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Country Report Indonesia



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1. About MRV and this report

MRV stands for Monitoring, reporting and verification (MRV). 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 measurement, reporting and verification (MRV) of emissions, the preparation of National Communications, Greenhouse Gas Inventories, and planning and development of nationally appropriate mitigation actions (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 October 2010. Said process was aimed at identifying capacity barriers, gaps and recommendations for the monitoring and reporting of GHG emissions and mitigation policies and measures in Indonesia. The following steps have allowed the team to arrive to this final country report:

- Introduction workshop on MRV on May 21, 2010, organized in collaboration with the Ministry of Environment. It was attended by over 80 participants, mainly from the Indonesian government.
- Development of a first draft of the country report which analyses the current status with regard to MRV, sectoral emissions, and emission reduction policies in Indonesia (See Appendix 1).
- First in-country mission: consultation with stakeholders and systematization of findings. During the first visit, stakeholders from forestry, agriculture, energy production, industry sectors were interviewed. Approximately 10 meetings were held with more than 25 key stakeholders including information providers, analysts, policy makers and research institutions, as well as international donors. See Appendix 4 for the summary report of the interviews.
- Second in-country mission: country workshop and systematization of findings. The country workshop took place on August 27th, 2010. More than 90 representatives from the government – environment, economy and finance, energy and mining, foreign affairs and agriculture-; the private sector; civil society and the international community attended the workshop. The objectives set for the workshop were to socialize and validate preliminary findings, to gather more information about barriers, gaps and recommendations, and to identify key work areas for a MRV capacity building project. See Appendix 5 for workshop report, Appendix 6 for the workshop agenda and Appendix 7 for the list of participants and Appendix 8 for the workshop discussion paper. The workshop participants were also requested to provide written input which is included in Appendix 9.
- Preparation of the final country report. The current report aims to analyze the process of planning, design, implementation and evaluation of nationally appropriate mitigation actions and low emission development strategies in Indonesia. It also includes existing instruments and processes for monitoring and reporting such as GHG inventories and National Communications to the UNFCCC.

This report begins with an introduction of the country's circumstances relevant to the subject of monitoring and reporting of GHG emissions and mitigation policies and measures (MRV), followed by a discussion on how Indonesia's current and planned activities further enables MRV and LEDS (chapter 3). The fourth chapter focuses on the main barriers to MRV and climate change mitigation. Finally chapter five gives a detailed overview of barriers and recommendations for capacity building for MRV and NAMAs/LEDS.

2. Introduction: Indonesia, MRV and mitigation

2.1 Introduction to the country

Indonesia consists of an archipelago situated in South East Asia, covering an area of 190 million ha with five large islands and more than 13,000 small islands, of which 7% are permanently inhabited. Since 2005, the Republic of Indonesia has been administratively divided into 33 provinces. The current population is 231 million, projected to grow to over 300 million by 2030. Gross domestic product (GDP) is approximately US\$175 billion, with a growth rate of 6.3% in 2007.

Indonesia has a rich forest resource which is however subject to heavy degradation and deforestation, mostly by so-called unplanned drivers: forest fire, illegal logging, and forest encroachment. Planned drivers include forest conversion for establishment of agriculture plantation, transmigration areas, and establishment of new districts, development of new rice fields, and large-scale mining activities.

The area of agricultural land has increased dramatically, particularly due to the high growth of palm oil plantations. The rapid increase in the palm oil plantations is driven by the demand increase in the domestic and international markets, including the demand for bio-diesel. To secure rice production in the future, Indonesia also plans to have 15 million ha of land permanently allocated as cropland.

In line with the country's economic and population growth, final energy consumption has been growing by about 3% per year since the year 2000. The share of total energy consumption by sector in 2008 is: industry 48%, transportation 31%, households 13%, commercial 4%, and agriculture, construction and mining (ACM) 5%. The growth of the industrial sector, particularly for mineral, chemical and metal products in the period of 2000-2005 was low or even negative.

2.2 Institutional structure

Indonesia operates within the political framework of a presidential democratic republic where both the head of state and government is the president, who is assisted by 34 ministers incorporated under a cabinet. Important ministries for climate change policy include Ministry of Environment (MoE), Energy and Mineral Resources (MEMR), Finance (MoF), Agriculture (MoA), Forestry (MoFor), Transportation (MoT), Public Works (MoPW) and Planning (Bappenas). The latter is responsible for translating the national target into sectoral policies, and to monitor and evaluate climate policies. Furthermore the National Climate Change Council (DNPI), chaired by the President and membership from several ministries, has been established to formulate strategies coordinate activities between ministries and ensure consistency. Indonesia has a high level of decentralisation, with a lot of decision power with provincial and local governments.

2.3 Mitigation activities

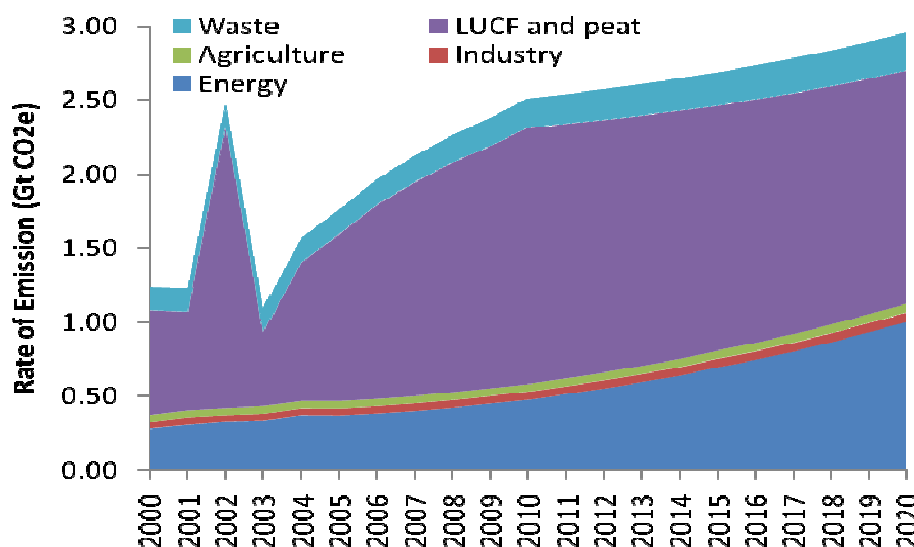
Indonesia is developing plans to limit the emissions growth, and is preparing to take measures in the context of sustainable development. Indonesia has submitted seven NAMAs to the UNFCCC in the framework of the Copenhagen Accord, mainly focussing on the forestry sector: (i) sustainable peat land management, (ii) reduction in rate of deforestation and degradation, (iii) development of carbon sequestration projects in forestry and agriculture, (iv) promotion of energy efficiency, (v) development of

alternative and renewable technology, (vi) reduction in soil and liquid waste and (vii) shifting to low emission transportation modes. The GoI also has announced a voluntary, unilateral GHG emission reduction goal of 26% below BAU in 2020, and 41% depending on international support. It has designed sectoral policies for achieving these reductions, and for the unilateral action the resources have already been included in the sectoral budgets. All sectors contribute to the emission reductions, with the forestry and agriculture taking the main part. MRV is recognised as being in the national policy interest and it therefore plays important element in the national climate strategy. There are existing systems (MONEV) which can be built upon.

