG inventories, the amount of CO₂ emissions from forestry and land use changes has declined compared with emissions from energy activities.

Energy combustion and fugitive emissions have become the largest source of CO₂ emissions, accounting for about 52 % of gross emissions of CO₂ in 1994. Several factors have contributed to the slowdown in emissions from forestry and land use changes. These include the imposition of the logging ban since 1989 and increased reforestation and commercial plantation activities.

Second National Communication

In 2008, Thailand commissioned the preparation of the Second National Communication (SNC). King Mongkut University has been tasked to prepare the GHG inventory (data collection, preparation of estimates, update emission factors, compilation of the GHG inventory). A draft report has been submitted to ONEP and was recently approved by the Steering Committee for the National Communication. TGO has commissioned, to this same University, the preparation of the Mitigation policy including the GHG Abatement cost Study.

The second national communication (SNC) builds onto the initial national GHG inventory: key researchers have been reappointed to ensure that the institutional knowledge that was gained in 2000 is built on. The SNC is used to selectively improve the quality of data and conduct additional research to reduce the uncertainty of the GHG inventory in key categories.

Climate Policy and Mitigation Activities

The National Strategy on Climate Change (2008 - 2012), includes those mitigation dimensions of energy policy framework and goals on improving energy security; promoting alternative energy and clean transport; supervising energy pricing and safety; energy conservation and efficiency, eco-cities and environmental protection.

The National Strategy on Climate Change plan includes 6 main strategies to respond to climate change:

- Strategy 1: Build capacity to adapt and reduce vulnerabilities to climate change impacts;
- Strategy 2: Support greenhouse gas emissions reductions and enhance carbon dioxide sinks to promote sustainable development;
- Strategy 3: Support research and development to better understand climate change, its impacts and adaptation and mitigation options;
- Strategy 4: Raise awareness and promote public participation;
- Strategy 5: Build capacity of relevant personnel and institutions and establish a framework of coordination and integration;
- Strategy 6: Support international cooperation to achieve the common goal of climate change mitigation and sustainable development.

In 2008, the Thai Energy Policy produced a set of concrete targets to promote alternative energy through bio-fuel development, renewable energy supply, renewable thermal energy and compressed natural gas for transport. Additionally, the Thai Government launched the Renewable Development Plan 2008-2022 (REDP), where its goal is to increase the proportion of renewable energy in total energy consumption up to 20% by 2022.

The economic crisis in 2008 and global recession have affected the economy and decreased energy demand. The government has examined its options for diversifying the energy supply sector and enhancing the energy security without compromising the environment. In the power generation sector there is still a heavy reliance on natural gas and dwindling oil reserves. Feasible clean energy generation strategies that

can meet future power demand are support of nuclear power and renewable energy, increasing energy efficiency and increasing use of clean coal.

Thailand and the Copenhagen Accord

Thailand has not yet officially expressed its association with the Copenhagen Accord to the UNFCCC . However, Thailand submitted a letter to the UNFCCC communicating that the country is in the process of considering such association.

There has been an intense discussion triggered by concerns from private sectors, which have questioned the costs of implementing the Copenhagen Accord and, whether industrialized countries are really committed to providing these funds and how the funds will be allocated for effective use.

3. Findings: Gaps, barriers and needs

Institutional Framework for climate change policy

The analysis of the institutional framework below is related to the current status of climate change policy in Thailand. This analysis is neither performed against any ideal scenario nor against any institutional needs or requirements for the future framework for NAMAs and MRV.

Thailand is engaged in climate change mitigation. The country has, like most others, prepared a national climate change strategy which provides for a good balance between mitigation and adaptation, also focusing on research needs in both of these areas.

The Thailand institutional framework for climate change policy planning and implementation reflects, like in most other countries in the world, the cross cutting nature of the issue, in which competences are divided among different institutions in different ministries, to cover issues ranging from renewable energy to agriculture waste, to transportation, to forestry, among others. ONEP and TGO share most of the responsibilities related to climate change. While ONEP is the UNFCCC focal point, TGO is the DNA for the Kyoto Protocol's CDM. Considering roles and responsibilities for both organizations, additional resources are essential.

However, as all provincial agencies concerned have duties to annually monitor and report the existing situation of natural resources, environment, energy supply & demand, industrial and agricultural activities to their central Departments. Therefore, the institutional infrastructure for National GHG inventory and monitoring has been in place. To increase the capacity of national MRV, a clear mandate and a proper data collection template and perhaps with a new related regulation are needed from the government. NCCC could play a key role to ensure that the national MRV is effective.

In addition, the level of awareness, knowledge and capacity of the different Thai climate change related agencies and institutions, especially in estimating GHG emissions, varies widely, thus potentially have impacts on implementing climate change measures. This is also promoted by the inexistence of regulation applicable to all stakeholders who could contribute to GHG emissions and inventories. Comments from most stakeholders during this project attributed high priority to the clarification of the institutional framework.

In the forestry sector, the institutional set up is admittedly more complex than in the rest of the sectors. The authority over forestry issues is attributed to several institutions, with different focuses and definitions of forest and forestry. Nonetheless, the World Bank's Forest Carbon Partnership Facility (FCPF) technical and financial support being provided to Thailand shall address such issues, including a Review of the Forest Law Framework, Forest Conservation Programme and REDD strategy. Readiness Plan Idea Note (R-PIN).

It is clear that such institutional problems lead to an overall difficulty in policy coordination, thus resulting in gaps from policy planning to designing and implementation, including the design of sectoral policies with contradictory goals or, at the least, effects.

Mitigation Activities

There has been important progress towards driving Thailand to low emission development, the most important of which may be the adoption of a strategy to promote the use of renewable energy sources. A target of increasing the proportion of renewable energy in total energy consumption up to 20% by 2022 will produce a significant reduction of energy sector GHG emissions by that year.

These energy-related policies include a series of measures on agriculture and energy, thus covering two of the most important emission sectors in Thailand. Thailand will resort to funds from the CIF Clean Technology Fund (CTF) as a catalyst for further financing of the implementation of the energy strategy, as announced in Copenhagen.

It has become apparent during consultations that there is no clear indication of the costs and the macro-economic impacts of such policies, thus contributing to the low level of buy in from stakeholders, in particular the private sector. Many Thai stakeholders fear that the increased costs of mitigating climate change (including the costs of establishing and implementing an MRV system) may reduce the potential competitiveness of the private sector. TGO has recently commissioned a study on costs of climate change which may facilitate the understanding of the impacts (costs and benefits) of climate change policy.

Civil society, in particular the private sector, is very active in expressing its views related to climate change. Both formal (those provided by the law) and informal (such as the media) channels are used. However, some have expressed the desire that contributions to the development of policy can take place at the earliest stage possible so that it becomes an effective participation in the climate policy decision making process.

MRV of Mitigation Activities

The current Thai climate change strategy does not include a monitoring system and therefore, Thai stakeholders do not have an accurate view of the country's performance towards achieving the goals set for the period 2008-2012. However, the widespread perception is that the implementation of the strategy is behind schedule. The preparation of the second national communication (currently underway) may contribute to the collection and dissemination of information about the status of implementation of climate policies

The private sector is indeed a key stakeholder in the design, implementation and MRV of climate policy in Thailand. In addition to fears of loss of competitiveness mentioned above, the private sector in Thailand is also very concerned that MRV of climate mitigation will require disclosure of confidential information. The lack of experience by Thai companies on estimating GHG emissions, with exception of those involved in CDM projects is also a barrier to a more positive contribution to a low emission development.

When it comes to estimating GHG emissions, including emission reductions, a set of technical and methodological barriers, similar to those found in most countries, arise: lack of nationally appropriate emissions factors and other parameters; lack of knowledge on methodologies to estimate the potential GHG emissions reduction from a given measure; lack of commonly acknowledged and used methodologies for estimating baselines and projections related to policies and measures and emission scenarios.

Finally, despite Thailand have many experts appointed to be in IPCC's technical working groups and some are in the review committee to review NC of ANNEX I Parties; and they are also in the team preparing Thailand NC and participating in policy matter; the Thailand institutional infrastructure needs capacity

building and a clear mandate and policy in order to improve a national monitoring and verification system; and enhance the active participation of all stakeholders both public and private on these decision matters.

4. Needs, Gaps, Barriers and the Way Forward

4.1 Way forward

The way forward in Thailand towards an MRVed Low Emission Development includes three main areas of work:

1. Strengthen the institutional framework
 - a. Clearly define roles and mandates of institutions in relation to mitigation and MRV
 - b. Strengthen the coordination mechanisms among government institutions and with stakeholders
 - c. Increase resources devoted to climate change policy planning, design implementation and MRV in key ministries/agencies
2. Enhance and promote the widespread understanding of challenges and opportunities from Climate Change mitigation
 - a. Information on costs and benefits of climate change mitigation
3. Improve the availability and use of quality GHG information in the decision making process from all stakeholders
 - a. determination of baselines, in accordance with recognized methodologies
 - b. higher quality activity data (historical and up to date)
 - c. country specific emission factors for key sources
 - d. enhanced knowledge on corporate GHG inventories

4.2 Proposed concrete action

Taking into account the evaluation of the needs, gaps, and barriers, the recommendations on the way forward and the proposals from stakeholders two main set of proposals for cooperation and potential concrete actions were identified in relation to:

1. the elaboration of GHG National Inventories and National Communications;
2. the preparation and follow up of National Policies and Measures for seizing the opportunities for a low emission economy.

The proposals for cooperation were discussed in workshops through an in-country intensive and interactive stakeholder consultation process, in order to incorporate the input of stakeholder's views and comments and finally produce a set of validated proposals for capacity building which show the way forward.

In summary, the following areas of potential concrete actions, constituting cooperation opportunities were identified:

- support the creation of a single climate change national agency with specific political mandate, role and responsibilities for coordinating and incorporating climate change in sectoral policy planning;
- establish new or enhance existing coordination mechanisms (e.g., so as to incorporate climate change into sectoral policies);
- support the enhanced effectiveness of the participation of national and sub-national entities and stakeholders in the decision making process;
- support the design and implementation of an MRV national system, including the GHG data storage;
- support the elaboration of a GHG inventory development plan, in order to identify needs and prioritize resources in terms of increasing the overall quality and accuracy of the GHG inventory;
- regular collection of data and establishment of databases, assuring transparency and consistency of the collected data;
- determining national specific emission factors for key sources;
- establishing sectoral and activity baselines;

- enhance corporate capacity to estimate GHG emissions, namely by supporting the development of a voluntary private sector GHG Inventory elaboration initiative
- building national capacity for verification;

The following table matches the stakeholders' input on their needs, gaps and barriers for the production of GHG National Inventories and National Communications with concrete actions to overcome those. The information contained in this table is a result of the stakeholder consultation process.

Table 4.1: Inventories, National Communications⁴

Gap/Barrier	Classification	Action	Focal stakeholders	Other stakeholders involved	Range estimate of cost	Comments
1. Need for a unique national administrative agency with political mandate and enough resources to strongly coordinate and manage the compilation, continuous improvement and updating of the National GHG Inventory including the required electronic GHG inventory database system. Entities are identified and data collection procedures are in place. However, data is collected for other purposes and does not meet the necessary requirements to estimate GHG emissions.	Knowledge transfer, Institutional, coordination procedures, data acquisition, Information and Systems	Support to the establishment of a national agency and system for the regular compilation of data and estimation of GHG emissions, in order to facilitate the regular elaboration of the National Greenhouse Gas Emissions Inventory and to track effectiveness of domestic climate policy. Support data providing entities to update current procedures to collecting the required data for the estimation of GHG emissions. <i>Sharing EU experience and knowledge</i> <i>Support to TGO⁵ in drafting the "business plan" of the national agency and system.</i>	Climate change agency, all sectoral Ministries and National Agencies	Universities and research centers	US\$ 250,000 to 500,000	Involve: MoNRE and TGO Partial support is provided by GTZ. ⁶
2. Need to enhance knowledge across institutions in different sectors on the GHG Inventory Guidelines	Knowledge transfer	Capacity building and hands-on training on the Inventory Guidelines by sector for all sectors and for the players responsible for the inventory and national communication preparation. <i>Training with key experts participating in the IPCC process.</i>	All sectoral Ministries and National Agencies are important.	Universities and research centers,	US\$ 150,000 to 250,000	Partial support is provided by AFD and its study. ³
3. Emission factors for most key	Knowledge transfer	Establishing national Emission Factors for key sources and sectors, focusing on energy production, agriculture and LULUCF.	Relevant Ministries / agencies with	Local universities	US\$ 50,000 To 100,000	Involve local

⁴ In the annexes to this report, two working versions of this table can be found.

⁵ Since TGO has been established, by law, to be the National Clearing House or Center for National GHG Information, this activity should be TGO as the focal point, not ONEP.

⁶ Please find further information in Item 5.2 below

Gap/Barrier	Classification	Action	Focal stakeholders	Other stakeholders involved	Range estimate of cost	Comments
sources (with exception of rice cultivation) do not reflect national circumstances		Sources to be considered, include: • biogas from wastewater treatment use in electricity production • manure treatment • non-CO₂ emissions in sectors such as cement, pulp&paper, fertilizer production • fuel combustion in transportation sector, and • life cycle of biofuels. Support to discussion and study on designing a methodological development program: determine which EF for which level of accuracy (tier) should be developed – identify needs and prioritise resources.	assigned responsibility over GHG Inventory sectors or sources.	and research centres working on Climate Change issues		universities and research institutes. Partial support is provided by AFD and its study. ⁷
<i>Support to research programmes in Local Universities</i>						
4. Authority over forestry issues is divided into several institutions, with different focuses and definitions of forest and forestry.	Institutional and coordination procedures	Capacity building on estimating emissions in the LULUCF – from unifying the definition of forest across institutions and policies to moving from activity to area based approach. Build capacity on a combined satellite/ground approach. Capacity building on estimating soil carbon. <i>Workshops on best practices in estimating emissions from LULUCF.</i> <i>Hands on training for 2006 IPCC Guidelines for the AFOLU sector.</i>	Ministries and National Agencies working on Forestry	Universities and research centers		Support currently being provided by the World Bank (FCPF) ⁴
6. Need to expand knowledge and experience at facility and company level on GHG inventories.	Knowledge transfer	Enhance experience at facility level MRV of emissions, duly taking into account concerns regarding disclosure of information. Share experiences on measuring emissions at EU Emissions Trading Scheme (EU-ETS) installations. An example of capacity building, which can serve as a model for this activity, is that of the World Resources Institute's cooperation with Mexican Environment Ministry and a private sector association in the so called Mexico's GHG Initiative. . <i>Study on the design and establishment of a voluntary GHG Inventory system for companies.</i>	All sectoral Ministries and National Agencies are important, particular the ones related to industrial activities.	Universities and research centers,	US\$ 200,000 to 300,000	Involve All related stakeholders in the Thai public and civil society Partial support is provided by GTZ, ADB, JICA and USAID.⁴
7. Enhance	Knowledge	Cooperate on determining cost of MRV to both public and private sector,	Sectoral Ministry	Universities	US\$	Partial

⁷ Please find further information in Item 5.2 below

Gap/Barrier	Classification	Action	Focal stakeholders	Other stakeholders involved	Range estimate of cost	Comments
clarity on potential costs of MRV to both the public and private sectors	transfer and Financial barriers	namely by determining needs/costs related to: • measurement technology (sensors, gauges, data transmission networks, softwares...) • reporting tools, such as data bases and softwares • increasing technical knowledge on MRV • verification (costs associated with implementing verification procedures). <i>Share EU experiences on costs related to GHG MRV in both public and private sector via a workshop, taking also into account experiences under the EU-ETS.</i> <i>Develop case studies for Thailand with public and private entities.</i>	and National Agencies and private sector	and research centers	100,000 to 200,000	support is provided by GTZ, ADB and USAID. ⁴

The following table matches needs, gaps, and barriers for the preparation of National Policies and Measures with concrete actions to overcome those. The information contained in this table is a result of the stakeholder consultation process.

Table 4.2: National Policies and Measures: Design, Implementation and MRV⁸

Gap/Barrier	Classification	Action	Focal stakeholders	Other stakeholders involved	Overall estimate of cost	Comments
1. The current institutional framework does not fully provide for an inclusive and coordinated interministerial decision making process.	Institutional and coordination procedures	Enhancement of the institutional framework for the decision making, in order to facilitate the dialogue among the different sectoral ministries on climate change, focusing on challenges and opportunities relating to National Policies and Measures and MRV. Enhancement of the climate change related knowledge in the different ministries. <i>Workshops and training with climate change officers at the different ministries</i>	Climate change agency, all sectoral Ministries and National Agencies	Universities and research centers	US\$ 250,000 to 500,000	Involve All related stakeholders in the Thai public and civil society
2. Need to enhance the current institutional framework for the effective participation of civil society in the decision making process, in addition and beyond current legal consultation mechanisms.	Institutional	To build a Public/Private dialogue on mitigation frameworks, including the design of National Policies and Measures and the system for MRV, at the level of key economic sectors. Building consensus of key information needs for the decision making process. <i>Symposiums among Public and Private key actors. Support to the establishment of an on-line clearing house of information on climate change.</i>			Cannot be estimated at this point	Involve All related stakeholders in the Thai public and civil society
3. Enhance the use of macro-economic models to provide a common understanding for the development of emission scenarios and emission reduction measures	Knowledge transfer	Capacity building in developing and using macro-economic modelling tools (such as Markal and Century), including in using the outputs, for the support of the decision making process on National Climate Change Plans. <i>Train researchers on development of models Train government officials to use models and the respective outputs.</i>	Climate change agency, all sectoral Ministries and National Agencies	Universities and research centers	US\$ 50,000 to 100,000	
4. Need to establish a baseline for the transport sector to	Knowledge transfer	Exchange of experience on best practices on the establishment of baseline for transport sectors.	Sectoral and Ministry National Agencies	Universities and research centers	US\$ 50,000 to 100,000	Partial support is provided by AFD and ADB, ⁹

⁸ In the annexes to this report, two working versions of this table can be found.