2.4 National Communication and GHG emissions

Indonesia has prepared the Second National Communication (SNC), including an emissions inventory for the year 2000. Under BAU it is estimated that by 2020 GHG emissions may reach 2.95 GtCO₂-eq (Figure 2.1), a 1.57 GtCO₂-eq increase from the 1.38 GtCO₂-eq emissions in year 2000. The contribution of the energy sector to total emissions is projected to reach roughly 33 percent, while LULUCF and peat will still be the main source of national emissions. This BAU emissions projection has been adopted by the Government of Indonesia as the reference to measure Indonesia achievements in reducing its GHG emissions.

Figure 2.1: Historical and future projection of emissions from all sectors in Indonesia (Boer et al., 2010)



3. Mitigation: considerations and prospects

Indonesia is among the international front-runners when it comes to climate change mitigation, with the voluntary emission reduction target mentioned above. Strengthening of and building on the ongoing activities would further help Indonesia on the path of low-emission development. Important aspects of this are institutional structure, implementation on the local /provincial level of mitigation policies as well as of MRV procedures, improving data and data management and methodologies.

Sectoral policies are being identified in e.g. the Sectoral Roadmap and the National Action Plan on GHG Reduction (RAN-GRK). The actions in the latter are likely to be further “translated” into NAMAs (see Appendix I for further details on the proposed policies and measures).

A review of the available literature and government reports has revealed 12 existing studies with possible relevance for an Indonesian Low-emission Development Strategy (LEDS) covering the national GHG inventory and mitigation actions, climate change programs and policies, and low carbon development (a 13th document constitutes the submission made by the GoI to the UNFCCC in response to the Copenhagen Accord). At this stage however none of these can be considered as a broadly accepted, government-owned LEDS. A key challenge is to align those different studies and implement the policies at the national, provincial and local level while inter-sectoral coordination is also required. Considering the above fact, to advance NAMAs it is very important for sectors and local governments to be capable of designing development plans and policies that will lead to lower carbon emissions but at the same time sustain economic growth. In this regard, the availability of tools and methodologies for assessing the impact of policies on GHG emission is required. The tools should allow the sectors and local governments to assess impacts of different policy scenarios within and across sectors on GHG emissions. This will help to minimize potential contradictions between sectors’ climate change related policies and measures and also to improve coordination and programs’ synergies across sectors.

Uncertainty regarding the most appropriate methodology to estimate future Indonesian GHG emissions remains. The forecast of BAU emissions is a critical aspect of Indonesia’s climate change mitigation plans as this forms the reference point for the national emissions reduction target. While the Second National Communication includes the most complete emissions modelling performed to date in Indonesia, a number of assumptions are open to interpretation including; i) the choice of which existing policy measures are considered as BAU; ii) the level of future LULUCF emissions under BAU; iii) the structure of Indonesia’s economy in the future and iv) the interaction between sectors which is not accounted for in the SNC. Just as reported emissions should be verifiable and transparent, so should the projections of future emissions, particularly if international support is sought to pursue measures beyond the 26 percent unilateral target.

To gain international recognition for mitigation actions, the country needs to establish an MRV system. The reduced emissions need to be measurable, reportable and verifiable. However, the MRV system is not only applied to emission reductions, but goes beyond it, as it will measure and monitor all enabling condition components (technology, finance, and capacity building) relevant to emission reduction measures. Based on opinions from stakeholders obtained during interviews done by the project team (see Appendix 3), indicators that may need to be measured, reported and verified are presented in Table 3.1.

Table 3.1: Potential indicators to be MRV-ed

Measured component	Type of Data	Actor(s)
Emission reduction	Activity Data Emission Factor (EF)	Ministries and local governments
Development indicators	Calculated data	BPS
Finance	Amount Flow How it is used	Coordinating Ministry on Economic Affairs Bappenas
Technology	Type of technology Nature (loan/grant)	Ministry of Research and Technology
Capacity Building	Human resource development Institutional setting and capacity strengthening	Sectors, Ministries Central and local government

An issue that needs to be resolved is whether a single and independent institutional system is required to MRV all the different components listed above. At present all sectors at all levels already have a monitoring and evaluation system - MONEV (see Appendix 2). All programs implemented by sectors are subject to review by the Inspectorate Generals (in term of achievement of the program following the performance defined indicators) and by Agency for Financial Audit or BPKP (by means of financial audits). In the context of NAMAs, the new issue is to add a new indicator in the review process: GHG emissions. The issue is how an entity can measure, report and verify the emission reductions from the implementation of the programs that meet international standards. Development of a GHG MRV system is therefore mainly a matter how the current system can be improved to fulfil new needs in relation to GHG emission reductions.

An institutional structure for MRV is currently under discussion, and the exact roles of the National Climate Change Council, the Ministry of Environment, other Ministries, and lower-level governments in this context remain to be specified. It is also not clear how the MRV institutions will link with the national system for GHG inventory (SIGN, under development) and how such MRV system will link with MONEV.

The National MRV Institution will work under the International and National Steering Committees (SC), who are currently responsible for designing the MRV framework. In the context of Lol with Norway, the members of the International SC will be determined by the Government of Norway and the National SC will be chaired by the Chairman of UKP4 and the members will be the Chairman of Bappenas, Minister of Forestry, and Minister of Finance. The members of International and national SCs will be broadened later by including other international donors and other national institutional depending to scope of mitigation activities. This means that the establishment of the National MRV Institution is not intended only for accommodating the Lol with the Norwegian government but has a broader scope (i.e. beyond the forestry sectors). In the context of the Lol, it is planned that the MRV institutional system for REDD implementation will be established in November 2010 (further details can be found in Appendix 1).