Gap/Barrier	Classification	Action	Focal stakeholders	Other stakeholders involved	Overall estimate of cost	Comments
support the development of GHG mitigation scenarios and measures		Exchange of experiences on measures that reduce GHG emissions in the transport sector <i>Workshops, Hands-on Training; Coaching.</i>				
5. Need to understand the perceived lack of effectiveness of energy efficiency and savings measures currently in place.	Knowledge transfer	Support the identification of barriers to the implementation of the energy saving measures currently in place and actions to overcome them. Sharing experience on impacts on competitiveness from energy efficiency and mandatory energy efficiency standards. <i>Capacity building and study Knowledge sharing via energy sector coaching sessions and/or workshops.</i>	Sectoral and Agencies	Ministry National Universities and research centers	US\$ 50,000 to 100,000	Partial support is provided by World Bank, AFD and UNIDO ¹⁰
6. Need to develop capacity on verification in Thailand	Knowledge transfer	Develop national capacity for implementing verification systems and procedures for defining criteria for certifying verifiers. <i>To organize interchanges between Thai organizations interested in the matter and similar European entities, both from the public "regulator" and the private "verifier" sides. To exchange experiences and provide training in designing and implementing verification systems and procedures. To exchange experiences and provide training in establishing a system for certification of authorized verifiers.</i>			US\$ 50,000 to 100,000	Partial support is provided by USAID and JICA ⁷
7. Need to enhance the knowledge of energy consumption	Knowledge transfer	Establishing a baseline for energy consumption in the households and identifying the emission reduction potential of energy saving measures	Sectoral and Agencies	Ministry National Universities and research centers	US\$ 100,000 to 150,000	Partial support is provided by AFD ⁷

⁹ Please find further information in Item 5.2 below

¹⁰ Please find further information in Item 5.2 below

Gap/Barrier	Classification	Action	Focal stakeholders	Other stakeholders involved	Overall estimate of cost	Comments
patterns in households to evaluate clusters that allow the preparation of most effective policies and measures		<i>Workshop on EU experiences in reducing GHG emissions in the residential sector.</i> <i>Support a study on determining energy consumption baseline in households.</i> <i>Support a study on emission reduction potential and costs of energy saving measures in the residential sector.</i> <i>Support to the design of a Household Energy Efficiency Policy.</i>				
8. The current information available knowledge and tools to manage it do not allow for a thorough understanding of constraints and opportunities in relation to the use of agriculture waste as a source of energy.	Knowledge transfer	Capacity building addressing the intensive use of agricultural waste for energy production: establishing a time series and data collection system, determine methodologies for estimating emission reductions. Improving the GHG inventory and setting the base for baseline determination towards planning and designing national policies and measures. <i>Workshops</i> <i>Hands-on training.</i> <i>Evaluate potential options and their advantages including agriculture waste palletizing facilities and others</i>	Energy and Agriculture Ministries and related National Agencies	Universities and research centers,	US\$ 150,000 to 250,000	Partial support is provided by World Bank, GTZ, ADB, UNDP and UNIDO ¹¹
9. GHG and Climate Change is a new issue in Thailand and those related laws and regulations are on pollution matters and energy saving.	Legal instrument to enhance MRV.	Identify laws and regulations needed to support MRV implementation, and sharing EU Experiences and Knowledge.	TGO	All sectoral Ministries and universities, ONEP	US\$ 200,000 to 300,000	

¹¹ Please find further information in Item 5.2 below

5. Current and planned actions in Thailand

5.1 Thai initiatives, barriers and existing actions

Some of the barriers identified during the project, have been previously identified or have, in the meantime been subject to action by the Thai government. The following table tries to capture current Thai initiatives. In most circumstances, the actions presented below are only plans, sometimes already officially adopted which need support for implementation.

Table 5.1: Barrier and existing action.

Barriers	Existing GoT response strategy
Institutional barriers (including procedural barriers and knowledge)	
Lack of access to relevant activity data as a result of lacking, insufficient or inconsistent measurement (including inconsistencies within time series)	Voluntary reporting activities by the Department of Industrial Works to increase access to and quality of industrial emissions data.
Lack of mandatory requirements for measurement and reporting of activity data and data that is required to determine facility/process-specific emission factors	
Lack of central, stable administrative agency to coordinate and manage the compilation, continuous improvement and updating of the national GHG inventory including the required electronic GHG inventory database system	TGO has established GHG information center to monitor GHG emissions (per decree). A number of informal working groups exist and a basic network (for capacity building) has been established.
Lack of administrative processes and responsibility to collect, process and archive data on a continuous basis	
Lack of cooperation between government departments, industry associations, industry, academia and NGO to improve the availability and reliability of activity data and emission factors	
Technical barriers	
Lack of the technical systems and integration of technical systems to ensure continuous collection, processing, sharing and archiving of activity data and emission factors (overall)	TGO has launched an internal effort to program a GHG inventory database.
Lack of integration to technical systems that correlate policy actions, economic development to GHG emission mitigation scenarios	NESDB is in the process of developing this capacity.
Lack of measurement equipment, technical processes, testing procedures to determine activity data as well as specific emission factors (i.e. access to and processing of satellite data to observe land-use, measuring industrial emissions,...)	Department of Land Development is using GIS data for tracking of agricultural land-use purposes. TGO is looking to interface and add the land-use from emissions perspective (plus other).

5.2 Donor activities related to climate change mitigation in Thailand

Thailand has received support from various international donors for programmes related to climate change mitigation. A description of the main activities is provided below.

GTZ

GTZ is a not-for-profit organization providing services for sustainable development. GTZ's programmes are funded by the German Federal Government as well as multinational organizations and foreign partner governments. Programmes relating to climate change in Thailand are:

- Energy and Eco-efficiency in Agro-Industry – this programme is funded in collaboration with the Department of Alternative Energy Development and Efficiency (DEDE) and aims to promote biomass utilisation via implementation of cost-effective production process technologies in palm oil mills;
- Solar Heat in Agro Industrial Process – this programme is funded in collaboration with the Department of Alternative Energy Development and Efficiency (DEDE) and aims to promote solar heat in agro businesses by supporting business model development and facilitating joint investment;
- Methane to Power from Agricultural Waste Biogas – this programme is funded in collaboration with Chiang Mai University and aims to promote biogas utilization, especially from pig farms;
- Programme on Bio-Plastics production; and
- Programme with MoNRE on Climate Change policy.

AFD – French Development Agency

AFD was the first bilateral agency to sign an Establishment Agreement with Thai authorities during a visit by the French President in February 2006.

The main activities currently being implemented include:

- arrangement of a line of credit (€40M loan) to the Government Housing Bank to finance energy efficient residential buildings;
- technical assistance to support the Thai government in its efforts to integrate energy issues into its strategic decisions on public transport in Bangkok;
- the elaboration of studies to implement the Thai (Thanaleng) – Lao PDR (Vientiane) rail link and to develop village rubber growing in Cambodia; and

AFD is developing a technical assessment about the different Climate Change topics and Low Emissions Technologies in support of work of Thai Universities.. The final report will be available in 2010.

World Bank

The World Bank's Programmes related to climate change mitigation are:

- Thailand Small Scale Livestock Waste Management Programme – this programme is designed to promote methane emission reduction from livestock waste management. This will serve as a demonstration for future CDM projects. The Energy Research and Development Institute is implementing this programme;
- Thailand Saphthip Biogas Project – methane recovery from waste water treatment;
- Bioenergy Sugar Ethanol Wastewater Management Project – the programme aims to reduce methane emissions through waste water treatment system of an ethanol plant;
- Livestock Waste Management Programme – the programme is designed to promote methane emission reduction from livestock waste management;
- Building Chiller Replacement Project – the programme aims to reduce GHG emissions by reducing consumption of ozone depleting substances (ODS) and improving energy efficiency in building chiller industry; and
- World Bank's Forest Carbon Partnership Facility (FCPF), includes a Review of the Forest Law Framework, Forest Conservation Programme and REDD strategy. Readiness Plan Idea Note (R-PIN).

In Copenhagen Climate Change Summit, in December 2009, Thailand was one of three other countries in Asia poised to integrate new efforts for low-carbon growth in their national development plans after

countries governing the Climate Investment Funds (CIF) endorsed a first-ever infusion of new funding from the CIF Clean Technology Fund (CTF) for Asia on December 1, 2009 .

The Clean Technology US \$5-billion fund was created to support low carbon growth, build up capacity for accessing carbon revenues and promote scale-up investment. The fund aims to help Thailand achieve climate change related policy targets (especially the Alternative Energy Development Plan and Bangkok's Climate Change Action Plan) and move towards a low carbon economy. The fund is allocated to e.g. EGAT (for renewable energy projects), PEA (biomass and renewable energy projects), and urban transformation projects (to reduce carbon emissions of vehicles and improve air quality in Bangkok).

Then, the Thailand Investment Plan will use \$300 million from the Clean Technology Fund (CTF) for Asia, to support the government's ambitious target of a 20% share of alternative energy by 2022 and the Bangkok Metropolitan Authority's goal of reducing greenhouse gas emissions by 2012 by 15%.

The Investment Plan prioritizes activities that will catalyze private sector investments in renewable energy and energy efficiency through the government's Specialized Financial Institutions and private commercial banks as financial intermediaries, and investments in renewable energy and energy efficiency by state-owned electric utilities as part of a clean energy advancement program.

The Investment Plan will also support urban transformation through CTF co-financing for bus rapid transit and a first-of-its-kind urban GHG reduction action plan to build energy efficiency projects in Bangkok. The CTF investments will mobilize financing from the government, multilateral development banks, carbon finance, and the private sector.

USAID

USAID programmes in Thailand focus on peace, governing justly and democratically, health and environment as well as economic growth. Currently there is only one programme running related to climate change, the ECO-Asia Clean Development and Climate Program (CDCP), focused on the transition to clean energy and energy efficiency.

Asian Development Bank (ADB)

ADB is an international financial institution which helps developing countries reduce poverty and improve their people's quality of life. Programmes relating to climate change are:

- Bangchak Solar Power project – technical assistance;
- Biomass Power Project – loan to the private sector for a project located in Prachinburi province;
- Solar power project – loan to the private sector for a solar generation plant located in central Thailand;
- Lamthakong Wind Farm Development project; and
- Sustainable Urban Transport in Chiang Mai (with GEF).

Global Environment Facility (GEF)

Currently there is only one GEF programme running related to climate change, the Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labeling Project (BRESL). GEF supports the TGO in implementing this project

Other projects in Thailand are in partnership with other international organisations e.g. UNDP, UNIDO.

United Nations Development Programme (UNDP)

UNDP's programmes relating to climate change in Thailand are:

- Removal of Barriers to biomass power plant generation and co-generation (in partnership with the Japan Overseas Cooperation Fund);
- National Capacity Self-Assessment (NCSA);
- Promoting Renewable Energy in Mae Hong Son Province;
- SFM: Integrated Community-based Forest and Catchment Management through an Ecosystem Service Approach (CBFCM);
- Strengthening the Capacity of Vulnerable Coastal Communities to Address the Risk of Climate Change and Extreme Weather Events; and

United Nations Industrial Development Organisation (UNIDO)

UNIDO's programmes relating to climate change in Thailand are,

- CF: Industrial Energy Efficiency; and
- Overcoming Policy, Market and Technological Barriers to Support Technological Innovation and South-South Technology Transfer: The Pilot Case of Ethanol Production from Cassava.

Japan International Cooperation Agency (JICA)

JICA is a Japanese organisation which provides technical assistance to promote economic and social development in developing countries.

Currently there is only one programme running related to climate change, Capacity Development and Institutional Strengthening for GHG Mitigation in the Kingdom of Thailand – capacity building for TGO in GHG emissions, knowledge transfer, and information management on GHG emission.

Appendices

Appendix A. Background Report	23
Appendix B. List of interviewed stakeholders	35
Appendix C. Summary report from the interview minutes	37
Appendix D. Report and list of participants of the Thailand workshop organized by the European Commission on 1st September, 2010	44
Appendix E. Summary and list of participants of the Thai workshop organized by TGO in Thai language on September 23rd 2010	62

Appendix A. Background Report

A.1. Introduction to the country

Thailand is located in the south-eastern region of the Asian mainland. The total land area of the country is approximately 513 thousand square kilometres. Located in the monsoon region, the climate is dominated by three distinct seasons: hot, wet, and cool.

The country is divided into five regions: North, Northeast, Central, East and South. The North is generally mountainous, with altitudes rising over 2,000 meters above mean sea level. A large part of the Northeast is on a high plateau and dry. The land in the central region is flat and relatively fertile. The East is dominated by fertile land suitable for tree crops and a long coastal line. The Southern Peninsula constitutes most of the 2,500 km coastline of the country. The topographical nature, soil characteristics and climate conditions influence agricultural specialization and socio-economic development in each region.

Thailand's population was estimated at 62 million in 1999.

Slightly more than 40 % of the land in Thailand is used for agriculture; another 25 % is forest. The remaining one-third is used for other non-agriculture purposes and includes a small portion of idle land. Of the agricultural land, slightly more than one-half is paddy land. Another one-fourth of agricultural land is used for field crops, and more than 14 % is planted to fruit trees. Coastal aquaculture is an important fishery activity in Thailand, with shrimp farming dominating. The expansion of agricultural land and coastal aquaculture has reduced the areas of terrestrial and mangrove forests rapidly.

A.1.1. Summary of National Inventory and Key Greenhouse Gas Emitting Sectors

The latest national communication and GHG inventory dates from 1994. It represents the second official inventory of GHGs in Thailand. The first official inventory was undertaken for 1990 and was prepared in 1997. Prior to the 1990 inventory, however, the Thai government commissioned a study to assist in its preparation for the UN Conference on Environment and Development (UNCED) in June 1992.

The GHG inventory was compiled jointly by the Thailand Development Research Institute (TDRI) and the Thailand Environment Institute (TEI). Besides presenting a 1989 inventory of GHGs, the joint TDRI/TEI study identified various options to reduce greenhouse gas emissions.

Thailand's 1994 inventory of greenhouse gases is the result of recent studies conducted by various researchers throughout the country. In estimating the 1994 GHG inventory, the researchers used the 1996 IPCC Revised Guidelines for National Greenhouse Gas Inventories.

To a limited extent, the researchers used local emission factors to substitute for those recommended by the IPCC, thus making the latest estimates more accurate and relevant to the country. Still, many gaps in knowledge exist. These suggest that continued research be undertaken to generate scientific and technical information that is suitable to local conditions and circumstances. Basic research, field observations and testing are needed to improve the quality of the data, to reduce uncertainties, and to enhance understanding of the relationship of these emissions with productive activities in order to help determine the needs and limitations of reducing them. The Table below shows Thailand's national inventory of GHGs for 1994. Gross emissions of carbon dioxide (CO₂), the main greenhouse gas, amounted to about 241 Mt CO₂ in 1994. Due to carbon sequestration from reforestation activities and the re-growth of natural vegetation on abandoned lands, however, net CO₂ emissions were estimated at 202 Mt CO₂. Unlike previous GHG

inventories, the amount of CO₂ emissions from forestry and land use changes has declined compared with emissions from energy activities.

Energy combustion and fugitive emissions have become the largest source of CO₂ emissions, accounting for about 52 % of gross emissions of CO₂ in 1994. Several factors have contributed to the slowdown in emissions from forestry and land use changes. These include the imposition of the logging ban since 1989 and increased reforestation and commercial plantation activities. At the same time, reforestation and plantation activities have raised the amount of carbon removed from the atmosphere.

CH₄ emissions from agriculture are the second largest source of emissions by sector. They were estimated at 3.2 Mt CH₄ (or 69.8 Mt CO₂eq) in 1994. Most of these emissions were from agriculture in which rice constituted about 73 %, and by livestock constituted about 27 %. The bulk of CH₄ emissions came from activities that are closely linked to the livelihood of many Thais. Any measures undertaken, therefore, could have serious implications for the local socio economic and cultural environment.

Industry contributed 16 Mt of CO₂ emissions.

Table A.1: 1994 GHG Inventory for Thailand

Greenhouse Gas Source and Sink Categories	CO ₂ Emissions	CO ₂ Removals	CH ₄	N ₂ O	NO _x	CO	NM VOC
Total Emissions & Removals	241,030.55	-39,101.60	3,171.35	55.86	286.65	555.11	2,513.30
1. Energy	125,482.80	0.00	196.55	0.83	271.85	33.90	0.72
A. Fuel Combustion	125,482.80	0.00	2.85	0.83	271.85	33.90	0.72
Energy & Transformation Ind.	45,529.30		2.07	0.10	155.30	14.70	0.00
Industry, Mining & Construction	30,824.20		0.61	0.58	113.90	17.10	0.00
Transport	39,920.40		0.09	0.00	0.26	1.30	0.70
Commercial	890.50		0.02	0.08	0.87	0.20	0.00
Residential	3,469.40		0.06	0.06	1.37	0.50	0.00
Agriculture	4,849.00		0.00	0.01	0.15	0.10	0.02
B. Fugitive Emissions			193.7				
Solid Fuels			16.02				
Oil and Natural Gas			177.68				
2. Industrial Processes	15,970.40		0.31				2,512.58
3. Agriculture			2879.10	54.62			
A. Enteric Fermentation			629.53				
B. Manure Management			139.64	19.19			
C. Rice Cultivation			2,110.53				
D. Agricultural Soils				35.43			
E. Prescribed Burning of Savannas							
F. Field Burning of Agric. Residues							
G. Others							
4. Land Use Change & Forestry	99,577.35	-39,101.60	59.57	0.41	14.80	521.21	
A. Changes in Forest & Other							
Woody Biomass Stocks	40,180.51	-39,101.60					
B. Forest & Grassland Conversion	59,396.84		59.57	0.41	14.8	521.21	
C. Abandonment of Managed Land							
D. Others							
5. Wastes			35.22				
A. Solid Waste Disposal			19.57				
B. Wastewater Treatment			15.65				

Source: Center for Applied Economic Research, 2000a

A.1.2. The Policy Making Process

For more than 30 years, the Royal Thai Government has been implementing 5-year National Economic and Social Development Plans to guide the social and economic development of the country. Increasing deterioration of natural resources and environment during the 1960s prompted the government to seriously act on natural resource and environmental conservation.

Climate change policy making is embedded into the overarching National Economic and Social Development Planning process. Thailand is currently operating under the 10th National Economic and Social Development Plan.

Immediately following ratification of the UNFCCC, the Royal Thai Government set up a national Climate Change Committee (NCCC) and a Climate Change Expert Committee (CCEC) to prepare the country's response to climate change. The NCCC is chaired by the Permanent Secretary of the Ministry of Natural Resources and Environment (MNRE). The CCEC is headed by the Secretary General of the Office of Environmental Policy and Planning (ONEP), which is the agency that serves as Thailand's focal point for the Climate Change Convention and serves also as the Secretariat to the National Environment Board chaired by the Prime Minister.

In 2007, the MNRE established the Thailand Greenhouse Gas Organization as an autonomous governmental organization and implementing agency for GHG emission reductions in Thailand, promoting: low carbon activities; investment and marketing on GHG emission reductions; establishing GHG information centre; reviewing CDM projects for approval; providing capacity development and outreach for CDM stakeholders and promote low carbon activities, and particularly performing its role as the Designated National Authority for CDM (DNA-CDM) office in Thailand.

A.1.3. Sectoral Assessment – Status Quo

This chapter introduces the two largest sectors of GHG emissions: energy activities and agriculture.

A.1.3.1. Energy Activities - General; Fuel Combustion

Due to increasing use of commercial fuels and a decline in the rate of deforestation, the energy sector has become the largest source of CO₂ emissions in Thailand, accounting for more than half of total national CO₂ emissions in recent years. It is also the largest source of CO, NO_x and NMVOC, as well as the principal source of fugitive CH₄ emissions.

Previous GHG inventories considered only emissions from energy combustion activities. But starting with the 1990 GHG inventory, emissions from energy resource extraction, processing, transportation, storage and distribution were included.

Estimates of GHG emissions from this sector are probably the most accurate because the energy sector is studied extensively and is well integrated into the modern economy. The commercial nature of transactions in this sector also makes various abatement options easier to assess and quantify, thus making decisions and actions relatively easier to implement.

While CO₂ emissions depend mainly on the carbon content of fuels, rather than on technological processes or emission controls, the non-CO₂ emissions require a detailed monitoring of the technologies used and their associated process emissions.

From 1970's to 1990's, Thailand has succeeded in diversifying its sources of energy and reducing dependence on imported fuels. By mid 1990, domestic energy sources provided more than one-third of the country's energy needs. Tangible success has been achieved particularly in the energy industries sector, where more than two-thirds of energy requirements for power generation are supplied locally. Due to Thailand's ongoing rapid development since then, the share of imports has increased.

By type of fuel, therefore, the largest source of CO₂ emissions in the energy supply sector is natural gas. But this hides the fact that emissions would be even larger were it not for the shift to this cleaner fuel.

A substantial amount of biomass (e.g., charcoal, wood, paddy husk and bagasse) is still consumed as fuel for households, commercial establishments and industry.

Some 15 million tonnes of bagasse, 10 million tonnes of fuel wood, and 6 million tonnes of charcoal were estimated to have been used in 1994.

A.1.3.1.1. Energy Activities - Fuel Combustion

Total CO₂ emissions from the combustion of fuels amounted to 125.5 Mt CO₂ in 1994. As the largest consumer of fuel, the energy supply sector (mainly power plants) emitted the largest share of CO₂ (36 %), followed by the transport sector (32 %) and the industry and construction sector (25 %). When combined, these three sectors emitted more than 90 % of CO₂ emissions.

A.1.3.1.2. Energy Activities - Fugitive Emissions

Thailand's move to become more self-reliant in energy has spurred domestic hydro-carbon exploration and development activities. Consequently, there has been an increase in GHGs emitted from coal mining and oil and natural gas drilling as well as from various transmission, storage and distribution systems. CO₂ and gases that have low molecular weight such as CH₄ and volatile organic carbon (VOC) are released during mining, mineral extraction and other post-mining activities, but only CH₄ emissions are estimated in the national GHG inventory. Nonetheless, the estimates suffer from the lack of reliable emission factors that take into consideration the stratum and depth of deposits and the quality and characteristics of the fuels.

Methane emissions from coal mining as well as oil and gas production activities were estimated at around 0.194 Mt in 1994 using IPCC default values. The bulk of fugitive CH₄ emissions (91 %) came from natural gas production activities, which included extraction, processing, transport, distribution, venting and flaring. The production of 17 million tons of coal from surface mining leaked some 16 Gg of CH₄ into the atmosphere, while oil production, refining and storage activities produced 0.9 Gg of fugitive CH₄ emissions. The original calculation files that were used to prepare these estimates are not available any more.

A.1.3.1.3. Agriculture - General

The agriculture sector plays an important role in the economy and society of Thailand. It is still widely regarded as the backbone of the economy. Despite the gradual reduction in its contribution to the country's total economic output, the agriculture sector continues to provide the basis for an agro-based

manufacturing sector. It also remains an important source of labour, especially during the off season, and is the main source of livelihood for about 60 % of the population.

A number of agricultural practices and activities, including traditional cultivation methods, are known to produce adverse environmental consequences. However, recent concerns about greenhouse gases have focused more attention on activities where changes in management or agricultural practices can help alleviate problems related not only to GHGs but also to the environment in rural areas.

A.1.3.1.4. Agriculture – Rice Cultivation

Despite being one of the major rice producing countries in the world, Thailand's contribution to global CH₄ emissions is relatively small. Methane emissions from paddy fields were estimated at 2.1 Mt CH₄ (or 46.2 Mt CO₂eq) in 1994. About 86 % of these were emitted from the cultivation of major rice, while the remainder came from the second crop of rice. The reason is that only irrigated land is used to produce a second rice crop, and only about one-third of all irrigated land was planted to second rice in 1994.

Statistics for 1994 show that only about one-quarter of Thailand's total rice area is irrigated. The majority of paddy fields were still rain-fed. Nonetheless, irrigated areas were estimated to produce about 39 % of the methane emitted from the major rice crop, and about 33 % of total methane emissions from total rice cultivation. Of the four types of water regimes, only upland farming did not produce methane due to the absence of flooding during cropping periods.

Experimental data indicate that continuous flooding of paddy fields induces higher methane emissions. Despite the use of local values for emission factors, cropping periods and harvesting area, the uncertainty of these estimates is still high. This is due mainly to the extreme spatial and temporal variability of methane fluxes throughout the cropping season as result of soil characteristics, water and crop management practices, organic matter amendments and fertilizer application.

Actual measurements of methane emissions conducted in four provinces in different regions of Thailand indicate a wide divergence in results. For example, methane emissions from paddy fields without fertilizer application vary from 7.49 Gg/sq m to 35.23 Gg/sq m. Field measurements also showed that the addition of organic matter to rice paddies with chemical fertilizer further increased methane emissions by as much as 135 % compared to those without organic fertilization. The original files for the calculation of related GHG emissions are not available anymore, which makes it impossible to check actual emission factors and level of disaggregation.

A.1.3.1.5. Agriculture - Livestock

Animal husbandry provides protein essential in the diet of Thai people and to the national economy. The growing demand for meat and dairy products, together with an increase in livestock feed production and improved reproduction techniques, have increased significantly the number of livestock in Thailand.

Consequently, emissions of GHGs from animal husbandry also have increased. The two main sources of GHGs from livestock husbandry are enteric fermentation and manure management.

Methane emissions from enteric fermentation in livestock were estimated at 0.630 Mt CH₄ (13.9 Mt CO₂eq) in 1994. The largest source of enteric methane among ruminants was non-dairy cattle, followed by buffalo, dairy cattle, goat and sheep. Swine, which had a larger population than non-dairy cattle, emitted only about

0.013 Mt of enteric CH₄ (0.29 Mt CO₂eq). The measurement of enteric methane emitted could have been conducted directly through use of a facemask or respiratory chamber. But in the absence of special facilities and instrumentation, the amount of methane gas produced was indirectly calculated by using emission factors that estimate the amount of energy intake that is converted into methane.

Faecal CH₄ emissions amounted to around 0.140 Mt CH₄ (3.1 Mt CO₂eq) in 1994, while N₂O emissions from various manure management systems was estimated at 0.019 Mt of N₂O (5.9 Mt CO₂eq). The largest source of faecal CH₄ was swine, which accounted for 78 % of total CH₄ emitted from manure management.

A.1.4. Sectoral Assessment – Future Projections (BAU)

A.1.4.1. Overall GHG Emission Projections

Despite a reduction of net emissions from the forestry sector, total CO₂ emissions from both the energy and forestry sectors are predicted to increase from about 185 Mt CO₂ in 1994, to about 220 Mt CO₂ in 2000 and approx. 500 Mt CO₂ by the year 2020. This represents an annual average increase from the energy and forestry sectors of about 5%.

Emissions of CH₄ from agriculture and livestock are projected to stabilize at between 2.6 -2.9 Mt CH₄ (57-64 Mt CO₂eq) per year. This is due mainly to the trade-off of emissions between buffaloes and other types of livestock. As a result, methane emissions from agriculture and livestock increase at an average rate of less than 0.1 % per year.

A.1.4.2. Projected CO₂ Emissions from the Energy Sector (BAU)

Forecasts of CO₂ emissions from the energy sector are closely linked to the economic growth of the country. GDP is projected to increase by an average of about 5 % annually within the forecast period (to 2020). The forecasts of final energy demand, by sector, have been derived based on the recent projection of GDP and structure of energy use.

Of the total projected final energy demand, the transport sector is expected to consume the largest proportion, estimated to be about one-third of demand, followed by the industrial, residential and commercial sectors. Agriculture energy use will remain the smallest user of final energy.

Energy consumption in the transport sector is projected to increase from 18,763 ktoe in 1995 to 33,543 ktoe by 2020. Road transport will continue to be the major mode of transport and diesel will be the main fuel used. LPG, a cleaner fuel, is expected to contribute only a small share due to its limited potential uses and impact on engine performance.

Electricity as an energy source for light-rail transit system has just started. There are three main categories of energy used in the industrial sector: thermal, mechanical and other electric use. The industrial sector will continue to be the second largest energy-consuming sector. Final energy demand in this sector is projected to rise from 15,741 ktoe in 1995 to 29,998 ktoe in 2020, equivalent to an average growth rate of 2.6 % per year.

The main fuel used for cooking in the residential sector at present is biomass. Biomass use is especially widespread in rural areas. However, consistent with the development paths observed in other countries,

the forecast shows a declining trend of biomass use in recent years due to increased substitution with LPG and electricity. Fuel consumption in the residential sector is expected to reach 16,546 ktoe by 2020.

In the commercial sector, energy consumption is estimated based on 6 building types and 5 end-uses. The building types include office, retail, education, hotel, hospital, and others. Small commercial buildings of all types fall into the category of “other”. The end-uses are lighting, cooling, water heating, cooking, and miscellaneous. Cooling includes the energy used in air conditioning systems. Total energy consumption is projected to reach 10,523 ktoe by 2020, of which more than 80 % will be in the form of electricity.

By 2020, the agriculture sector is expected to use about 1,600 ktoe of energy.

As a consequence, emissions of CO₂ from the energy sector are expected to increase from about 151 Mt CO₂ in 1995, to 475 Mt CO₂ in 2020. The power sector could contribute substantially to total emissions and comprise more than one-half of total CO₂ emissions from the energy sector in the year 2020.

Transport is expected to be the second largest contributor with 26%, followed by the industrial, residential, commercial, and agriculture sectors, respectively.

Emissions of CO₂ from the burning of biomass are discounted from the total amount of CO₂ emissions from the energy sector, following IPCC guidelines for national GHG inventories. In addition, the CO₂ emissions presented here exclude those from fossil fuel extraction, production, transportation and distribution, which are often referred to as fugitive losses.

A.1.4.3. Projected CH₄ Emissions from the Agriculture Sector – Rice (BAU)

The area used for cultivating main-season rice will stabilize at around 8.8 million hectares. The off-season rice crop also will be reduced from 0.608 to 0.462 million hectares during the period from 1994 to 2001 and will be maintained at about the same level until 2020. To compensate for the reduction in cultivation area and to maintain the level of production, rice productivity (grain yield per area) must increase to meet domestic and export demand.

Based on the assumptions regarding rice cultivation areas above, an increase in rice production could be achieved through various soil and fertilizer management practices. Further assuming that the irrigation area for rice cultivation increases steadily at the rate of 1 % annually, and that the use of both chemical and organic fertilizers increases to maximize the grain yield of rice, the cultivation area with fertilizer application would expand at the rate of 20 % per year.

Although the rice cultivation area remains constant, CH₄ emissions are predicted to increase during the period due to an expansion in irrigated area and increased fertilizer application. Total CH₄ emissions are estimated to increase by about 1.3 % from 1994 to 2020. The estimated emission rate will change according to the assumptions made.

A.1.4.4. Projected CH₄ Emissions from the Agriculture Sector – Livestock (BAU)

Forecasts of CH₄ emissions from the livestock subsector are based on the emission rate of each type of animal derived from the 1994 inventory. The projected number of livestock between 1998-2009 is based on historic average growth rates over the past 6 to 9 years. For the period 2010-2020, it is assumed that growth rates would be reduced by one-half.

Using these growth rates, the numbers of livestock and the emissions are projected to decline gradually from 0.748 Mt CH₄ in 1994, to about 0.606 Mt CH₄ in 2005. This is due primarily to a rapid decline of emissions from buffalo, but with a simultaneous increase in that of cattle. With an increasing trend of faecal emissions, especially from swine, total CH₄ emissions are expected to rise again from 2005 to 2020.

About 0.691 Gg of CH₄ are expected to be emitted in the year 2020. By contrast, N₂O emissions are expected to drop from 0.019 Mt N₂O in 1994 to 0.017 Mt N₂O in 2000. The trend is likely to pick up again until 2020, when the total N₂O emissions are estimated to reach about 0.022 Mt N₂O in the last year of the projection.

A.2. Current Climate Change Policies

A.2.1. Current Policy

The climate policy of the Government of Thailand rests on six pillars:

1. building capacity to adapt and reduce vulnerabilities to climate change impacts,
2. promoting GHG mitigation activities based on sustainable development,
3. supporting research and development to better understand climate change, its impacts and adaptation and mitigation options,
4. raising awareness and promote public participation,
5. building capacity of relevant personnel and institutions and establish a framework of coordination and integration, and
6. support international cooperation to achieve the common goal of climate change mitigation and sustainable development.

Within the area of climate change mitigation, the climate policy seeks to address all major emitting sectors (energy, industry, agriculture, waste) as well as clean technology development.

Key aspects of climate policy objectives are also reflected in the Government of Thailand's energy policy. This energy policy consists of five pillars/key strategies, all of which are directly climate-policy relevant:

Table A.2: Thailand's 2008 Climate Change Mitigation Dimensions of Energy Policy

Energy Policy Strategy	Climate Policy Dimension of Energy Policy
Improve energy security	Encourage domestic renewable energy resources development and studying appropriateness of other alternative energy technologies
Promote alternative energy	Develop bio-fuels, natural gas for transportation, all forms of renewable energy (wind, solar, hydropower, biomass, biogas and energy from waste), carry out renewable energy related R&D, determine appropriate incentive measures, establish renewable energy networks on the local level
Supervise energy pricing and safety	Ensure price stability of feedstocks, promote service quality, technology standards, positive investment climate
Energy Conservation and Efficiency	Encourage energy conservation and efficiency in the household, industrial, service and transportation sectors through a mix of awareness raising, voluntary and mandatory actions
Environmental Protection	Monitor environmental impacts, promote CDM

A.2.2. Current Policies and Measures

A.2.2.1. Policies and Measures – Energy

The Thai Energy Policy identifies a set of concrete targets to reduce energy-related GHG emissions:

- Bio-fuel development: to grow current production capacity of 1.2 mil liters/day bio-ethanol to 9 mil liters/day by 2020 and to grow current production capacity of bio-diesel from 1.6 to 4.5 mil liters/day.
- Renewable energy supply: to grow current (2008) renewable power production capacity of 1846 MWeI to 5600 MWeI by 2020
- Renewable thermal energy (process steam): to grow current renewable process steam production capacity from 3272 MWth to 7433 MWth by 2020
- Compressed natural gas for transport: to grow current use from 147 mil cu.f/day to 690 mil cu.f/day by 2020.