For the interviews conducted it was assumed that the Independent National Entity would be responsible for implementing MRV as required. This independent MRV institution is expected to function as a body that will (i) coordinate sectors in defining baselines and reference emission level (REL), (ii) act as an internal verifier for all sector, (iii) ensure compliance with IPCC requirements, (iv) register all mitigation activities whether supported or credited, (v) develop standard operating procedures on activities' MRV, (vi) coordinate and to keep records on implementation of capacity building on MRV and (vii) coordinate the verification process

with external/international verifiers. Up to now, the form of the National MRV Institution as well as its role and function is not defined. Discussions, workshops and capacity building on this issue are ongoing.

4. Findings: gaps and barriers in regards to mitigation and MRV

Based on the stakeholder interviews and findings from available studies, the main gaps and barriers identified for Indonesia to move forward on MRV, NAMAs and low-emissions development are related to : 1) policy planning at all levels and implementation at the provincial and local level; 2) institutional structure with roles and mandates for MRV and mitigation yet to be clearly defined; 3) technical expertise and capacity to measure existing and estimating future emissions not present in the key institutions; 4) lack of data, data management and quality procedures, and 5) lack of consistency in methodologies for estimating future emissions. These gaps apply to all sectors, but in particular forestry.

4.1 Policy

As mentioned above, the government of Indonesia has set up sectoral mitigation policies and programs to achieve the 26% of emission reduction target (ERT) through unilateral actions and 41% with international supports. The RAN-GRK has defined share of each sector to achieve the ERT. However, the level of involvement of sectors in the process of defining emission under BAU and ERT varied. The linkage of mitigation policies among sectors has also not been well taken. Certain mitigation programs in a particular sector may be closely interlinked with mitigation program of other sectors. Thus the successful implementation of mitigation programs in one sector may depend on successful implementation of mitigation program of other sector. On the other hand, it is also unclear how this policy is translated to local government policies and the private sector. In many cases local policies have not accommodated the national mitigation policies. These all will affect the effectiveness of the implementation of the mitigation policies and program. Therefore, capacity development for sectors and local governments on the climate change mitigation is needed to assist them in integrating the climate change mitigation into their development plans.

4.2 Institutional structure for climate policy

Who is responsible for what, seems to be one of the toughest questions to answer with regard to institutional setup of MRV and NAMAs. Although it is clear that line ministries will be responsible for managing activities with their respective sectors, coordination between sectors is still lacking. For example, the Ministry of Environment is assigned to coordinate the GHG Inventory System. However the extent to which the system can be managed by the Ministry of Environment, the flow of data within the system, and how to apply QA/QC of the GHG data is still undecided. Some stakeholders mention that it is important to respect data ownership and that the system should be set up in such a way that allows for each sector to be fully responsible for the whole process: from data collection to emissions estimates. Such an approach is controversial and there is much debate about it, mainly as this could imply higher capacity building needs.

With regard to local and national communication and coordination, as local governments tend to be autonomous this may create gaps in regards to communication and flow of data from the local to the national level and vice versa. City or district agencies are collecting data and submit it mostly in summary to the head of city or district's office. Submission of data to the respective ministries is mostly done when requested by the ministry or if there is a national program implementing in the city/district which requires such data, rather than on a regular basis. Without having a National Registry System which registers all

carbon related projects implemented by any entities in the country it will be difficult to identify which part of emission reduction come from unilateral, supported actions and projects for carbon market.

There is a need to develop registry systems which will record all mitigation actions being supported by developed countries and via carbon markets, and possibly also unilateral actions. The discussion on the registry system is still limited. So far, the national registry system has been mentioned in Minister Forestry Regulation P.30/Menhut-II/2009 on Guidance for REDD Implementation. The National Registration is an institution that has the task to conduct the registration of all REDD activities. However, the National Registration has not been developed yet. During a stakeholder consultation workshop, it was mentioned that the role of KOMNAS MPB (National Commission for CDM), an institution which issues host country approval to any CDM projects, could be expanded to act as the National Registration Institution. Based on the above conditions, it is apparent that the development of institutional framework for MRV is urgently required. At least three types of institutions will be needed at National Level namely Independent National MRV Institutions, the National System for GHG Inventory (SIGN) and the National Registry System.

4.3 Technical expertise

Limited available experts with deep understanding on issues such as climate change mitigation and GHG inventory is a problem almost every sector faces. One crucial issue is the lack of understanding on which data need to be collected and/or measured for estimating GHG emissions of activities.

4.4 Data Collection

All sectors are collecting various types of data required to support the development planning process. However, in most cases data is being collected without proper documentation and good archiving system and QA/QC¹ systems are also not in place. Subministerial departments (divisions and subdivisions) in each sector have a responsibility to maintain their data. However some ministries have Centres for Data and Information responsible for collecting and managing the sector's data but the centres have a limited responsibility in controlling the data quality. For example, data on energy production and consumption are usually sent by companies/institutions to its respective Directorate General rather than the Ministry's Centre for Data and Information, which then get data from the Directorate Generals. For some key data, the Ministry's Centre for Data and Information does data checking randomly. In the case inconsistencies are found, the Centre will check with the Directorate Generals or the relevant companies.

For some types of activity data, the collection and data measurement is conducted by different agencies, and inconsistencies are commonly found. The inconsistencies can be due to the difference in methodologies e.g. in terms of number of sampling, data collection techniques, data definitions, verification systems etc. For example, land use, land use change and forest cover data are collected by a number of

¹ Quality Assurance (QA) activities include a planned system of review procedures conducted by personnel not directly involved in the inventory compilation/development process to verify that data quality objectives were met, ensure that the inventory represents the best possible estimate of emissions and sinks given the current state of scientific knowledge and data available, and support the effectiveness of the quality control (QC) programme.

institutions, including Directorate General of Forest Planning under MoFoR (commonly called as BAPLAN), LAPAN (Indonesia Space and Aeronautics Agency), and BAKOSURTANAL (National Coordination Agency for Survey and Mapping). The estimates of deforestation from different institutions can be different which may lead to confusion as to which data is the best for reference. For the industrial sector, some companies have followed international standards of measurement or calculation methods which are mostly in line with IPCC guidelines, but some use their own methods and send reports to respective associations/ministries.

Those data in the reports are treated in the same way as data sourced from industries/companies who have followed the international standards.

Some of the data maintained at national level come from local governments. In some cases there is no clear mechanism for data communication. For example, the central government may visit local governments to collect data, e.g. for captive power generation and local coal production. This issue has been a growing concern in the Ministry of Energy and Mineral Resources as the Ministry has the supervisory role to the energy and mineral sector of the country. The institutional mechanisms and standard operating procedure for sending activity data from the local to the national level in developing the National GHG Inventory is required. Implementation of a standardised QA/QC systems is crucial to produce reliable and accurate data. The role and mandate of institutions responsible for data management or data centres (such as Pusdatin) in line ministries could be expanded so that centres have increased power to directly collect data from the sources and the authority to assess the quality of the data.