The policy identifies 7 mechanisms/actions to support the achievement of these targets:

1. Establishing and operating an energy database and data center that provides information on RE R&D, demonstration projects and the RE potential operated by the Department for Alternative Energy (DEDE) within the Min. of Energy.
2. Investment subsidies/grants for certain RE project categories (operated by DEDE and the Energy Policy and Planning Office (EPPO)).
3. Soft loans for certain RE project categories operated by DEDE.
4. ESCO Venture Capital Fund operated by DEDE (support provided by implementation partners).
5. Differentiated Feed-in-Tariff operated by EPPO and implemented through the Provincial Electric Authority.
6. Board of Investment Incentives (tax exemptions)
7. Clean Development Mechanism

In aggregate, these policies have an assessed technical potential to reduce emissions by 72 Mt CO₂ when fully funded and implemented (including with international support). This represents a 20% reduction of total projected GHG emissions.

A.2.2.2. Policies and Measures – Agriculture

Agricultural policies and measures related to manure management and field burning of agricultural residues have been addressed within the section on energy policy as the main incentive for the avoidance of GHG emission-intensive practices within these agricultural sub-categories are energy related (use of manure for energy production, use of agricultural residues for biomass power).

In relation to other agricultural sub-categories – especially rice cultivation – climate change mitigation is not yet a subject of agricultural policy; instead, policy is dominated by land development, soil improvement and farming technique related issues.

At the same time, a number of no-regrets GHG mitigation actions have been identified. Such actions are implemented through small pilot programs and awareness building but not in a systematic fashion. Such actions include:

- Proper land management and crop planting,
- Improved land tillage techniques to increase soil sequestration,
- Organic farming/organic fertilizer use, and

- Irrigation techniques.

The Department of Agricultural Promotion within the Ministry of Agriculture is responsible for the promotion and implementation of such actions. In practice, farmers as well as responsible government agencies are very focused on meeting short-term objectives: maximizing field yields to repay their debts using the techniques they are familiar with.

At the same time, action in these areas might be hampered by substantial measurement uncertainties regarding the actual GHG impacts of rice cultivation under different action scenarios.

A.3. GHG Inventories and implementation of mitigation

The objective of this chapter is to describe the quality of existing systems in relation to:

- measurement and report Thailand's national GHG emissions for internal planning purposes and its reporting under its National Communications, and
- measurement of the performance of existing policies and measures.

This analysis will inform Thailand's "readiness" to design and implement nationally appropriate mitigation actions under an MRV framework that is deemed sufficient under international and domestic MRV rules under a future international climate agreement.¹²

A.3.1. Preparation of Initial National GHG Inventory (2000)

Thailand submitted its initial GHG Inventory in 2000, following the 1996 IPCC Revised Guidelines. It was prepared by researchers on behalf of the Ministry for Environment, financed by a grant from the GEF using a mix of data with widely varying levels of uncertainty.

A brief assessment of the quality of the GHG estimates can be made:

- Overall, activity data collection is decentralized, partly incomplete for key categories and mainly incomplete for non-key categories. The main reason is that monitoring and reporting of certain activity data is not mandatory but voluntary.
- The majority of emission factors for key categories are default emission factors.
- The quality of documentation and explanations does not allow a 3rd party to replicate the calculation.

A.3.2. GHG Emissions from Energy Activities

The quality of activity data in the main sub-categories is good and based on statistics that have been reported to the Ministry of Energy for decades. Emission factors are usually based on IPCC default values.

A.3.2.1. GHG Emissions from Agriculture

The quality of activity data in the main sub-categories is good (land under rice cultivation using different irrigation techniques, animal husbandry inventories). However, emission factors for the main sub-categories (enteric fermentation, rice cultivation and manure management) are extremely uncertain as

¹² The terms "domestic MRV" and "international MRV" have been coined in the Copenhagen Accord in relation to domestically funded national mitigation actions and "internationally supported" national mitigation actions.

practices and circumstances vary widely. This uncertainty has been acknowledged but not quantified in Thailand's Initial Communication.

A.3.2.2. Others

Industrial Emissions have not been included in the Initial National Communication. The Department of Industrial Works is currently coordinating a voluntary effort to collect activity data and emission factors (not in time for the submission of the second national communication).

A.3.3. Preparation of Second National GHG Inventory (2010)

Thailand has recently commissioned the preparation of the Second National Communication (SNC). King Mongkut University has been tasked by the Ministry of Environment and Thailand GHG Organization to prepare the GHG inventory (data collection, preparation of estimates, update emission factors, compilation of the GHG inventory). A draft report has been submitted to ONEP and was recently approved by the Steering Committee for the National Communication.

The second national communication (SNC) builds upon the initial national GHG inventory: key researchers have been reappointed to ensure that the institutional knowledge that was built in 2000 is reutilized. The SNC is used to selectively improve the quality of data and conduct additional research to reduce the uncertainty of the GHG inventory in key categories.

A.3.4. Assess GHG Impacts of Current Policies & Measures

As introduced above, Thailand operates a number of policies and measures to stimulate the country's low carbon emission development. The objective of this chapter is to assess the quality of existing MRV systems that enable the Thai government to assess the performance of these existing policies and measures in relation to achieving the ultimate objective of these policies and measures: delivery of actual GHG emission reductions.

A.3.4.1. MRV to Assess Performance of Current Policies & Measures: Energy Activities

Under its existing energy policy, the Ministry of Energy has defined concrete targets in terms of:

- actual production of bio-fuel quantities,
- installed capacity of renewable energy facilities,
- an energy intensity target in industry and transport, and
- an energy cost saving target for households.

In case of a) and b) these targets are readily monitored, reported and verified as the production of bio-fuels is reported and verified for a number of purposes already (i.e. taxation) and the installation of RE power plants requires approval of operating licenses.

However, these MRV processes alone do not provide for the proper accounting of GHG impacts related to these interventions:

- in the case of bio-fuels, land-use change and production process (esp. waste-water treatment and treatment of other feed-stock related wastes) related GHG impacts are not captured, and

- in the case of RE facilities, the actual utilization of the plants (actual generation of clean energy (power or steam) is not captured. In addition, baseline emissions for the prior use of agricultural residues are not captured as well.

In the case of c) and d) the monitoring and reporting is more complex: a combination of sampling and extrapolation would be required. The current policy does not address this aspect.

A.3.4.2. Assess Performance of Current Policies & Measures: Agriculture

As indicated above, outside of the animal manure management and field burning categories, there are no implemented mitigation actions. One reason might be the complexity of proper monitoring of GHG impacts of such actions (i.e. there is no approved CDM method for reducing GHG emissions from rice cultivation).

A detailed description of MRV for policy actions in the fields of manure management and the use of agricultural residues that are not burnt in the field is in section 4 in the energy activities category.

Appendix B. List of interviewed stakeholders

European Delegation and European Development Agencies

Attendees

Mr. Samuel Cantell, EC First Secretary
Ms. Delphine Brissonneau, EC Attache, Climate Change
Ms. Sutthiya Cantawarangul, EC Programme Officer, Climate Change
Mr. Tadeuz Ignasiak, Poland Embassy, Head of Economic Section,
Mr. Gregory Thomassin, AFD, French Development Agency,
Mr. Siam Phoolcharoen, Danish Embassy, Local Project Coordinator
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

USAID

Attendee

Mr. Jack Kneeland, Deputy Chief of Party
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Energy for Environment Foundation (EFE)

Attendee

Ms. Suwaporn Sirikoon, CEO of EFE
Ms. Kannimar Srithunyalucksana, Energy Policy Analyst
Mr. Areerat Yoohoon, Scientist, Senior Professional Level
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Department of Industrial Works (DIW)

Attendee

Ms. Bongkoch Kittisompun, Director of Strategies and Environmental Agreements Section, DIW
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Energy Research Institute (ERI)

Attendee

Mr. Bundhi Eua-arporn, PhD. Professor, ERI Director
Mr. Weerin Wangjiranin, PhD. ERI Researcher
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

German Development Agency (GTZ)

Attendee

Mr. Torsten Fritsche, Director Resource-Efficiency and Energy, GTZ
Mr. Supalerk Kanasook, Project Manager Carbon Market (CDM), GTZ
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Department of Alternative Energy development and Efficiency (DEDE)

Attendee

Mr. Twarath Sutabutr, Sc D. Deputy Director General, DEDE
Ms. Arrerat Yoohoon, Scientist, Senior Professional Level, DEDE
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Thai Environmental Institute (TEI)

Non-profit foundation

Attendee

Ms. Qwanruedee Chotichanathawewong, Dr. TEI, Executive Director, Assistant President
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Thai Chamber of Commerce (TCC)

Attendee

Mr. Buntoon Wongseelashote, V. Chairman TCC, Chairman, JSCCIB working group on Climate Change
Ms. Teerin Vanichseni, PhD, Committee RE and Climate Change working group (JSCCIB)

Ms. Patsharee Congtrakultien, Senior Vice President Safety Health and Environment, Charoen Pokphand Group
Dr. Piyanuch Malakul Na Ayuthya, Vice Chairman, Committee on Trade Rules and International Trade, TCC
Ms. Kuhuman Ladpli, Senior Economist, Ministry of Finance
Ms. Abhisra Chaikittisilpa, The Federation of Thai Industries
Ms. Pornsiri Sakornvanasak, Trade Technical Officer, Department of Trade Negotiations, Ministry of Commerce
Mr. Narin Sampattanavorachai, Secretarial Officer, TCC
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

The Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi

GHG researcher's view

Attendee

Ms. Dr. Sirintornthep Towprayoon, Associate Professor, in charge of 2nd NI and NC (ONEP), in charge of cost effective abatement curves (TGO) for Thailand
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Thailand Greenhouse Gas Management Organisation (TGO), Executive Director Interview

Attendee

Mr. Sirithan Pairoj-Boriboon, TGO Executive Director
Mr. Chessada Sakulku, TGO, Data MRV Coordinator

Appendix C. Summary report from the interview minutes

The following document summarizes the stakeholders' interviews made in Bangkok from 14 June 2010 to 18 April 2010, where more than 12 stakeholders' organizations were interviewed with the attendance of more than 17 stakeholders from Government, Academic, Non-Profit and Industrial Sectors.

Stakeholder ¹³	Date	Summary from the interview
European Delegation and European Development Agencies Attendees Mr. Samuel Cantell, EC First Secretary Ms. Delphine Brissonneau, EC Attache, Climate Change Ms. Sutthiya Cantawarangul, EC Programme Officer, Climate Change Mr. Tadeuz Ignasiak, Poland Embassy, Head of Economic Section, Mr. Gregory Thomassin, AFD, French Development Agency, Mr. Siam Phoolcharoen, Danish Embassy, Local Project Coordinator Mr. Chessada Sakulku, TGO, Data MRV Coordinator	14/06/2010	The purpose of the meeting was to introduce the project to interested European Development Agencies active in the field of climate mitigation and to share information about ongoing, related activities. The French Development Agency is developing a technical assessment about the different Climate Change topics and Low Emissions Technologies that Thai Universities are working on. The final report will be available on 5th July.
USAID Attendee Mr. Jack Kneeland, Deputy Chief of Party Mr. Chessada Sakulku, TGO, Data MRV Coordinator	14/06/2010	USAID operates a regional hub in Thailand. There is only little activity in Thailand. USAID provides capacity building programs in GHG MRV with regional focus, including Thailand. For their own interventions, they use simple monitoring system for GHG accounting (e.g. financial transaction). According to USAID, Thailand is ahead in the region with continuous improvement in energy statistics. Key categories in Thailand, waste water treatment, biomass waste, bio-fuel (bio-ethanol). The country support is on energy efficiency (e.g. Revolving Fund, loan support) and VSPP. The support for the transportation sector is still unclear. Another good new topic would be EE in buildings and the sizing of facilities. Re: NAMA readiness, the Government lacks standards and intermediaries in the market for transactions, resulting in high transaction costs. However, some government supporting schemes has technical capacity to do MRV e.g. ESCO financing.
Energy for Environment Foundation (EFE) Attendee Ms. Suwaporn Sirikoon, CEO of EFE Ms. Kannimar Srithunyalucksana, Energy Policy Analyst Mr. Areerat Yoohoon, Scientist, Senior Professional Level Mr. Chessada Sakulku, TGO, Data MRV Coordinator	14/06/2010	EFE is promoting RE demonstration projects (active projects are (small-scale) biomass, solar PV development, (small-scale) hydro power). They also act as an ESCO Fund manager for the Ministry of Energy (500 million Baht). The fund has various scheme e.g. equity investment, equipment leasing, ESCO venture, CDM support and technical assistance. They also work on MRV (article 4.1). EFE has received funding from Danish Embassy to do capacity building for a PoA CDM for solar PV. World Bank has promoted the idea: biogas from waste (but technology is

¹³ All meetings were conducted by Mr. Alejandro Saenz-Core, MM Consultant together with one or two members of the National Expert team (Mr. Ingo Puhl, Ms. "Pat" Pathathai Tonsuwonnont, Ms. "Sara" Sasithorn Kittithumkul, all employees of South Pole Carbon Asset Management)

Stakeholder ¹³	Date	Summary from the interview
		not mature). The Danish Embassy plans to promote solar PoA in particular. Barriers to investment in their views are: financial support (for small-scale projects), access to new technologies, clarification of PPA process, should introduce standards (capacity building by importing from the other countries, as now it does not exist for renewable energy)
Department of Industrial Works (DIW) Attendee Ms. Bongkoch Kittisompun, Director of Strategies and Environmental Agreements Section, DIW Mr. Chessada Sakulku, TGO, Data MRV Coordinator Mr. Ingo Puhl, South Pole Consultant Ms. "Sara" Sasithorn Kittithumkul, South Pole Consultant Mr. Alejandro Saenz-Core, MM Consultant	15/06/2010	Main role of DIW is on capacity building, and study of GHG emissions from industrial sector, no authority to provide financial support. Examples of capacity building activities: baseline analysis of energy use, energy savings (this is actually a misunderstanding: they should focus on industrial emissions NOT energy emissions from industry). There is no systematic collection of energy use. They try to cover all industries or use the existing system to collect data (e.g. factory registration system) on a voluntary basis based on IPCC 2006 as there is no law for reporting. They focus on 8 main industrial sectors (top-5 producers in each sector). They also prepared a manual and programme for reporting. The survey is supported by a consultant as well as a GHG management strategy study for internal use. They also prepared a manual for green technology, public relation (magazine) to industrial sector to build more awareness e.g. about Copenhagen. Barriers to MRV are awareness among industrial sector (factories); there is not enough cooperation. Regulations might help in this process. They acknowledge that they focus on energy not process emissions. They work with donor GTZ (for energy efficiency, PoA, solar water heater for SMEs), PoA for small cassava producers. In their views, the focus should be on energy efficiency and waste to energy. DIW focuses on CSR and sustainability issues from the Industrial sector and it is connected with TEI
Energy Research Institute (ERI) Attendee Mr. Bundhi Eua-arporn, PhD. Professor, ERI Director Mr. Weerin Wangjiranin, PhD. ERI Researcher Mr. Chessada Sakulku, TGO, Data MRV Coordinator	15/06/2010	ERI is working with the Energy Ministry on simulating policy impacts on the energy outlook. ERI has Energy Data for the last 30 years; they are keeping and maintaining that database. ERI has strong model capabilities. They also do scenario analysis of policies e.g. impacts of policies on land use, costs, outcomes etc. However, no analysis on mitigation scenarios so far. They support EPPO (Ministry of Energy) with biogas development strategies. In relation to MRV and mitigation actions, the focus, in their views, should be on energy intensive industries, transportation sector. They see constraints in the sector e.g. political/institutional constraints, different authorities within the sector, many stakeholders). The constraints in energy efficiency sector are institutional barrier, capacity issue (great potential but underutilised), has the right focus (not only energy auditing but value engineering process). Also, some sectors have no primary data available because policy makers do not put prioritize this issue. ERI points out that a refinement of the MRV system that is

Stakeholder ¹³	Date	Summary from the interview
		required (better emission factors, adjusted system boundaries) will imply that time series might become inconsistent when not properly adjusted. ERI is also used to prepare energy indicators. There is no national mitigation cost curve so far. ERI conducts its own energy efficiency auditing on basis of direct measurement.
German Development Agency (GTZ) 16/06/2010 Attendee Mr. Torsten Fritsche, Director Resource-Efficiency and Energy, GTZ Mr. Supalerk Kanasook, Project Manager Carbon Market (CDM), GTZ Mr. Chessada Sakulku, TGO, Data MRV Coordinator		GTZ has 4 climate change programs in place, of which one is dedicated to support the climate change policy making process. Of the four, 3 are operating well. The fourth, with ONEP, and in relation to policy, including national inventories is relatively inactive, possibly for political reasons. GTZ recommends to create a clear mandate, responsibility and authority under ONEP to create a national GHG management system. Some programmes are not well supported e.g. PoA on solar-thermal (now using DEDE subsidy programme) to introduce monitoring system. In the view of GTZ, subsidy programmes should have stronger MRV to measure subsidy effectiveness (not only for carbon credits) so that the policy makers can see importance of MRV. GTZ is a front-runner in monitoring impact of technical assistance. All programmes have indicators to measure impacts in terms of carbon emission (using CDM approach as monitoring mechanism). However, in terms of baseline assessment, the data is not available. At the beginning of the project, this information is created by a consultant. To monitor its programmes, GTZ uses simple analysis based on log-frame matrix; GTZ is not yet following up to track the effectiveness of results, except for CDM projects. They recommend that we should look at the indicator framework and progress report as a case study as a simple method for tracking indirect GHG impacts of actions.
Department of Alternative Energy development and Efficiency (DEDE) 17/06/2010 Attendee Mr. Twarath Sutabutr, Sc D. Deputy Director General, DEDE Ms. Arrerat Yoohoon, Scientist, Senior Professional Level, DEDE Mr. Chessada Sakulku, TGO, Data MRV Coordinator		DEDE has a deep knowledge of the Thai Energy Sector and its planning (with 2030 time horizon). They have supporting programmes for both energy efficiency and renewable energy as follows: Energy efficiency: They have mandatory measure for regulated factories and buildings. So not all of them are covered. Supporting programmes are also available for households, SMEs and transportation sector. Renewable energy: Voluntary incentives (e.g. tax break, financial support, feed-in tariff, and promotion) for power generation, process heat and biofuel. DEDE has a clear target to increase the installed capacity from 29,000 MW (2009) to be 60,000 MW (2030) Clear goal for power generation, to add 4,000 MW to existing 1,600 MW (2010). The added value is from various renewable energy sources with the most in biomass (wind/solar: 1,300 MW, biogas: 120 MW, MSW: 160 MW, small hydro: 300 MW, biomass: 2,100 MW). The figure does not include large dams. Goal for process heat use from 3,100 MW to 6,200 MW with 90% from biomass (agricultural waste). Biofuel, the main sources will be molasses (by-product from

Stakeholder ¹³	Date	Summary from the interview
		sugar manufacturing), cassava, palm oil, and jatropha. Gaps in MRV e.g. Biomass from agricultural waste: it is unclear how this has been accounted for in Thailand's initial GHG inventory? It might possibly have been under-reported. BAU data is not available. Bio energy: internal consumption is not monitored. Barrier in renewable energy projects: e.g. biomass transport, carbon price (too low), the procedure of using the carbon credit needs to be accelerated (down payment on the investment), and more mandatory approach (as there is not enough interest to invest for future returns). DEDE is looking for fuel switching and waste to energy projects, proposing agricultural waste pelletizing plants in order to eliminate and cut CH₄ and N₂O emissions cycle from agricultural waste. DEDE is consulted in the writing of the second national communication.
Thai Environmental Institute (TEI) Non-profit foundation Attendee Ms. Qwanruedee Chotichanathawewong, Dr. TEI, Executive Director, Assistant President Mr. Chessada Sakulku, TGO, Data MRV Coordinator	17/06/2010	TEI is working in sustainable development and corporate social responsibility for main corporations as part of the WBCSD organization. They support several trainings with industrial member, including CDM capacity building program and sustainability plans. One of the projects is to train about corporate carbon foot-printing for 35 large corporations. All need to report back using IPCC methods (direct and indirect emissions). TEI is working together with TGO in "Green Label" programme. TEI has experience working with stakeholders, case of the agricultural sector and paddy rice. TEI was part of the team that prepared Thailand's Initial National Inventory (not part of the team for the Second GHG Inventory) Comments on data availability for National Communication and barriers: no systematic data collection information on process emission is available only from key factories. The question is whether this information is usable for preparing NC. Emission factors for agricultural sector are under development. Biomass waste activity data is known, emission factor of MSW might be unknown, lack of common definition in forestry sector. Recommendation on how to get to low emission development strategies (LEDs): stakeholder analysis drives technology; involve consumer using mass media, green products.
Thai Chamber of Commerce (TCC) Attendee Mr. Buntoon Wongseelashote, V. Chairman TCC, Chairman, JSCCIB working group on Climate Change Ms. Teerin Vanichseni, PhD, Committee RE and Climate Change working group (JSCCIB)	18/06/2010	The consultant met with the Climate Change Committee of the TCC and invited guests. The general tone of the meeting was highly "official" vs. the "technical" nature of all other meetings. The meeting organizer (TGO) did not prepare the consultant in this respect. As a result of the meeting format (plus possibly other concerns), we did not receive technical comments from Committee members. TCC expressed that it was unsure about the objectives of this

Stakeholder ¹³	Date	Summary from the interview
Ms. Patsharee Congtrakultien, Senior Vice President Safety Health and Environment, Charoen Pokphand Group Dr. Piyanuch Malakul Na Ayuthya, Vice Chairman, Committee on Trade Rules and International Trade, TCC Ms. Kuhuman Ladpli, Senior Economist, Ministry of Finance Ms. Abhisra Chaikittisilpa, The Federation of Thai Industries Ms. Pornsiri Sakornvanasak, Trade Technical Officer, Department of Trade Negotiations, Ministry of Commerce Mr. Narin Sampattanavorachai, Secretarial Officer, TCC Mr. Chessada Sakulku, TGO, Data MRV Coordinator		project and concerned that their participation in a GHG MRV system might create additional costs for them. TCC does not intend to facilitate the submission of comments from individual members. Instead, TCC prefers to submit consolidated answers to our questionnaire in writing. From our point of view, TCC answers will not reach us in time for inclusion in final report. The need for follow-up action has been identified subsequently.
The Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi GHG researcher's view Attendee Ms. Dr. Sirintornthep Towprayoon, Associate Professor, in charge of 2nd NI and NC (ONEP), in charge of cost effective abatement curves (TGO) for Thailand Mr. Chessada Sakulku, TGO, Data MRV Coordinator	18/06/2010	Dr. Sirintornthep has directed the compilation of the first National Inventory (NI) and National Communication (NC). She has the full database that has been used to originate all the calculations. She appears to be THE authority on Thailand's GHG inventory and is a regular participant in IPCC meetings on GHG inventory preparation. In May 2010, ONEP has directly hired her to prepare the second NI and NC. In addition TGO has hired her to develop the cost-effective abatement curves by sector for Thailand (such as the ones prepared by McKinsey & Company for several countries). JGSEE is currently doing a research on improvement of emission factors e.g. soil organic carbon emission factors as well as research on activity data (forestry – move from move from activity based to an area based approach based on GIS and satellite data (capacity building). Combined approach: satellite and ground monitoring. According to her, the NI for Energy Activities is quite robust in IPCC's Tier 1 and Tier 2, but weak in Tier 3. Comments on emission factors: From the interviewee's experience, emission factors have improved. More accurate data, better assumptions with a lower uncertainty <10%. The INC over estimated emissions because of less conservative emission factors Comments on activity data: Energy sector (60%) quite stable because based on DEDE (based on fuel use) no consideration of technology (to assess energy efficiency) (EGAT and PTT) incl. transport (try to move to higher tier (tier 2 in TNC): measurement of some emission factors from EGAT (tier one for SNC). Transport tier 2 with Japanese support Industry: industrial emissions. Spotty data (from DIW), only activity data, difficult to derive process emissions, institutional change required. F-Gas data is very difficult (SNC try tier 1 approach: based on export and import only), might not be a priority (But very interesting for mitigation options). Cement is good (because of WBCSD reporting initiative, they use it to compare), lime production: difficult, no info, iron & steel, chemical: problem, Pulp and paper and food & drink: no big

Stakeholder ¹³	Date	Summary from the interview
		issue (lets research) Agriculture: fermentation: good no of stocks (30 years back) but two databases that yield different results: they normalize (people who create the data need to better understand what the data is collected for; this helps them to standardize. Emission factors: tier 1, tier 2 would yield an increase Manure management is more difficult as the animal keeping process is unknown. Tier 1 approach Rice cultivation: data from national agricultural statistics: land under cultivation, irrigated (called single drainage) and rain-fed (multiple drainage), fertilized and not fertilized. How to MRV practice change. Emission factors by research (KMUTT, Kasetsart, Khon Kaen: normalize info) Field burning/agriculture residues: Agriculture statistics office. Use of tier 2 for biomass burning on site (N₂O etc.). There is information on waste use for energy; residue burning is adjusted for that. Issues in data collection: Forestry sector: most problematic for data collection, interpretation of forest definition is different overtime and the definition is unclear (no consistent time series). . Since 1994 there has been a lot of reforestation, net sink: 7.8 Mt. High uncertainty: >30% Waste sector: waste - lots of new information. Through examination of land-fill sites (PCD) plus policy on waste recycling, country specific K value (tier 2), waste water - better information but not complete by sector (in each category not enough data) using reporting from factories (or PCD) and mtec. The activity data is from Ministry of Interior (population data). Other gaps / barriers: MARKAL, CENTURY: no one can use these in Thailand. Science and Technology Institute is just established Mandate for climate change policy (could to the mitigation cost curve) is needed No one has developed the econometric model using historic data and BAU to model the system. It is difficult to understand the mitigation study: create a better understanding of the abatement cost curve. MRV of mitigation actions should be captured by a national monitoring system. Verification is not addressed much. Knowledge gap Lack of resources (16 persons and 10 students working for 6 months) Recommendation for improvement: Perception and understanding of people who have information, this will lead to better coordination. The country should have a national GHG management system that is integrated into the administrative process. Increase human resource network Simultaneous data collection Multiple skills group combining: economic, technology, emission specialists so that people know the complete information on best mitigation options to do future projection

Stakeholder ¹³	Date	Summary from the interview
		of GHG emissions. Current status: JGSEE submitted draft final GHG inventory report for Thailand's Second National Communication to ONEP in early July.

Appendix D. Report and list of participants of the Thailand workshop

Introduction

The *Developing Countries, Monitoring and Reporting on Greenhouse Gas Emissions, Policies and Measures – Thailand Workshop* was held at Sathorn Heritage Hotel, Bangkok, on the 1st September 2010 (see Annex 1 – Agenda). A total of 54 participants from the government, universities, civil society, private sector and donor society, among others participated on a list of 116 invitations sent (see Annex 2 – List of Workshop Participants).

The workshop was one of the activities envisaged under European Commission's scoping study *Developing Countries, Monitoring and Reporting on Greenhouse Gas Emissions, Policies and Measures* and was aimed at understanding and exploring the needs of Thailand as regards enabling activities related to mitigation of Greenhouse Gas (GHG) emissions – focusing on Measurement, Reporting and Verification (MRV) of emissions, the preparation of National Communications, GHG Inventories, and planning and development of Nationally Appropriate Mitigation Actions (NAMAs). The EU is in particular interested in understanding the needs related to capacity building in these areas.

The study will provide concrete recommendations on the structure and elements for a subsequent capacity building designed with a view to addressing institutional, procedural and methodological issues, relating in particular to data gathering, barriers, needs, constraints and opportunities, identified during this scoping study through an intensive in-country interactive stakeholder engagement and consultation process.

Acronyms

AFD	Agence Française de Développement – French Development Agency
AFOLU	Agriculture, Forestry and Other Land Uses
AIT	Asian Institute of Technology
BAP	Bali Action Plan
CC	Climate Change
DEDE	Department of Alternative Energy Development and Efficiency/Ministry of Energy
EC	European Community
ERI/CHULA	Energy Research Institute of CHULALONGKORN University
EU	European Union
EU ETS	European Union Emission Trading System
GHG	Greenhouse Gas
GTZ	Deutsche Gesellschaft fuer Technische Zusammenarbeit – German development agency focus on international cooperation for sustainable development
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JGSEE - KMUTT	Joint Graduate School of Energy and Environment/ King Mongkut's University of Technology Thonburi
kgCO₂/kWh	Kilogram Carbon Dioxide per kilowatt-hour
LULUCF	Land Use, Land-Use Change and Forestry
MNRE/MoNRE	Ministry of Natural Resources and Environment

MRV/GHG MRV	Monitoring, Reporting and Verification of Greenhouse Gas
NAMAs	Nationally Appropriate Mitigation Action
NESDB	National Economic and Social Development Board (Public organization)
NGOs	Non-Government Organizations
ONEP	Office of Natural Resources and Environmental Policy and Planning
REDD	Reducing Emissions from Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and Forest Degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks.
REDP	15-year Thai Renewable Development Plan
TBCSD	Thai Business Council for Sustainable Development
TCC	Thai Chamber of Commerce
TEI	Thailand Environment Institute
TGO	Thailand Greenhouse Gas management Organization (Public Organization)
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention for Climate Change
USAID	United States Agency for International Development
WB	World Bank
WBCSD	World Business Council for Sustainable Development

Welcome Address – Opening remarks

The workshop was opened by Mr Attila Nyitrai, Deputy Head of the European Union Delegation in Bangkok. He introduced the various activities that the EU is undertaking in Thailand and how they relate to this project. He also gave an introduction to the Copenhagen Accord.

Mr. Sirithan Pairoj-Boriboon, Executive Director of the TGO, Thailand Greenhouse Gas Management Organization, national sponsor of this project introduced the current climate change situation in Thailand and what mitigation actions they are current pursuing in Thailand.

Mr. Sirithan noted that MRV is like an infrastructure important for developing countries. Without it, reducing emissions means nothing as other countries do not recognize it. He expressed his hope that the workshop was a step towards a reliable and accurate MRV in Thailand so that the country does not lose opportunities, in particular related to the market mechanisms.

The presentation is available in the following link:

<http://dl.dropbox.com/u/11293581/Introduction.pptx>

Workshop Methodology

Mr Alejandro Saenz-Core, EC's consultant, introduced the Workshop Methodology, objectives and expected results to be developed during the workshop.

He explained to the audience the workshop would be divided in two main components. In the morning session, attention would be focused on introducing the national circumstances through different Thai

stakeholders including Government, Academic and NGO sectors. The achievements so far regarding GHG and Clean Energy policies would be described. Opportunities for questions and answers will be provided.

He encouraged the invitees to participate during the discussions to be held during the afternoon in order to add the most realistic views of the stakeholders on the Memo for discussion that was provided during the event registration.

The presentation is available in the following link:

http://dl.dropbox.com/u/11293581/1%20Alejandro%20Saenz-Core_Thailand.ppt

D.1. Measuring, Reporting and Verification: EU's Perspective

Mr Goncalo Cavalheiro, Project Team Leader, on behalf of Ms Erasmia Kitou from the European Commission introduced the scoping study by presenting to the benefits in having an MRV system highlighting that a transparent MRV system is key to building trust among countries in the future climate change regime. He gave the historical perspective on MRV beginning from the Bali Action Plan. He highlighted the needs to build a reporting framework, including information sharing and good practices. He also explained the important links between MRV, carbon markets and financial support and provided an overview of EU mitigation policies and future mitigation actions highlighting in particular the EU ETS.

The presentation is available in the following link:

<http://dl.dropbox.com/u/11293581/Mr%20GC%20on%20behalf%20of%20Dr%20EK.pdf>

D.2. National Circumstances - Presentations introducing the climate change situation from the players in Thailand, such as Government Officials, Academia, and NGOs

Overall Aspects related to Climate Change Policy in Thailand - ONEP

This presentation was delivered by Ms Araya Nuntapotidech, Deputy General Secretary from the Office of Natural Resources and Environmental Policy and Planning (ONEP), Ministry of Natural Resources and Environment (MNRE). She presented the Climate Change current situation, and researches underway to develop action plans in Thailand. The plans aim to strengthen and focus nation-wide actions towards climate change mitigation and adaptation measures. She presented the study process conducted country wide.

Ms Araya noted that Thailand should set up an MRV system before it is mandatory, so that the country is awarded enough time to build capacity.

She also noted the need for Thailand to undertake an internal stakeholder discussion and approval by the parliament before joining the Copenhagen Accord.

The presentation is available in the following link:

http://dl.dropbox.com/u/11293581/Ms%20Araya_ONEP.pdf

Compiling National Communications and GHG Inventories - TGO

Mr. Sirithan Pairoj-Boriboon from TGO delivered this presentation. He presented the various components of the second GHG National Inventory by sector, and the methodologies used in preparing the report and the constraints and gaps that Thailand had faced in the process, especially constraints of the emission factors. The inventory is therefore tier I and tier II in some sector.

Mr. Sirithan noted that both IPCC 1996 and 2006 guidelines are used in the preparation of its NGHGI

Mr Sirithan was one of the stakeholders interviewed during the stakeholders' interviews week conducted in June 2010.

The presentation is available in the following link:

http://dl.dropbox.com/u/11293581/Mr%20Sirithan_TGO.pdf

Energy Sector and GHG Impacts in Thailand - ERI

This presentation was delivered by Ms Dawan Wiwattanadate who is an Associate Professor and Deputy Director of the ERI, Energy Research Institute of CHULALONGKORN University.

The ERI is providing technical and modelling resources for the Ministry of Energy in order to simulate and understand the impact of Energy Policies, quantifying energy savings and energy rates impacts on several macro-economic scenarios.

She emphasized in her presentation that the Energy sector is a major source of GHG Emissions, of which Power Generation and Transportation are two main emitters. She also described in details the current Thailand Energy policy and the 15-year Thai Renewable Development Plan, REDP which broad goal would be to increase the proportion of renewable energy in total energy consumption up to 20% by 2022. In addition, she presented the new projected trend of the grid emission factor in Thailand going from 0.53 kgCO₂eq/kWh by 2008 to 0.45 kgCO₂eq/kWh by 2030 under currently considered energy and climate change related policies. She left open whether this trend constitutes Thailand's baseline or should already be considered a GHG mitigation scenario within a future NAMA framework.