4.5 Methodologies

The selection of methods and assumptions for developing GHG inventories and projections is crucial in designing mitigation strategies. For example, projections of GHG emissions in the absence of climate change policies is needed as a basis to measure what is the level of reduction of emission reached after the implementation of mitigation policies. The SNC has provided business-as-usual emissions projections for all sectors. However the assumptions made by different sectors have been made independent of each other. In reality assumptions used in one sector may affect other sectors: for example, the projected increase in demand for agricultural land for rice cultivation should be captured in the forecast for the forestry sector as an increase in deforestation. Ideally the development of assumptions used for emission projections are done in an integrated way.

In addition, with the exception of the energy sector, most projections to date in Indonesia used simple extrapolation techniques taking into consideration the historical trends. Activity data is then projected based on projection models, which generally use GDP and population as growth drivers. Boer et al. (2010) has reviewed various studies in Indonesia related to GHG inventories, emission projections and mitigation strategies. For GHG inventories, including the SNC, mostly Tier 1 and 2 methodologies were used. For emission projections, studies used different methodologies and assumptions, and as a result there is substantial uncertainty regarding baseline greenhouse gas (GHG) emissions forecasts in Indonesia. Uncertainties for the BAU projections are substantial for all sectors, in particular for forestry. Appendix 3 summarises the methodologies and uncertainties related to recent GHG inventories and projections.

4.6 The way forward

The way forward for Indonesia towards a LEDS, NAMAs and an effective MRV system is, based on the findings and considerations above, composed of three key elements:

- Further aligning and building consensus across all sectors and levels of government on the path towards low emission development, based on a strong leadership, commitment from sectors and coordination among stakeholders.
- Ensuring capacity for implementation at provincial and local levels.
- Designing an MRV system which provides for the collection and management of good quality data and which, while ensuring independence, builds upon and upgrades current existing systems (MONEV).

5. Way forward regarding MRV and mitigation

Capacity building can help Indonesia to further develop its MRV system and enhance its ability to embark on a low-emission development path. There is a number of ongoing unilateral activities and systems to build on, and a host of internationally funded activities related to MRV capacity building, however, most of these targeting the forestry sector, several of which include REDD programmes on the provincial level. The relevant activities are included in Table 5.1. Discussions, workshops and capacity building on MRV institutions are ongoing. The initiatives implemented by the agencies are not always coordinated well. It is crucial that these similar initiatives will be well coordinated and integrated to produce a positive and valuable outcome.

It is suggested by stakeholders that the EC supported capacity building activities be directed to sectors other than forestry, and to issues such as projections of emissions, estimation of achieved emission reductions, and the planning, development and implementation of NAMAs, whereby added value to SIGN needs to be ensured.

The focus of the EC capacity building activities may be on the industry, energy and agriculture sectors. The focus of the capacity building activities could be on (i) institutional development related to the establishment of an effective monitoring and evaluation system and of a national registry system, (ii) strengthening technical capacity of national experts in regards to methodologies for data collection and measurement/estimation of GHG emissions and (iii) management and use of transferred technology². For the forestry sector, one important capacity building activity in need of support is the development of technical capacity or transfer of technology for measuring forest degradation.

The specific capacity building activities related to MRV as proposed by the stakeholders are:

- Design effective national and local MRV systems taking into consideration the current monitoring and evaluation (MONEV) system;
- Improve activity data collection procedures, particularly for key sources such as transport, rice cultivation, animal husbandry and peat;
- Design an effective institutional mechanism for activity data transfer from the local to the national level;
- Provide for the international exchange of information and capacity building to use radar technology or other available technology for assessing and monitoring forest degradation;
- Develop capacity of local and regional governments and the private sector in designing development programs with lower emissions and defining baseline;
- Sharing of best practices and models for emission reduction estimates.

² Technology transfer would include 'hard' aspects (acquisition of the technology) as well as 'soft' aspects (e.g. capacity building on the use and maintenance of the technology), e.g. technology to monitor forest degradation

During the consultation process with stakeholders in the MRV Workshop conducted under this project, it was also suggested that the EC capacity building project is done at both national and sub-national level. Capacity building at the local level through pilot activities with support from international experts is thought to be an effective approach. The capacity building at the sub-national level could be done as pilot-NAMA at the district, province or city level, and in parallel this would assist in establishing the MRV system. The pilot would cover several of the aspects of NAMAs and MRV described in Table 5.1: data management and transfer, data quality, institutional structure, local GHG inventory, design of NAMA, use of methodologies for baselines and determination of emission reduction potentials, monitoring of the actions (whenever a given issue covered in Table 5.1 should be part of a pilot project, there is a reference to it). The process for selecting sectors and locations for pilot-NAMAs has not been decided yet and this needs to be further consulted with the Ministry of Environment.

Based on gap and barriers analysis and inputs gained during the interview and the workshop as well as from other available studies, some key capacity building activities and proposal for initiatives and action on MRV is presented in the table below.

Table 5.1: Gaps, barriers and potential capacity building activities related to MRV

Gap/Barrier	Classification	Type of capacity buildings and potential concrete actions	Focal stakeholders	Other stakeholders involved	Ongoing related initiatives
<p>Current focus in building capacity for MRV is on REDD and on GHG emissions, while other sectors and other issues beyond GHG emissions – such as financial assistance, capacity building and technology transfer - are also relevant.</p> <p>The challenge lies in setting up a system which encompasses all the different aspects which builds upon and upgrades the current MONEV system.</p>	Institutions	<p>Design effective Local and National MRV system taking into account current monitoring and evaluation system</p> <ol style="list-style-type: none"> 1. Support a series of dialogues with local governments and sectors for getting inputs in defining effective National MRV and assist the establishment of sectoral and local MRV systems by improving current monitoring and evaluation (MONEV) system 2. Establish National Working Group with members from agencies and bodies that implement MONEV and local government representatives to design sectoral and local MRV system 	<p>Ministry of Finance, Bappenas, Ministry of Environment, Inspectorate General, and BPK (Financial Auditing Agency), Ministry of Domestic Affairs and local government association, DNA (KOMNAS MPB), DNPI</p>	<p>Other line ministries, CSO, Universities and Research Agencies</p>	<p>Establishment of National MRV for REDD under the LoI with Norway</p>
<p>No formal institutional mechanism to allow for regular transfer of activity data required for the elaboration of reliable National GHG inventories from local governments to the national level and in particular to the Ministry of Environment</p>	Institutional	<p>Design effective institutional mechanisms for activity data transfer from the local to the national level.</p> <ol style="list-style-type: none"> 1. Workshops to facilitate discussion on development of effective institutional mechanisms for transferring activity data from the municipal/district level to the province and national levels and from the private sector to related directorates and ministries to allow for regular elaboration of National GHG inventories 2. Facilitate workshop discussions by providing a study on the institutional set up in other countries, including options for Indonesia 	<p>Ministry of Environment, Centre for Data and Information of all sectors and Association of Local Governments, local governments, and Business Associations,</p>	<p>Universities and research Agencies, CSO, DNPI</p>	<p>SIGN Project supported by JICA may cover part of this capacity building needs</p>

Gap/Barrier	Classification	Type of capacity buildings and potential concrete actions	Focal stakeholders	Other stakeholders involved	Ongoing related initiatives
		<ol style="list-style-type: none"> 3. Support to the Ministry of Environment to follow up the result of the workshops to design effective institutional mechanisms for activity data transfer and to develop supported regulation as well as standard operation procedures (SOP) for the activity data transfer, namely through support by international experts. 4. Provision of on the job trainings for the relevant stakeholders on the application of the SOP and standard format for the data transfer (e.g. the use of e-forms to facilitate quick data transfer). 5. Implement pilots to test the system in particular at the level of district/province and relevant ministries 			
<p>Inconsistent and high uncertainty associated with activity data particularly for the non-energy sectors. No system for QA/QC and poor data collection and management systems, particularly at the local level. Greater challenges associated with key sources such as rice cultivation, animal husbandry and peat</p>	<p>Data collection and management</p>	<p>As part of the institutionalization efforts in the proposals above, specifically improve the collection process of activity data from key sources, giving priority to key sources such as rice cultivation, animal husbandry and peat.</p> <ol style="list-style-type: none"> 1. Developing manuals for QA/QC, uncertainty assessment, based on IPCC 2. On the job training on IPCC guidelines, including on good practice, namely for identifying key sources, designing and applying QA/QC procedures, assessing data uncertainty 3. Design and implement a data archiving system which includes national, provincial, local and sectoral information 4. Support capacity building activities and international 	<p>Ministry of Environment, Centre for Data and Information of all sectors, local governments, and selected private sectors</p>	<p>Universities and research Agencies (national and international) and CSO)</p>	<p>SIGN Project supported by JICA and internal program from government budget</p>

Gap/Barrier	Classification	Type of capacity buildings and potential concrete actions	Focal stakeholders	Other stakeholders involved	Ongoing related initiatives
<p>Most of the efforts, including with support from international donors is still focused on assessing deforestation not in forest degradation, thus not covering an important part of the problem in Indonesia</p>	<p>Methodology/ Technology</p>	<p>sharing of experiences in regards to use of the technology mentioned in point 1, including on management and use and processing of data collected, and interpretation</p> <p>5. Capacity building, including international exchange of information and data, such as high resolution satellite data of remote areas, system, the use of CRF etc) at local (city, district and province) and national level (selected sector)</p> <hr/> <p>1. Exchange of information and experiences on best practices and best available technologies for assessing and monitoring forest degradation, such as the radar technology.</p> <p>2. Support to the definition of best options for measuring forest degradation in Indonesia, taking also into account cost associated with acquisition, maintenance and use of technologies.</p> <p>3. Support the implementation of a system based on such best technology.</p> <p>4. Support capacity building activities and international sharing of experiences in regards to use of the technology mentioned in point 1, including on management and use and processing of data collected, and interpretation</p> <p>5. Capacity building, including international exchange of information and data, such as high resolution satellite data of remote areas,</p>	<p>Ministry of Forestry</p>	<p>LAPAN</p>	<p>JICA Project in Central Kalimantan on the use of RADAR for measuring emission from peatland</p>

Gap/Barrier	Classification	Type of capacity buildings and potential concrete actions	Focal stakeholders	Other stakeholders involved	Ongoing related initiatives
<p>The Ministry of Industry plans to undertake an exercise of compiling GHG inventories for different industrial sectors. However, there is a great need to define specific emission factors for such sectors in order to increase the accuracy of the exercise.</p> <p>Work undertaken by the cement sector can be a reference.</p>	Methodology	<ol style="list-style-type: none"> Determination of National Emission Factors for selected industrial sectors such as Pulp and Paper, Steel, Ceramics, Sugar, Petrochemicals, Textile, Cooking Oil and Fertilizer 	<p>Centre for Data and Information and Research Centre for Industry</p> <p>-Ministry of Industry</p>		Internal program on GHG Inventory from Government Budget
<p>Currently there is no official database which is publicly accessible and that provides for all the key data and parameters that, if used by all relevant stakeholders, would facilitate coherence among methodologies used to design NAMAs and to MRV. Human resources are also lacking.</p>	Information	<ol style="list-style-type: none"> Support to the establishment of an online clearing house that includes information related to: <ul style="list-style-type: none"> Key activity data Key emissions factors and other parameters Methodologies for baselines Methodologies for estimating the potential emission reductions from measures The clearing house would also include any other relevant information for planning and designing policies and to MRV, such as <ul style="list-style-type: none"> Emission scenarios and paths Actual determination of baselines Determination of reduction potentials of given measures/technologies. 	<p>MoE, KOMNAS</p> <p>MPB</p>	<p>Other Ministries, and local level governments</p> <p>Universities</p>	