The ERI is currently evaluating several energy policies and GHG mitigation actions on behalf of the Ministry of Energy.

The presentation is available in the following link:

http://dl.dropbox.com/u/11293581/Dr%20Dawan_ERI.pdf

Renewable Energy and Energy Efficiency opportunities in Thailand - DEDE

Ms Sirinthorn Vongsoasup, Director of the Department of Alternative Energy Development and Efficiency, DEDE of the Ministry of Energy delivered this presentation. She presented in deep the Thailand Energy tools and incentives in place and new plans in order to implement the 15-year Thai Renewable Development Plan, REDP.

She gave some explanations on the ESCO Fund, which is endowed with 500 million Thai Batt (local currency) and is supporting 39 projects.

DEDE was one of the stakeholders interviewed during the stakeholders' interviews week conducted in June 2010.

The presentation is available in the following link:

http://dl.dropbox.com/u/11293581/Dr%20Sirinthorn_DEDE.pdf

Climate changes initiatives with other donors in Thailand - TEI

This presentation was delivered by Dr. Qwanruedee Chotichnathawewong who is an Assistant President of the Thailand Environment Institute, TEI, and the Executive Director of the Thailand Business Council for Sustainable Development, TBCSD, and member of the WBCSD.

She reviewed the different actions of multilateral donors in Thailand, including mitigation and adaptation programmes. She highlighted the role of the TEI and the private sector particularly on current education programmes which include renewable energy, energy efficiency labelling and recycling projects.

She highlighted the need to have adaptation as a major component of Climate Change initiatives.

TEI was one of the stakeholders interviewed during the stakeholders' interviews week conducted in June 2010.

The presentation is available in the following link:

http://dl.dropbox.com/u/11293581/Dr%20Qwan_TEI.pdf

D.3. Project Results in Thailand

After the lunch, in the afternoon, Mr Alejandro Saenz-Core, EC's consultant; and Ms. Pathathai Tonsuwonnon and Mr Ingo Puhl, which are the local experts introduced the Workshop Methodology and its objectives.

Alejandro linked MRV to the Bali Action Plan and the Copenhagen Accord. He also presented which stakeholders were interviewed and how the process has been developed in Thailand so far.

Pat and Ingo presented the findings from stakeholders' interview sessions during June 2010. The gaps and barriers detected were included in a Memo for discussion during that afternoon.

The presentation is available in the following link:

<http://dl.dropbox.com/u/11293581/MRV%20Scoping%20Study.pdf>

D.4. Memo with gaps and barriers findings for discussion

The consultant introduced the discussion Memo which was distributed to the workshop audience at the registration, and included a summary of the gaps and barriers identified by the consultant from the

stakeholders' consultation made in June 2010. (please see Annex 3 – Memo for discussion - Note on cooperation opportunities to address needs and challenges for discussion by workshop participants)

The Memo for discussion with the audience, focused on the clear validation and identification of concrete capacity building actions to address the barriers, gaps and constraints identified in Thailand related to MRV of GHG emissions, mitigation policies and NAMAs. The Memo would be concluded through the validation of options previously identified and the proposal of new initiatives in the workshop.

The consultant effectively addressed each of these gaps and barriers during the workshop in order to validate them and to add comments from the audience (please see Annex 4 – Working with Thailand on Enhanced Climate Action).

D.5. Results from the workshop discussion - Mitigation Opportunities

At the end of this workshop session, participants validated and identified concrete recommendations and priorities to be included in the proposed EC capacity building programme.

This process was based on a point-by point discussion of identified barriers/gaps, proposed opportunities for cooperation with the EU and concrete actions, summarized in Annex 3, below.

Details of this discussion are summarized in Annex 4.

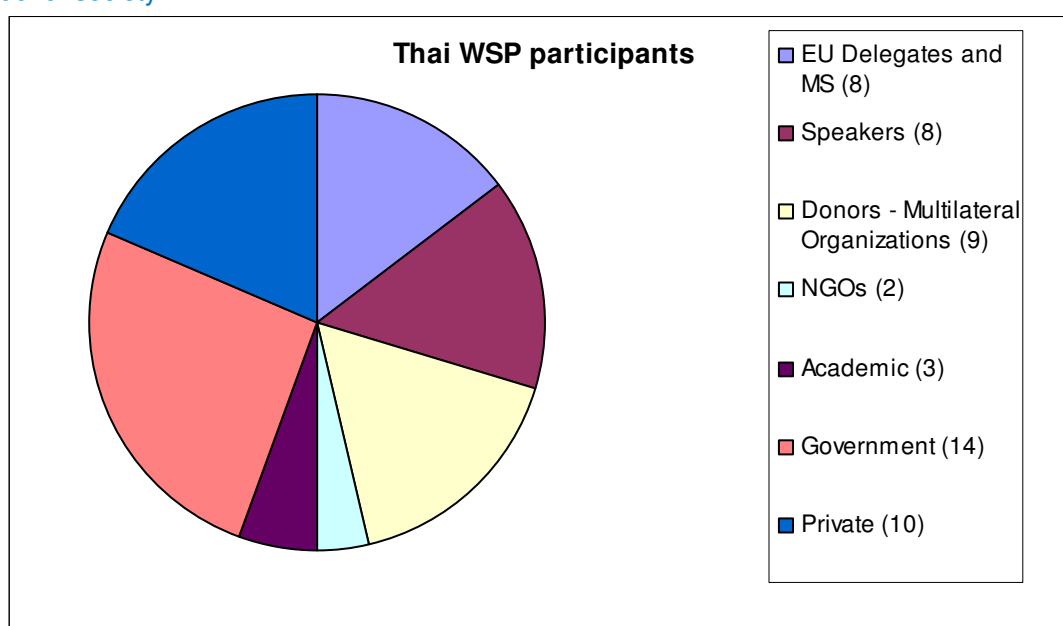
D.6. Annex 1 - Agenda

8:30 – 9:00	Participants' Registration – Secretariat
	Opening Session
9:30 – 9:20	Welcome address – Opening Remarks <i>Attila Nyitrai, Deputy Head, European's Union Delegation</i> <i>Dr Sirithan Pairoj-Boriboon, Executive Director, TGO</i>
9:20 – 9:30	Workshop Methodology <i>Alejandro Saenz-Core, EC's consultant</i>
9:30 – 10:00	EU's Perspective on National Mitigation Measures and Measuring, Reporting and Verification (MRV) Systems <i>Gonçalo Cavalheiro, EC's consultant on behalf of Erasmia Kitou, EU</i>
10:00 – 10:15	Coffee break (15 min)
	National Circumstances
10:15 – 12:15	Overall Aspects Related to Climate Change Policy in Thailand <i>Dr Araya Nuntapotidech, Deputy, ONEP, MNRE</i>
	Compiling National Communications and GHG Inventories <i>Dr Sirithan Pairoj-Boriboon, Executive Director, TGO</i>
	Energy Sector and GHG impacts in Thailand <i>Assoc. Prof. Dr Dawan Wiwattanadate Deputy Director, Energy Research Institute</i>
	Clean energy and Energy Efficiency opportunities in Thailand <i>Ms Dr Sirinthorn Vongsoasup, Director, DEDE, Ministry of Energy</i>
	TEI initiatives with other donors <i>Dr. Qwanruedee Chotichnathawewong, Assistant President, TEI</i>
	Q&A
12:15 – 13:30	Lunch

	The Scoping Study
13:30 – 14:00	The Scoping Study and Major Findings so far <i>A. Saenz-Core, EC's consultant and Pat and Ingo Puhl, local consultants</i>
	Round table and Memo for discussion - Needs and Barriers
14:00 – 15:30	Inventories, National Communications <i>EC's Consultants</i>
15:30 – 15:45	Coffee break (15 min)
15:45 – 17:15	National Policies and Measures: Design, Implementation and MRV <i>EC's Consultants</i>
17:15 – 17:30	Closing

D.7. Annex 2 – List of Workshop Participants

Figure D.1: Summary: 54 participants from the government, universities, civil society, private sector and donor society



EU Delegates and MS (8)

	Name	Organization	e-mail	telephone	Mobile
1	Mr. Attila Nyitrai	EU Delegate	Attila.Nyitrai@ec.europa.eu	(+66 2 305 2680	
2	Mrs. Sutthiya Chantawarangul	EU Delegate	Sutthiya.Chantawarangul@ec.europa.eu	(+66 2 305 2742	(+66 81 838 4305
3	Mr Kati Veijonen	Embassy of Finland	kati.veijonen@formin.fi	(+66 2 250 8801	(+66 81 933 5675
4	Mr Sanomat Ban	Embassy of Finland	sanomat.ban@formin.fi;		
5	Mr Tadeusz Andrzej Ignasiak	Embassy of Poland	bangkok.amb.sekretariat@msz.gov.pl; economic@polemb.or.th	(+66 2 645 0367	
6	Mr Marin Stancu	Embassy of Romania	romembnk@ksc.th.com		

	Name	Organization	e-mail	telephone	Mobile
7	Ms Kanyasorn Tansubhapol	Embassy of the United Kingdom	info.bangkok@fco.gov.uk; kanyasorn.tansubhapol@fco.gov.uk		
8	Mr. Siam Poolcharoen	Embassy of Denmark	SIAPHO@um.dk	(+66 2 343 1124	

Speakers (8)

	Name	Organization	e-mail	telephone	Mobile
1	Mr. Gonalo Cavaleiro	EC/Ecoprogrosso	gcavaleiro@ecoprogresso.pt	(+351217981 210	(+351 917111158
2	Ms.Araya Nuntapotidech	ONEP/MoNRE	Araya@onep.go.th	(+66 2 265 6509	
3	Mr. Sirithan Pairoj-Boriboon	TGO	sirithan@tgo.go.th	(+66 2 141 9801	
4	Ms Sirinthorn Vongsoasup	DEDE/Ministry of Energy	sirinthorn_v@dede.go.th	(+66 2 218 8096	
5	Assoc. Prof. Dawan Wiwattanadate	Energy Research Institute	Dawan.k@gmail.com	(+66 2 226 3969	(=)66 81 629 4068
6	Dr. Qwanruedee Chotichnathawewong	TEI	Qwan@tei.or.th	(+66 2 504 4786	
7	Mr. Alejandro Saenz-Core	EC/Mott MacDonald	Alejandro.Saenz-Core@mottmac.com	(+441273365 039	(+44 7898949635
8	Mr. Ingo Puhl	EC/South Pole	i.puhl@southpolecarbon.com	(+66 2 678 8977	(+66 86 778 2869

Donors – Multilateral organizations (9)

	Name	Organization	e-mail	telephone	Mobile
1	Ms Jacqueline Rodriguez	World Bank	jrodriguezgarcia@worldbank.org	(+66 2 686 8355	
2	Mr Rajiv Garg	UNEP	Rajiv.garg@unep.org		
3	Khun Khan Ram-Indra	USAID	kramindra@usaid.gov	(+66 2 257 3260	
4	Mr. Brian Thomson	USAID - EcoAsia	brian@cleanenergyasia.net		
5	Mr Torsten Fritsche	GTZ	torsten.fritsche@gtz.de	(+66 2 298 6591	
6	Ms Martina Kolb	GTZ	Martina.kolb@gtz.de	(+66 2 298 2607	
7	Mr. Supalerk Kanasook	GTZ	Supalerk.kanasook@gtz.de		
8	Mr Grgory Thomassin	AFD	thomassing@afd.fr	(+66 2 663 6090	
9	Mr. Alexander Hirschle	German Trade & Invest	Alexander.hirschle@gtai.com		

NGOs (2)

	Name	Organization	e-mail	telephone	Mobile
1	Ms Pannipha Dokmaingam	Thailand Environment Institute (TEI)	pannipha@tei.or.th		

	Name	Organization	e-mail	telephone	Mobile
2	Ms. Radda Larpnun	IUCN	Radda.larpnun@iucn.org		

Academic (3)

	Name	Organization	e-mail	telephone	Mobile
1	Dr Charles O P Mapaung	School of Environment, Resources and Development, AIT	cmarpaung@ait.ac.th		
2	Ms. Siriluk Chiarakorn	JGSEE - KMUTT	siriluk.chi@kmutt.ac.th		
3	Weerin Wangjiraniran	ERI/CHULA Univ.	weerin@eri.chula.ac.th	(+)66 2 218 8096	(+)66 89132 6636

Government (14)

	Name	Organization	e-mail	telephone	Mobile
1	Mr Seksan Sangdao	Pollution Control Dept - MoNRE	sangdow_s@yahoo.co.uk; seksan.s@pcd.go.th		
2	Ms Arrerat Yoohoon	DEDE/Ministry of Energy	areerat_y@dede.go.th		
3	Ms. Patsaraporn Plubcharoensuk	DIW/Ministry of Industry	patsaraporn.p@diw.mail.go.th; pummit2003@yahoo.com		
4	Ms. Patsaraporn Plubcharoensuk	DIW/Ministry of Industry	Patsaraporn.p@diw.mail.go.th		
5	Khun Tepwitoon Thongsri	Ministry of Sc and Technology	tep@dss.go.th		
6	Ms. Chueeporn Bunyamalik	NESDB	chuleeporn@nesbd.go.th		
7	Mr. Ratchkrit Sangsukdee	ONEP/MoNRE	ratchkrit@gmail.com		
8	Dr. Puttipar Rotkittikhun	TGO	r.puttipar@tgo.or.th		
9	Ms. Prasertsuk Chamornmarn	TGO	Sertsuk@tgo.or.th		
10	Ms. Mewadee Seresathiansub	TGO	mewadee@tgo.or.th		
11	Ms. Thanaporn Wannasiri	TGO	onosukae@hotmail.com		
12	Mr.Chessada Sakulku	TGO	Chessada.s@tgo.or.th		
13	Dr. Chaiwat Muncharoen	TGO	Chaiwat.m@tgo.or.th		
14	Ms. Wararat Cha-umkrue	TGO	Wararat.c@tgo.or.th		

Private organizations (10)

	Name	Organization	e-mail	telephone	Mobile
1	Mr Cholathorn Dumrongsak	The Siam Cement Group	cholathd@scg.co.th		
2	Khun Abhisra Chaikittisilpa	Thai Federation of industries	abhisrac@off.fti.or.th		
3	Dr Teerin Vanichseni	TCC - Board of Trade of Thailand	teerinv7@yahoo.com		
4	Dr Piyanuch Malakul Na Ayuthya	TCC	piyanuch@cpf.co.th		
5	Mr. Jerome R. Hassler	Metrix Associates	jerh@metrixassociates.com		
6	Ms. Sommai Srikong	Thai Mott MacDonald	Sommai.srikong@thaimottmac.com		
7	Mr Surasak Sriwong	Thai Mott MacDonald	surasak.sriwong@thaimottmac.com		
8	Ms. Pathathai Tonsuwonnont	South Pole Thailand	p.tonsuwonnont@southpolecarbon.com	(+)66 2 678 8977	
9	Ms. Sasithorn Kittithumkul	South Pole Thailand	s.kittithumkul@southpolecarbon.com	(+)66 2 678 8977	
10	Mr. Santosh Kumar Singh	South Pole Thailand	s.singh@southpolecarbon.com		

D.8. Annex 3 – Memo for discussion

Note on cooperation opportunities to address needs and challenges for discussion by workshop participants

Climate change related policies form an integral part of Thailand's environmental and economic development agenda. These policies serve to strengthen Thailand's domestic sustainable development agenda, such as improving energy security and environmental protection through the promotion of alternative energy and energy efficiency.

The EU Project on GHG MRV:

The Thailand Greenhouse Gas Management Organization (TGO) and the European Commission are working together in this joint project called "Developing countries monitoring and reporting on greenhouse gas emissions, policies and measures".

The overall purpose of this project is to assess Thailand's capacity building needs to measure domestic GHG emissions as well as GHG related impacts of domestic policies and measures with a view to strengthen those capabilities to facilitate two outcomes:

8. enable the Government of Thailand to plan, design, implement and measure the impacts of domestic climate change policies and measures for national planning purposes and thus gain the ability to assess the performance of such policies; and
9. identify the capacity building needs in order to meet the minimum requirements for a (to be created) international MRV system under a future international climate change agreement.

In order to assess the performance of existing policies and to assess the impact of potential future policies, Thailand needs to put in place a system for the monitoring, reporting and verification of the GHG emission related outcomes of such policies.

At the same time, the contribution of these policies to global GHG emission reductions should be recognized by the international community. In fact, current negotiations for a future international climate agreement have acknowledged the need for provision of financial and technical support to developing countries for the design and implementation of such domestic policies under the condition that the impact of such policies is in fact monitored, reported and verified.

This note introduces some of the cooperation opportunities which have been identified and compiled as a result of a stakeholder consultation process which was conducted by the project team in June 2010 and some additional recommendations which were derived from the team's work in other countries. These proposals are intended for discussion during the workshop but do not represent official positions of the stakeholders interviewed, the Thai government or the European Commission.

Assessment of MRV capacity and gaps¹⁴

The project team assessed the existing MRV systems in two key GHG emission categories in Thailand – Energy and LULUCF.¹⁵

Thailand's first National Communication to the UNFCCC was submitted in 2000, and including a national GHG inventory for year 1994 (with LULUCF). Thailand is currently preparing its second National Communication and GHG inventory.