building activities related to LEDS and mitigation actions

<p>Mitigation actions</p>	<p>Understanding of LEDS and NAMAs by local governments and ministries is still limited, no capacity in putting NAMAs in the context of sustainable development. No good understanding of local government on how certain development policies and programs will significantly affect the level of emissions.</p> <p>Furthermore, several studies include elements of a LEDS for Indonesia, however there is no comprehensive accepted low-emission development strategy.</p>	<p>Policy</p>	<p>Support the enhancement of the understanding of the challenges and opportunities from LEDS and NAMAs across the different levels of government and across sectors.</p> <ol style="list-style-type: none"> 1. Support to a multi-stakeholder process, including workshops, to develop a common vision for low carbon development between local and national government and with sectors, including civil society 2. Exchange of knowledge on methodologies for estimation of costs and determination of co-benefits of emissions reduction measures through joint-work and workshops, as a key component of the process of understanding the opportunities arising from LEDS. 3. Implement pilots in selected cities, districts or provinces and particular sectors to get lessons learnt from practicing the knowledge gained from hands-on and on the job trainings (defining baseline, mitigation actions and assessment of economic and co benefits of mitigation actions)* 	<p>National Agency for Planning and Development (Bappenas), Local Governments, Ministries, DNPI</p>	<p>Universities and research agencies (national and international)</p>	<p>A number of REDD+ Demonstration activities and low carbon development project in three provinces led by DNPI</p>
	<p>Understanding and capacity for defining baselines for measuring the effectiveness of NAMAs' implementation is still lacking.</p>	<p>Methodology</p>	<ol style="list-style-type: none"> 1. Develop capacity at the level of local governments and relevant ministries to assess impacts of programs, projects and actions on emissions, focused on methodologies for baselines determination and assumptions for emissions 	<p>Bappenas and provincial / local planning agencies, MoE</p>	<p>Universities and research agencies</p>	<p>ICLEI / GTZ programme on city level actions</p>

<p>Different sectors use different approaches and assumptions (a number of assumptions are open to interpretation)</p>		<p>projections. 2. Exchange of experiences in and provision of support for the definition of methodologies for establishing baselines which are compatible across sectors and at all levels (national and sub-national)</p>			
<p>Designing policies in the transport sector has proven extremely complex due to the very low quality of the information available as well as to the low level of expertise to analyse such data, both forex-ante and ex-post emission reduction estimates</p>	<p>Methodology and data</p>	<p>1. Build capacity on methodologies for estimating ex-ante and ex-post emission reductions in the transport sector 2. Provide support for setting up the required framework for data collection</p>	<p>Ministry of Transport and local transport and planning agencies</p>	<p>Bappenas and JICA (study on Integrated Transportation Master Plan); Min. of Public Works on collection of data regarding road development plan; Police force for data on number of vehicles</p>	<p>GTZ and ICLEI have ongoing programmes for transport and mitigation at the local level</p>
<p>Lack of knowledge for the estimation of the effects of energy efficiency measures in the industrial sector as well as in the residential and commercial sector.</p>	<p>Methodology</p>	<p>1. Build capacity, including the development of a dedicated software both for ex-post and ex-ante energy efficiency calculations 2. Base capacity building training initiatives on specific case studies in different sectors. 3. Support the determination of relevant emission factors 4. Workshop and training on emission reduction</p>	<p>Centre for Data and Information and Research Centre for Industry - Ministry of Industry and MEMR</p>	<p>PLN, IPP, EE Industries</p>	<p>JICA Project on Implementation of Practical DSM with MEMR</p>

Scoping study: Developing countries monitoring and reporting on greenhouse gas emissions, policies and measures					
			calculation, based on specific case studies for different sectors		
No capacity to measure or to assess emission reduction from off-grid power plant, since there is no data collection system as for the PLN electricity grid.	Methodology/Technology	<ol style="list-style-type: none"> 1. Develop a data collection system for off grid/captive power plant 2. Workshop and training on emission reduction calculation 	Ministry of Energy and Mineral Resources	Ministry of Agriculture, Ministry of Forestry, CSO	
Lack of a central system to coordinate, track and register climate action at the national, sectoral and local levels.	Institutional/Technology	<ol style="list-style-type: none"> 1. Establish a National Working Group to develop a national registry system and to assess the potential of the current DNA (KOMNAS MPB) to act as the agency responsible for registering supported and carbon credited NAMA 2. Develop a national registry system (hardware and software) in the institution that will be responsible for managing the system including the legal and administrative matters 3. Facilitate exchange of experiences and approaches to a registry system among key developing countries Implement pilot on registering climate action in selected cities, districts or provinces and for particular sector* 	KOMNAS MPB	Other Ministries	

* Some of components of activities could be implemented in the same pilot project

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Appendix 1. In-country report

1.1. Introduction to the country

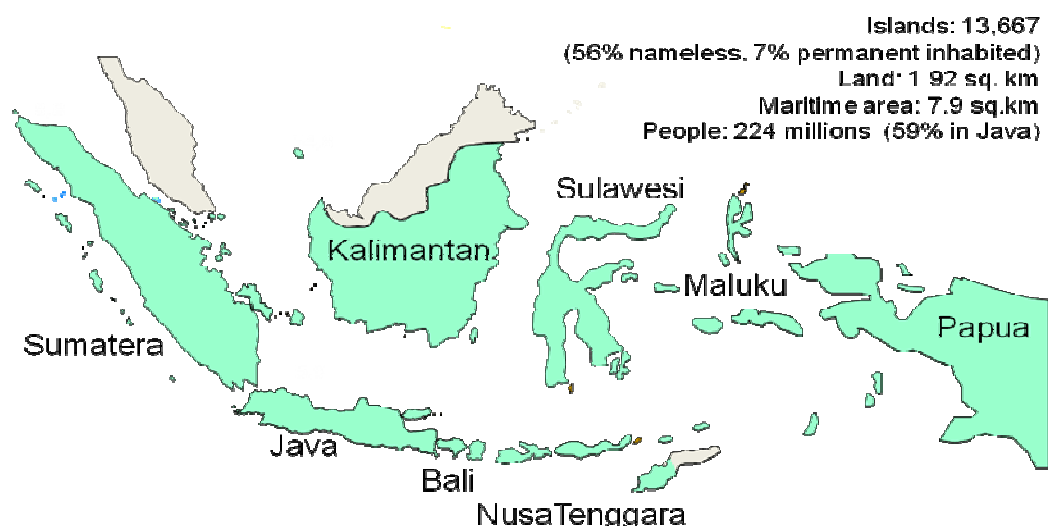
This chapter provides an overview of Indonesia's national circumstances, of its policy framework and of its policy priorities as regards climate change. The most up to date available information on key drivers related to greenhouse gas emissions will also be analyzed.

1.1.1. National circumstances

Indonesia consists of an archipelago situated in South East Asia, covering an area of 190 million ha with five large islands (Sumatra, Java, Kalimantan, Sulawesi and Irian Jaya, Figure 1.1). Small islands are about 13,667 islands and more than half (56%) are nameless and only 7% are permanently inhabited. About 50 million ha of the territory are devoted to various agricultural activities. There is nearly 20 million ha of arable land, of which about 40% is wetland (e.g., rice fields), 40% is dry land, and 15% is shifting cultivation. Since 2005, the Republic of Indonesia has been divided administratively into 33 provinces.