To the extent possible, national emission factors were used, thus making the latest GHG estimates more accurate and relevant to the country. Still, many gaps in knowledge exist. These suggest that continued research to generate scientific and technical information suitable to national conditions and circumstances would be desirable. Basic research, field observations and testing are needed to improve the quality of the data, to reduce uncertainties, and to enhance understanding of the relationship of these emissions with productive activities in order to help determine the needs and limitations of reducing them.

Thailand has devised a number of policies and measures to stimulate the country's low emission development. The project team assessed the quality of the existing MRV systems that enable the Thai government to assess the performance of these existing policies and measures in relation to achieving the ultimate objective of these policies and measures: delivery of actual GHG emission reductions. Main conclusions are presented in the section below.

The table below also includes the identification of main barriers identified. For each specific barrier or gap, a proposal for cooperation and concrete capacity building activities is presented. When designing capacity building activities attention should be paid to minimizing overlaps and maximizing benefits.

¹⁴ The analysis has been prepared using publicly available documents. This does not include the underlying calculation sheets that were used in the preparation of the Initial National Communications.

¹⁵ These two key categories have received the most attention for GHG Inventory purposes because of their relative importance. As a result, the quality of monitoring and reporting of other categories tends to be worse/not-existent (i.e. in the case of industrial process emissions) even though there is a substantial GHG mitigation potential in these sectors.

Workshop participants are invited to criticize, complement, delete and add to the draft recommendations for future cooperation that the project team has collected below.

Inventories, National Communications

Need/Barrier/Gap	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Need for a unique national administrative agency to strongly coordinate and manage the compilation, continuous improvement and updating of the national GHG inventory including the required electronic GHG inventory database system	Support to the establishment of a national system for the regular compilation of data and estimation of GHG emissions, in order to facilitate the regular elaboration of the National Greenhouse Gas Emissions Inventory and to track effectiveness of domestic climate policy.	Sharing experience and knowledge	• What is the current legal basis for the collection of GHG relevant data? • Is there any data management system already build for other purposes, such as air pollution that could be used?
Need to enhance knowledge across institutions in different sectors on the GHG Inventory Guidelines	Capacity building and hands-on training on the Inventory Guidelines by sector for the players responsible for the inventory and national communication preparation.	Training with key experts participating in the IPCC process.	• Are energy and AFOLU the priority sectors for such training?
Emission factors for most key sources (with exception of rice cultivation) do not reflect national circumstances	Establishing national Emission Factors for key sources and sectors, focusing on energy production, agriculture and LULUCF.	Knowledge sharing via sectoral coaching sessions and/or workshops.	• In which sources should the priority for determining national emission factors be set?
Authority over forestry issues is divided into several institutions, with different focuses and definitions of forest and forestry.	Capacity building on estimating emissions in the LULUCF – from unifying the definition of forest across institutions and policies to moving from activity to area based approach. Build capacity on a combined satellite/ground approach.	• Workshops on best practices in estimating emissions from LULUCF. • Hands on training for 2006 IPCC Guidelines for the AFOLU sector. • Knowledge sharing with the EU	
Lack of common understanding on how agriculture waste can be fully used as a source of energy for Thailand and on how such use can be internationally recognized as Thailand's effort for global GHG emissions reduction.	Capacity building addressing the use of agricultural waste for energy production: establishing a time series and data collection system, determine methodologies for estimating emission reductions. Improving the GHG inventory and setting the base for baseline determination towards planning and designing national policies and measures.	• Workshops • Hands-on training.	

National Policies and Measures: Design, Implementation and MRV

Barriers/Gap	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
The current institutional framework does not fully provide for an inclusive and coordinated decision making process.	Enhancement of the institutional framework for the decision making, in order to facilitate the dialogue among the different sectoral ministries on climate change, focusing on	Workshops and training with climate change Focal Points at the different ministries.	• What current institutional setting should this initiative be based upon?

Barriers/Gap	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
	challenges and opportunities relating to National Policies and Measures and MRV.		
The current institutional framework does not have solid mechanism to include civil society contributions into the decision making process.	To build a Public/Private dialogue on mitigation frameworks, including the design of National Policies and Measures and the system for MRV, at the level of key economic sectors. Setting the reference for key information for the decision making process.	Symposiums among Public and Private key actors.	• Which sector could be a pilot of such a dialogue? • Which activities should be implemented?
The country is lacking across the board, generally accepted macro-economic scenarios which can form the basis and can provide a common understanding for the development of emission reduction measures	Capacity building in using macro-economic modelling tools (such as Markal and Century) for the support of the decision making process on National Climate Change Plans.	Hands on Training with selected researchers.	• Should this exercise be limited to researchers? Should government agencies be included also? Which Universities/Research Centres are most suitable for this?
Need of enhancing the baseline determination for energy and transport sectors to research entities to support the development of GHG mitigation scenarios	Baseline determination for energy and transport sectors	Workshops, Hands-on Training; Coaching.	• Who are the target stakeholders? • Which activities/emission categories shall be targeted?
There is currently no official data relating to the potential emission reductions from energy efficiency.	Elaboration of methodologies for modelling energy efficiency and savings	Knowledge sharing via energy sector coaching sessions and/or workshops.	• Who are the target stakeholders? • Which sub-sectors shall be targeted?
Current Thai law on deforestation needs to be built upon in order to fully benefit from any opportunities from REDD and REDD+ initiatives.	Facilitating the creation of a national framework that would allow the planning of an avoided deforestation action plan (at the scales of project, region and country).	Workshops and hands-on training.	• What subjects should the workshops and the hands-on training be focused on? • Who should participate in this exercise, in particular at regional and local levels? • Which network could be used to spread knowledge on a train the trainer approach?
Actors fear loss of competitiveness due to strict emissions reduction policies, but admit that there is little information on the issue.	Improve the knowledge relating to competitiveness and emissions reductions. Learn from the experience of the EU on carbon leakage in critical economic sectors.	Study on competitiveness and carbon leakage in Thailand.	• Which sector could be a pilot for such a study?
Lack of mandatory requirements for measurement and reporting of activity data and data that is required to determine facility/process-specific emission factors	Enhance experience at facility level MRV of emissions, dully taking into account concerns regarding disclosure of information.	Design and establish a voluntary MRV system for companies.	• Which organizations should be involved in this initiative? • Start with a sectoral pilot or work across all sectors?

D.9. Annex 4: Comments to the Memo for discussion (Annex 3) from the audience at the Workshop.

These tables represent intermediate work steps towards the final tables present in the main body of this report as concrete proposals for action. The comments received are recorded for future reference.

Inventories, National Communications

Issue 1 Need/Barrier/Gap	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Need for a unique national administrative agency to strongly coordinate and manage the compilation, continuous improvement and updating of the national GHG inventory including the required electronic GHG inventory database system	Support to the establishment of a national system for the regular compilation of data and estimation of GHG emissions, in order to facilitate the regular elaboration of the National Greenhouse Gas Emissions Inventory and to track effectiveness of domestic climate policy.	Sharing EU experience and knowledge	What is the current legal basis for the collection of GHG relevant data? Is there any data management system already build for other purposes, such as air pollution that could be used?

Comments to Issue 1

The agency requires a political mandate and sufficient resources.
There are designated entities in place that collect data for other purposes. However, the collection effort is not compliant with a defined GHG monitoring standard.

Support the establishment of such agency.
Support data providing entities to update current procedures to collecting the required data for the estimation of GHG emissions.

Support to ONEP in drafting the business plan of the national agency and system.

There is no such basis.
This national agency/system should be particularly prepared to coordinate the process of defining national emission factors.

Issue 2 Need/Barrier/Gap	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Need to enhance knowledge across institutions in different sectors on the GHG Inventory Guidelines	Capacity building and hands-on training on the Inventory Guidelines by sector for the players responsible for the inventory and national communication preparation.	Training with key experts participating in the IPCC process.	Are energy and AFOLU the priority sectors for such training?

Comments to Issue 2

Include all sectors/IPCC categories and relevant players

All sectors are important. Energy (production) may be the least complex sector. Agriculture, both in terms of activity data and emission factors may be the most important followed by energy efficiency.

Issue 3 Need/Barrier/Gap	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Emission factors for most key sources (with exception of rice cultivation) do not reflect national circumstances	Establishing national Emission Factors for key sources and sectors, focusing on energy production, agriculture and LULUCF.	Knowledge sharing via sectoral coaching sessions and/or workshops.	In which sources should the priority for determining national emission factors be set?

Comments to Issue 3

Support discussion/study on designing a methodological development program: determine which emission factors for which level of accuracy (tier) should be developed.

Support research programs in local universities

Issue 4 Need/Barrier/Gap	Proposal for cooperation	Potential concrete actions	Question Participants	to	Workshop
Authority over forestry issues is divided into several institutions, with different focuses and definitions of forest and forestry.	Capacity building on estimating emissions in the LULUCF – from unifying the definition of forest across institutions and policies to moving from activity to area based approach. Build capacity on a combined satellite/ground approach.	Workshops on best practices in estimating emissions from LULUCF. Hands on training for 2006 IPCC Guidelines for the AFOLU sector. Knowledge sharing with the EU			

Comments to Issue 4

Capacity building on designing a forest and climate policy – LULUCF and REDD

Capacity building on estimating soil carbon

Issue 5 Need/Barrier/Gap	Proposal for cooperation	Potential concrete actions	Question Participants	to	Workshop
Lack of common understanding on how agriculture waste can be fully used as a source of energy for Thailand and on how such use can be internationally recognized as Thailand's effort for global GHG emissions reduction.	Capacity building addressing the use of agricultural waste for energy production: establishing a time series and data collection system, determine methodologies for estimating emission reductions. Improving the GHG inventory and setting the base for baseline determination towards planning and designing national policies and measures.	Workshops Hands-on training.			

Comments to Issue 5

The problem is not the lack of understanding but the development of a program for the best use of agricultural waste.

Capacity building should focus on the efficient and intense use of wastes.

Evaluate concrete usage options and their advantages, such as agriculture waste palletizing facilities.

National Policies and Measures: Design, Implementation and MRV

Issue 6 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
The current institutional framework does not fully provide for an inclusive and coordinated decision making process.	Enhancement of the institutional framework for the decision making, in order to facilitate the dialogue among the different sectoral ministries on climate change, focusing on challenges and opportunities relating to National Policies and Measures and MRV.	Workshops and training with climate change Focal Points at the different ministries.	What current institutional setting should this initiative be based upon?
Comments to Issue 6		Build capacity of officers within line ministries.	This should be based/be driven by the Climate Change Committee and respective sub-committees.
Issue 7 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
The current institutional framework does not have solid mechanism to include civil society contributions into the decision making process.	To build a Public/Private dialogue on mitigation frameworks, including the design of National Policies and Measures and the system for MRV, at the level of key economic sectors. Setting the reference for key information for the decision making process.	Symposiums among Public and Private key actors.	Which sector could be a pilot of such a dialogue? Which activities should be implemented?
Comments to Issue 7		Support to the establishment of an on-line clearing house of information on climate change.	A pilot initiative could be established in relation to land use planning, involving local governments and communities.
Issue 8 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
The country is lacking across the board, generally accepted macro-economic scenarios which can form the basis and can provide a common understanding for the development of emission reduction measures	Capacity building in using macro-economic modelling tools (such as Markal and Century) for the support of the decision making process on National Climate Change Plans.	Hands on Training with selected researchers.	Should this exercise be limited to researchers? Should government agencies be included also? Which Universities/Research Centres are most suitable for this?
Comments to Issue 8		Support the development of such models as well. Train researchers on the development of these models Train government officials on the use and interpretation of models	
Issue 9 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Need of enhancing the baseline determination			

for energy and transport sectors to research entities to support the development of GHG mitigation scenarios	Baseline determination for energy and transport sectors	Workshops, Hands-on Training; Coaching.	Who are the target stakeholders? Which activities/emission categories shall be targeted?
--	---	---	---

Comments to Issue 9

The energy baseline is already robust.	Focus on transport sector and other sectors with high uncertainty.
--	--

Issue 10 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
There is currently no official data relating to the potential emission reductions from energy efficiency.	Elaboration of methodologies for modelling energy efficiency and savings	Knowledge sharing via energy sector coaching sessions and/or workshops.	Who are the target stakeholders? Which sub-sectors shall be targeted?

Comment to Issue 10

The problem is not so much unavailability of data but a policy-shortcoming to realize identified potentials.	Support the identification of barriers to the implementation of energy saving measures and actions to overcome them. Share experience on increased competitiveness through energy efficiency and mandatory energy efficiency standards.	Capacity building and study
--	--	-----------------------------

Issue 11 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Current Thai law on deforestation needs to be built upon in order to fully benefit from any opportunities from REDD and REDD+ initiatives.	Facilitating the creation of a national framework that would allow the planning of an avoided deforestation action plan (at the scales of project, region and country).	Workshops and hands-on training.	What subjects should the workshops and the hands-on training be focused on? Who should participate in this exercise, in particular at regional and local levels? Which network could be used to spread knowledge on a train the trainer approach?

Comment to Issue 11

This issue as it is not applicable. World Bank has a current program in this area	NA. World Bank has a current program in this area	NA. World Bank has a current program in this area	NA. World Bank has a current program in this area
---	---	---	---

Issue 12 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Actors fear loss of competitiveness due to strict emissions reduction policies, but admit that there is little information on the issue.	Improve the knowledge relating to competitiveness and emissions reductions. Learn from the experience of the EU on carbon leakage in critical economic sectors.	Study on competitiveness and carbon leakage in Thailand.	Which sector could be a pilot for such a study?

Comment to Issue 12

There is little clarity on potential costs of MRV to both the public and private sectors (and the competitive impact of such costs)	Cooperate on determining cost of MRV to both public and private sector.	Share experiences via workshop. Develop case studies for Thailand with public and private entities	Let the private sector decide (volunteers)
---	---	---	--

Issue 13 - Barriers/Gap/Need	Proposal for cooperation	Potential concrete actions	Question to Workshop Participants
Lack of mandatory requirements for measurement and reporting of activity data and data that is required to determine facility/process-specific emission factors	Enhance experience at facility level MRV of emissions, dully taking into account concerns regarding disclosure of information.	Design and establish a voluntary MRV system for companies.	Which organizations should be involved in this initiative? Start with a sectoral pilot or work across all sectors?
Comments to Issue 13			
Lack of experience at facility and company level on GHG inventories		Study the process and issues surrounding the design and implementation of a voluntary MRV system for companies.	
Additional Issue 14 Barriers/Gap/Need There is lack of experience in verification in Thailand	Potential proposal for cooperation Build capacity at he appropriate level (namely in the private) on verification of greenhouse gas emissions and emission reductions.	Potential concrete actions Training on relevant GHG emissions and emissions reductions verification standards	
Additional Issue 15 Barriers/Gap/Need There is little knowledge about energy consumption patterns in households, which constitutes a barrier to the development of policies	Potential proposal for cooperation Enhance knowledge on energy consumption in households, in order to facilitate the determination of building codes for Thailand.	Potential concrete actions Support research on energy use and energy saving potentials in households.	

Appendix E. Summary and list of participants of the Thai

Workshop on Measurement, Reporting and Verification of GHG emissions

Note on cooperation opportunities to address needs and challenges for discussion by workshop participants

(This note has been revised taking into account the comments made by stakeholders at the workshop held September, 1st 2010)

Climate change related policies form an integral part of Thailand's environmental and economic development agenda. These policies serve to strengthen Thailand's domestic sustainable development agenda, such as improving energy security and environmental protection through the promotion of alternative energy and energy efficiency.

E.1. The EU Project on GHG MRV:

The Thailand Greenhouse Gas Management Organization (TGO) and the European Commission are working together in this joint project called "Developing countries monitoring and reporting on greenhouse gas emissions, policies and measures".

The overall purpose of this project is to assess Thailand's capacity building needs to measure domestic GHG emissions as well as GHG related impacts of domestic policies and measures with a view to strengthen those capabilities to facilitate two outcomes:

1. enable the Government of Thailand to plan, design, implement and measure the impacts of domestic climate change policies and measures for national planning purposes and thus gain the ability to assess the performance of such policies, and
2. identify the capacity building needs in order to meet the minimum requirements for a (to be created) international MRV system under a future international climate change agreement.

In order to assess the performance of existing policies and to assess the impact of potential future policies, Thailand needs to put in place a system for the monitoring, reporting and verification of the GHG emission related outcomes of such policies.

At the same time, the contribution of these policies to global GHG emission reductions should be recognized by the international community. In fact, current negotiations for a future international climate agreement have acknowledged the need for provision of financial and technical support to developing countries for the design and implementation of such domestic policies under the condition that the impact of such policies is in fact monitored, reported and verified.

This note introduces some of the cooperation opportunities which have been identified and compiled as a result of a stakeholder consultation process which was conducted by the project team in June 2010 and some additional recommendations which were derived from the team's work in other countries. These proposals are intended for discussion during the workshop but do not represent official positions of the stakeholders interviewed, the Thai government or the European Commission.

E.2. Assessment of MRV capacity and gaps¹⁶

The project team assessed the existing MRV systems in two key GHG emission categories in Thailand – Energy and LULUCF.¹⁷

Thailand's first National Communication to the UNFCCC was submitted in 2000, and including a national GHG inventory for year 1994 (with LULUCF). Thailand is currently preparing its second National Communication and GHG inventory.