According to national statistics (Indonesian Bureau of Statistics – BPS (2009) the total population of Indonesia is about 231 million. Most of these people lives in Java (58.1%) and in Sumatra 21.4%. The population growth rate is about 1.34% per annum. It is projected that Indonesia's population will exceed 300 million by 2030.

Figure 1.1: Map and overview of Indonesia, 2007

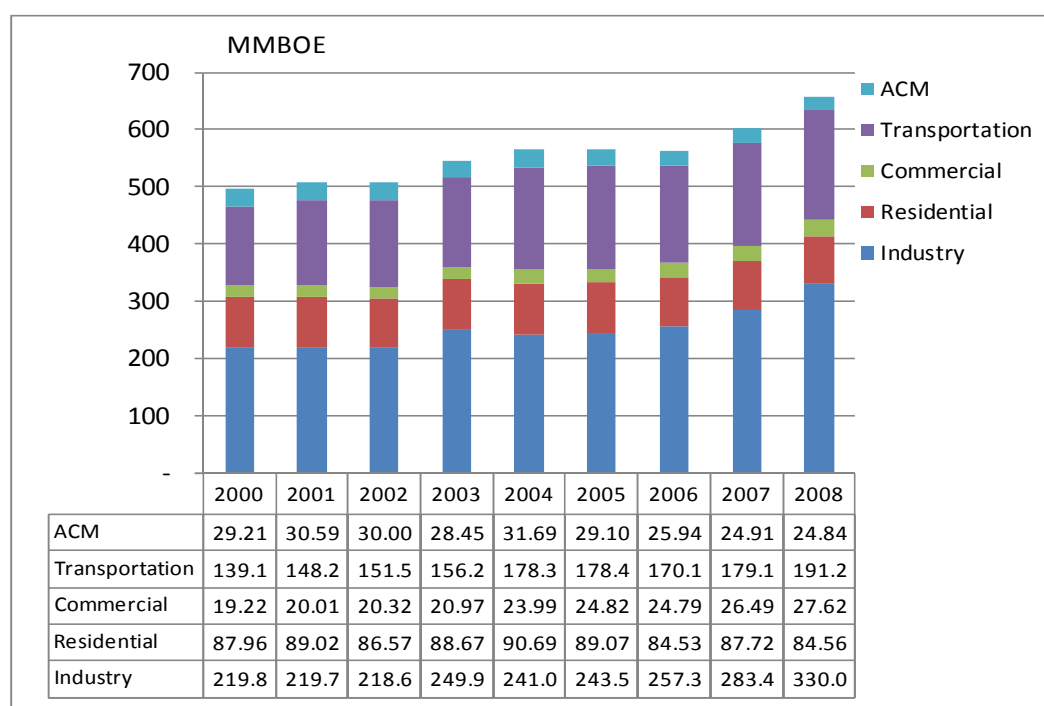


Gross domestic product (GDP) is approximately US\$175 billion. The main contributors to the GDP are trade (16.7%), manufacturing (28%), agriculture (15.4%) and services (10.17%). Earnings from exports (oil and gas, textiles, appliances, coal, copper) were approximately US\$69 billion, while imports (food, chemicals, capitals and consumer goods) generated about US\$44.8 billion. The GDP growth has increased steadily since 1998 and reached 6.3% in 2007. Government of Indonesia is targeted the economic growth of about 7% in 2015.

In line with the country’s economic and population growth, final energy consumption has been growing. The domestic consumption of final energy (excluding biomass) grew from 495.45 MMBOE (million barrel oil equivalent) in 2000 to 564.94 MMBOE in 2005 (3.1 % per year).

The majority of this consumption is accounted by industry sector, followed by transportation, residential, commercial, and ACM (agriculture, construction, and mining) sectors (Figure 1.2). In 2008, the final consumption is about 658.36 MMBOE. The share of total energy consumption by sector in 2008 is industrial sector 48%, transportation 31%, household 13%, commercial 4%, and ACM 5 % (PUSDATIN–MEMR, 2009). Nevertheless, the growth of Industrial sector, particularly for mineral, chemical and metal products in the period of 2000-2005 was quite slow and even negative for some industries (MoE, 2010a). Since 1998, after the global economic crisis, investment on these types of industries has been very limited. It is estimated that until 2025 these types of industries may not grow (MoE, 2010a).

Figure 1.2: Final energy consumption in Indonesia, 2000 – 2007 [MEMR, 2009]



Indonesia also has rich of forest resource. About 45% of its land territory is covered by forest. However, this forest resource subject to heavy degradation and deforestation. Main drivers of deforestation and forest degradation in Indonesia can be divided into unplanned and planned drivers. Unplanned drivers include forest fire, illegal logging, and forest encroachment. Planned drivers include forest conversion for establishment of agriculture plantation, transmigration areas, and establishment of new districts, development of new rice fields, and large-scale mining activities. Based on satellite interpretation, rate of forest loss between 2000 and 2005 reached about 1.1 million ha per year (MoFor, 2008). About 80% of the forest loss was due to unplanned drivers. However, due to the increase in request from local governments to release forest area for the expanding and development of their districts, the planned deforestation will also be a big threat for Indonesian forest.

Area of agricultural land increased dramatically particularly area of agriculture plantation. The growth rate of plantation area reached 571,000 ha annually (Agus et al., 2006). This rapid increase is mainly due to the high growth of palm oil plantation. The rapid increase in the palm oil plantations is driven by the demand increase in the domestic and international markets, including the demand for bio-diesel. Areas of cacao and coffee plantation have also increased, but not as drastically as that for palm oil. Indonesia has targeted to expand the palm oil plantation as much as 1.375 million ha between 2010 and 2015 (Ditjenbun, 2008). The target provinces for the establishment of palm oil plantations are East, West and Central Kalimantan, Jambi and South Sumatra. These five provinces account for 78% of the total area. To secure rice production in the future, Indonesia also plans to have 15 million ha of land permanently allocated for cropland.