To the extent possible, national emission factors were used, thus making the latest GHG estimates more accurate and relevant to the country. Still, many gaps in knowledge exist. These suggest that continued research to generate scientific and technical information suitable to national conditions and circumstances would be desirable. Basic research, field observations and testing are needed to improve the quality of the data, to reduce uncertainties, and to enhance understanding of the relationship of these emissions with productive activities in order to help determine the needs and limitations of reducing them.

Thailand has devised a number of policies and measures to stimulate the country's low emission development. The project team assessed the quality of the existing MRV systems that enable the Thai government to assess the performance of these existing policies and measures in relation to achieving the ultimate objective of these policies and measures: delivery of actual GHG emission reductions. Main conclusions are presented in the section below.

The table below also includes the identification of main barriers identified. For each specific barrier or gap, a proposal for cooperation and concrete capacity building activities is presented. When designing capacity building activities attention should be paid to minimizing overlaps and maximizing benefits.

Workshop participants are invited to criticize, complement, delete and add to the draft recommendations for future cooperation that the project team has collected below.

¹⁶ The analysis has been prepared using publicly available documents. This does not include the underlying calculation sheets that were used in the preparation of the Initial National Communications.

¹⁷ These two key categories have received the most attention for GHG Inventory purposes because of their relative importance. As a result, the quality of monitoring and reporting of other categories tends to be worse/not-existent (i.e. in the case of industrial process emissions) even though there is a substantial GHG mitigation potential in these sectors.

These tables have been updated to reflect the comments received from stakeholders at the workshop. The last column record commenst made by stakeholders in this meeting organized by TGO.

Inventories, National Communications

Need/Barrier/Gap	Proposal for cooperation	Potential actions	concrete	Question to Workshop Participants / Comments	Validated Stakeholders Comments
Need for a unique national administrative agency with political mandate and enough resources to strongly coordinate and manage the compilation, continuous improvement and updating of the NGHGI including the required electronic GHG inventory database system. Entities are identified and data collection procedures are in place, However, data is collected for other purposes and does not meet the necessary requirements to estimate GHG emissions.	- Support to the establishment of a national agency and system for the regular compilation of data and estimation of GHG emissions, in order to facilitate the regular elaboration of the National Greenhouse Gas Emissions Inventory and to track effectiveness of domestic climate policy. - Support data providing entities to update current procedures to collecting the required data for the estimation of GHG emissions.	- Sharing experience and knowledge - Support to ONEP in drafting the business plan of the national agency and system.	EU	- What is the current legal basis for the collection of GHG relevant data? Answer: there is currently no such legal basis. - Is there any data management system already build for other purposes, such as air pollution that could be used? Answer: see description of Need/Barrier/Gap This national agency/system should be particularly prepared to coordinate the process of defining national emission factors.	The national administrative agency should be non-governmental organization as it will have more flexibility. A national administrative agency (for coordinating with other organizations and managing data) may be important but what is more important is a good system/mechanism that enable efficient data sharing / links. The fact that entities collect data for their own purposes leads to repetition in data collection from the same sources (e.g. factories, farmers etc). Therefore, it is better to have a national administrative agency. However, the agency should be in a position where it is capable to acquire sufficient information from other sources. On the other hand, the relevant organizations should also be able to provide data with good quality to the agency. Data management is also important, especially in terms of the structure which allows all different organizations to use the same data pool. Data collection should be in continuous basis, rather than project basis. The data structure should also be ready for any new future standards e.g. when the IPCC guidelines are updated. Issue from the agricultural sector –to collect data

Need/Barrier/Gap	Proposal for cooperation	Potential actions	concrete	Question to Workshop Participants / Comments	Validated Stakeholders Comments
					from this section is quite difficult, as it involves surveys which are time and cost-consuming.
					In addition to the above issues, there should be a strong support through either policies or regulations to help enable this to happen.
Need to enhance knowledge across institutions in different sectors on the GHG Inventory Guidelines	Capacity building and hands-on training on the Inventory Guidelines by sector for all sectors and for the players responsible for the inventory and national communication preparation.	• Training with key experts participating in the IPCC process.	• Are energy and AFOLU the priority sectors for such training? Answer: all sectors are important. Energy (production) may be the least complex sector. Agriculture, both in terms of activity data and EF may be the most important.		In addition to the need to enhance knowledge across institutions, the entities who allocate national budget should be more convinced that this is important. Also, each sector should realize or understand their roles in the GHG Inventory.
Emission factors for most key sources (with exception of rice cultivation) do not reflect national circumstances	Establishing national Emission Factors for key sources and sectors, focusing on energy production, agriculture and LULUCF.	• Support to discussion and study on designing a methodological development program: determine which EF for which level of accuracy (tier) should be developed. • Support research programmes in Local Universities	• In which sources should the priority for determining national emission factors be set? Answer: see proposal for concrete action.		If we want to work on emission factors, there should be a meeting where all relevant organizations are in one place so that all can share useful data that leads to accurate emission factors. We can start from sectors that are more ready e.g. energy sector. On the other hand, does Thailand really need its own emission factors? To obtain national emission factors involves great effort, if the default factors do not result in significantly inaccurate data; then default ones should be sufficient.
Authority over forestry issues is divided into several institutions, with different focuses and definitions of forest and forestry.	• Capacity building on estimating emissions in the LULUCF – from unifying the definition of forest across institutions and policies to moving from activity to area based approach. Build	• Workshops on best practices in estimating emissions from LULUCF. • Hands on training for 2006 IPCC			Capacity building is needed for forestry sector, different institutions e.g. have different definitions, and different carbon sinks etc. The important issues in forestry sector are Not enough human resources dedicated to tasks

Need/Barrier/Gap	Proposal for cooperation	Potential actions	concrete	Question to Workshop Participants / Comments	Validated Stakeholders Comments
	capacity on a combined satellite/ground approach. Capacity building on estimating soil carbon.	Guidelines for the AFOLU sector.			relating to climate change, especially younger generations The management does not put importance on this, thus the allocated budget is not enough.
Planning programme on use of the agriculture waste as a source of energy for Thailand and on how such use can be internationally recognized as Thailand's effort for global GHG emissions reduction.	Capacity building addressing the intensive use of agricultural waste for energy production: establishing a time series and data collection system, determine methodologies for estimating emission reductions. Improving the GHG inventory and setting the base for baseline determination towards planning and designing national policies and measures.	- Workshops - Hands-on training. - Evaluate potential options and their advantages including agriculture waste palletizing facilities and others			Some efforts have been done but just were not well publicized.
Need to expand knowledge and experience at facility and company level on GHG inventories.	Enhance experience at facility level MRV of emissions, dully taking into account concerns regarding disclosure of information.	Study on the design and establishment of a voluntary MRV system for companies.			Examples of MRV from developed countries would be useful. Royal Forest Department was approached by international companies who offer to do MRV for them. However, Thailand should be self-reliance.

National Policies and Measures: Design, Implementation and MRV

Barriers/Gap/Need	Proposal for cooperation	Potential actions	concrete	Question to Workshop Participants / Comments	Validated stakeholders Comments
The current institutional framework does not fully provide for an inclusive and coordinated decision making process.	Enhancement of the institutional framework for the decision making, in order to facilitate the dialogue among the different sectoral ministries on climate change, focusing on challenges and opportunities relating to National Policies and Measures and MRV.	Workshops and training with climate change officers at the different ministries		What current institutional setting should this initiative be based upon? Answer: based upon the Climate Change Committee and respective sub-committee.	The participants agreed with the gaps identified.
Need to enhance the current institutional framework to include civil society participation in addition and beyond current legal consultation mechanisms.	To build a Public/Private dialogue on mitigation frameworks, including the design of National Policies and Measures and the system for MRV, at the level of key economic sectors. Setting the reference for key information for the decision making process.	- Symposiums among Public and Private key actors. - Support to the establishment of an on-line clearing house of information on climate change.		- Which sector could be a pilot of such a dialogue? - Which activities should be implemented? Answer: a pilot initiative could be established in relation to land use planning, involving local governments and communities.	The participants agreed on more public and private dialogue. However, in terms of civil society is not yet ready. Comment from private sector: the private sector is willing to disclose information. However, they have only one major concern of any possible negative consequences. For example, if a company discloses information showing their high GHG emission due to their production scale, would it be any impacts on them later on?
Enhance the use of macro-economic models to provide a common understanding for the development of emission reduction measures	Capacity building in developing and using macro-economic modelling tools (such as Markal and Century), including in using the outputs, for the support of the decision making process on National Climate Change Plans.	- Train researchers on development of models - Train government officials to use models and the respective outputs.		Should this exercise be limited to researchers? Should government agencies be included also? Which Universities/Research Centres are most suitable for this?	It is important to develop a practical model, as it should be widely used. During the development phase, relevant organizations should involve.
Need to establish a baseline for the transport sector to support the development of GHG mitigation scenarios and measures	- Exchange of experience on best practices on the establishment of baseline for transport sectors. - Exchange of experiences on measures that reduce GHG emissions in the transport	Workshops, Hands-on Training; Coaching.			This is very important for the transportation sector.

Barriers/Gap/Need	Proposal for cooperation	Potential actions	concrete	Question to Workshop Participants / Comments	Validated stakeholders Comments
	sector.				
Need to better understand the energy efficiency and savings measures currently in place.	- Support the identification of any barriers to the implementation of the energy saving measures currently in place and actions to overcome them. - Sharing experience on increased competitiveness through energy efficiency and mandatory energy efficiency standards.	- Capacity building and study - Knowledge sharing via energy sector coaching sessions and/or workshops.			No additional comments
Need to enhance the current institutional framework on designing a forest and related climate policy - LULUCF and REDD, in order to fully benefit from any opportunities from REDD and REDD+ initiatives.	- Capacity building on designing a forest and climate policy – LULUCF and REDD - Complement existing donors' programme(s) on this topic (World Bank).				MoNRE has already received support from the World Bank to study about REDD. This issue can be omitted.
Enhance clarity on potential costs of MRV to both the public and private sectors	Cooperate on determining cost of MRV to both public and private sector.	- Share EU experiences on costs related to GHG MRV in both public and private sector via a workshop. - Develop case studies for Thailand with public and private entities.			Cost of MRV is important, especially now how the MRV will be is not clear. In addition, cost relating to technology should also be taken into consideration, especially in agricultural and forestry sectors.
Need to develop robust experience in verification in Thailand	Build capacity at the appropriate level (namely in the private) on verification of greenhouse gas emissions and emission reductions.	Training on relevant GHG emissions and emissions reductions verification standards			No additional comment
Need to enhance the knowledge of energy consumption patterns in householders to evaluate clusters that allow the preparation of most effective policies and measures	Establishing a baseline for energy consumption in the households and identifying the emissions reduction potential of energy saving measures.	- Workshop on EU experiences in the residential sector. - Support to study on determining energy consumption baseline in			No additional comment

Barriers/Gap/Need	Proposal for cooperation	Potential actions	concrete	Question to Workshop Participants / Comments	Validated stakeholders Comments
		households. • Support to study on emission reduction potential and costs of energy saving measures in the residential sector. • Support to the design of a Household Energy Efficiency Policy.			

E.3. List of participants - Meeting on Measurement, Reporting and Verification of GHG emissions - 23 September 2010, organized by TGO

	Name	Organization	e-mail
1	Mr. Chaiwat Mancharoen	TGO	Chaiwat.m@tgo.or.th
2	Mr. Chessada Sakulku	TGO	Chessada.s@tgo.or.th
3	Ms. Wararat Chaumkrue	TGO	Wararat.c@tgo.or.th
4	Ms. Mewadee Sereesatheensub	TGO	mewadee@tgo.or.th
5	Ms. Wasinee Chunbaan	TGO	Wasinee.che@tgo.or.th
6	Mr. Rongphet Boonchuaidee	TGO	Rongphet.b@tgo.or.th
7	Ms. Paweena Panitpichet	TGO	paweena@tgo.or.th
8	Ms. Puttipar Rojkitikhun	TGO	r_puttipar@tgo.or.th
9	Ms. Penporn Petsri	TGO	penporn@tgo.or.th
10	Ms. Anna Keawchauum	TGO	Anna.k@tgo.or.th
11	Ms. Nuangruthai Chortip	TGO	Chortip_d@tgo.or.th
12	Ms. Neeracha Threenej	TGO	neeracha@tgo.or.th
13	Mr. Pahol Sawetjinda	TGO	Pahol_sjinda@tgo.or.th
14	Mr. Jakkanit Kananurak	TGO	Jakkanit.k@tgo.or.th
15	Ms. Wiriya Pantap	TGO	Wiriya.p@tgo.or.th
16	Mr. Darnp Padungsri	TGO	darnp@tgo.or.th
17	Ms. Waraporn Kunawanakij	TGO	Waraporn.k@egat.co.th
18	Ms. Somjai Boonnak	Electricity Generating Authority of Thailand (EGAT)	Somjai.bu@egat.co.th
19	Ms. Kornpawee Hemmakorn	Electricity Generating Authority of Thailand (EGAT)	Kornpawee.h@egat.co.th
20	Ms. Jirapa Intisang	Office of Agricultural Economics (Ministry of Agriculture and Cooperatives)	jirapai@oae.go.th
21	Ms. Sasithorn Kittithumkul	South Pole Carbon (Thailand)	s.kittithumkul@southpolecarbon.com
22	Ms. Pathathai Tonsuwonnont	South Pole Carbon (Thailand)	p.tonsuwonnont@southpolecarbon.com
23	Ms. Bongkoch Kittisumphan	Department of Industrial Works (Ministry of Industry)	Bongkoch.k@diw.mall.go.th
24	Ms. Kanyasorn Tansubhapol	British Embassy Bangkok	Kanyasorn.tansubhapol2@fco.gov.gsi.uk
25	Ms. Areerat Kittisomboonsuk	National Statistics Office	oarawan@nso.go.th
26	Mr. Sutthiluck Kanluan	National Statistics Office	sutthiluck@nso.go.th
27	Mr. Chingchai Wiriabancha	Department of National Parks, Wildlife and Plant Conservation (Ministry of Natural Resources and Environment)	Chingchai.v@gmail.com

////

P:\Arnhem\Projects\DocsInPrep\3 - Reports in preparation\Various countries\Greenhouse Gas\final report december 2010\To be printed\Thailand Country Report_FINAL_to be submitted.doc

	Name	Organization	e-mail
28	Mr. Arwut Nitiphon	Petroleum Authority of Thailand (PTT)	-
29	Ms. Sineenart Wisutsamarn	Thai Airways International	Sineenart.w@thaiairways.com
30	Mr. Jannarong Ngamsamparn	Thai Airways International	-
31	Mr. Seksan Sangdow	Department of Pollution Control, (Ministry of Natural Resources and Environment)	sangdow@s@yahoo.co.uk
32	Mr. Nintaphan Kulpreedarat	Department of Livestock Development (Ministry of Agriculture and Cooperatives)	NINGEN43@yahoo.com
33	Ms. Sutthiya Chantawarangkul	The Delegation of the European Union to Thailand	Sutthiya.chantawarangkul@ec.europa.eu
34	Mr. Wisarut Tangsuntornkan	Department of Mineral Fuels (Ministry of Energy)	witsarut@dmf.go.th
35	Mr. Kongchai Ekhsansin	SCG Chemicals Co.,Ltd	kongchae@scg.co.th
36	Mr. Yutthapong Mahasittiwat	Rayong Olefins Co., Ltd (SCG Chemicals)	yuttapom@scg.co.th
37	Ms. Sukanya Chaishun	The Federations of Thai Industries	sukanya@cpf.co.th
38	Mr. Buntoon Wonsilachot	The Thai Chamber of Commerce and Board of Trade of Thailand	Buntoon@gmail.com
39	Mr. Jeerasak Chukwamdee	Department of Marine and Coastal Resources	j.chukwamdee@hotmail.com
40	Mr. Worapong Waramit	Land Development Department	Worapong@lddd.go.th
41	Mr. Chaiyasit Liengsiri	Department of Forestry	Cliengsiri@yahoo.com
42	Ms. Chananan B.	Energy Policy and Planning Office (EPPO, Ministry of Energy)	chananan@epo.go.th
43	Ms. Thanaporn Wansiri	TGO	Ononsukae@hotmail.com
44	Ms. Areerat Yuhun	Department of Alternative Energy Development and Efficiency (Ministry of Energy)	-
45	Mr. Wisarut Tansuntornkan	Department of Mineral Fuels (Ministry of Energy)	-
46	Ms. Patwalai A.	Full Advantage Co.,Ltd	Patwalai.a@fulladvantage.com
47	Ms. Theerarat T.	TGO	-
48	Ms. Supanan Pueknok	Department of Marine and Coastal Resources (Ministry of Natural Resources and Environment)	Kaewjahor@hotmail.com

////

P:\Arnhem\Projects\DocsInPrep\3 - Reports in preparation\Various countries\Greenhouse Gas\final report december 2010\To be printed\Thailand Country Report_FINAL_to be submitted.doc

	Name	Organization	e-mail
49	Ms. Wonkot Wongapai	Chiangmai University	Wongkot.w@yahoo.com
50	Ms. Duankamol Watcharakitti	The Thai Chamber of Commerce and Board of Trade of Thailand	-
51	Mr. Thitipong Piboonjunsamrid	TGO	-
52	Ms. Nattanan Kitworawat	TGO	-
53	Ms. Worakamol Laopitinan	King Monkut's University of Technology Thonburi (KMUTT)	Jeng.onamon@gmail.com
54	Mr. Jakapong Pongthanaisawan	The Joint Graduate School of Energy and Environment (JGSEE)	Jakapong@jgsee.kmutt.ac.th