1.1.2. Indonesia's GHG emissions

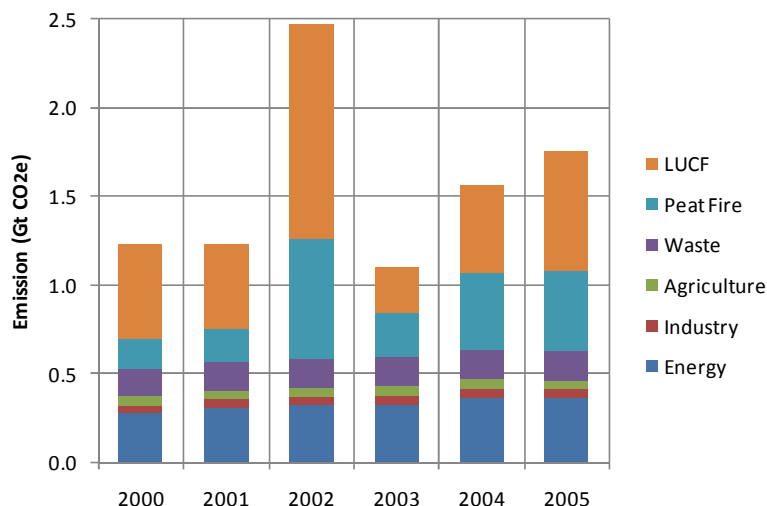
Based on Second National Communication estimates (MoE, 2010a), total GHG emissions in 2000 for the three main greenhouse gases without LULUCF reached 556 MtCO₂-eq. With the inclusion of LULUCF, total net GHG emissions from Indonesia increase significantly to about 1,378 MtCO₂-eq. Of this, CO₂ made up the majority of equivalent emissions with 1,113 Mt, representing 80.8% of the national total; methane (CH₄) totalled 237 Mt (CO₂-eq) or 17.2%; and nitrous oxide (N₂O) totalled 28 Mt (CO₂-eq) or 2.0%. The main contributing sectors were Land Use Change and Forestry, followed by energy, peat fire related emissions, waste, agricultural and industry (Table 1.1). Contribution of waste to the total emission was relatively high particularly from industrial liquid waste (e.g. palm oil and rubber industrial processing). In the period between 2000 and 2004, the rate of emission from LULUCF fluctuate considerable due to high variation of deforestation rate and fire, while that of other sectors increased consistently (Figure 1.3).

Table 1.1: Summary of 2000 GHG emission and removal (in Gg CO₂e)

	CO ₂	CH ₄	N ₂ O	PFC	Total
Energy	247,522.25	30,174.69	3,240.64	NO	280,937.58
Industrial Process	40,342.41	2,422.73	133.22	145.15	43,043.52
Agriculture	2,178.30	50,800.18	22,441.25	NO	75,419.73
LUCF1	821,173.35	56.35	24.47	NO	821,254.17
Waste	1,662.49	153,164.02	2,501.45	NO	157,327.96
Total	1,112,878.82	236,617.97	28,341.02	145.15	1,377,982.95

1 Note: Emission from peat fire was included. Source: MoE (2010a)

Figure 1.3: Emissions trends by sector (MoEa, 2010; LUCF emission of 2005 from DNPI, 2010)



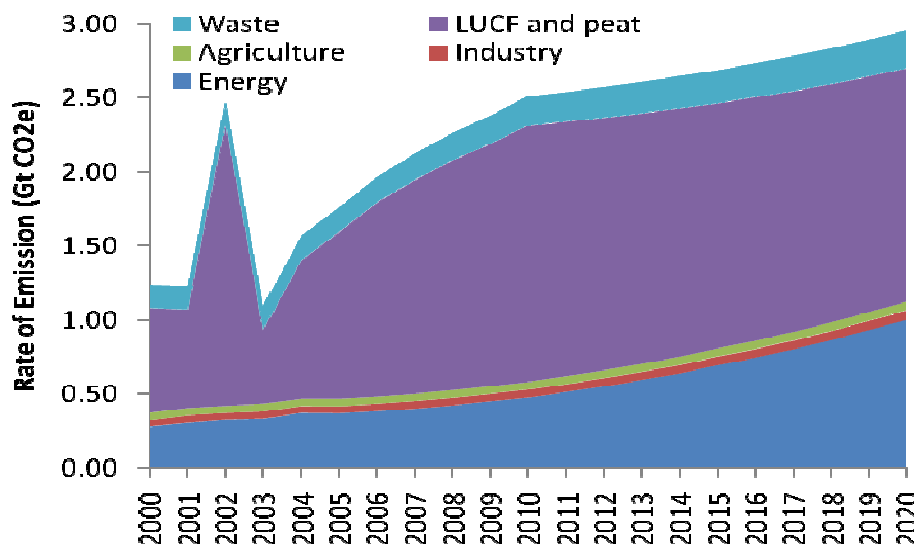
1.2. Climate Change Policies: Planning and Designing NAMAs

1.2.1. Indonesia's GHG Emission Projection

Development of emission projection under business as usual (BAU) is very crucial as a basis to measure the level of success in reducing the emission. BAU show how GHG emissions will grow over time in the absence of policy intervention. There were a number of studies that develop emission projection (Boer et al., 2010). Most studies on the GHG Inventory have provided projection of the emission up to 2030, particularly for the energy sector. Government of Indonesia has adopted the result of the SNC study as a basis for setting up national mitigation policies as the SNC is the most important national document concerning GHG emissions inventory and projections and climate change related issues (mitigation options, adaptation, etc). In addition, the SNC is more complete and covers more sectors and gases than the other studies (Boer et al., 2010).

The SNC provided projections of emissions of almost all key source categories. Under BAU, the SNC estimated that by 2020 the rate of GHG emissions from Indonesia may reach 2.95 GtCO₂-eq (Figure 3), a 1.57 GtCO₂-eq increase from the 1.38 GtCO₂-eq emissions in year 2000. The contribution of the energy sector to total emissions will reach roughly 33 percent, while LUCF and peat will still be the main source of national emissions (MoE, 2010a). This BAU emission has been adopted by the Government of Indonesia as reference emission to measure Indonesia achievement in reducing its GHG emission.

Figure 1.4: Historical and future projection of emission from all sectors in Indonesia (Boer et al., 2010)



1.2.2. National Policies for Reducing GHG Emission

To support the world's commitment to mitigating climate change as agreed at the Bali COP under long cooperative action, the GOI in G-20 Pittsburgh and COP15 announced a non-binding emission reduction target (ERT) of 26 percent below BAU levels by 2020 as part of its Unilateral National Appropriate Mitigation Actions (Unilateral NAMA) and an additional emission reduction target of 15% with support from developed countries (Supported NAMA; Figure 1.4). In its submission to the UNFCCC, the Government of Indonesia submitted seven prioritized mitigation actions which include (i) sustainable peat land management, (ii) reduction in rate of deforestation and degradation, (iii) development of carbon sequestration projects in forestry and agriculture, (iv) promotion of energy efficiency, (v) development of alternative and renewable technology, (vi) reduction in soil and liquid waste and (vii) shifting to low emission transportation mode. The annual rate of GHG emissions would be gradually reduced versus BAU estimates from 2005 to 2020.

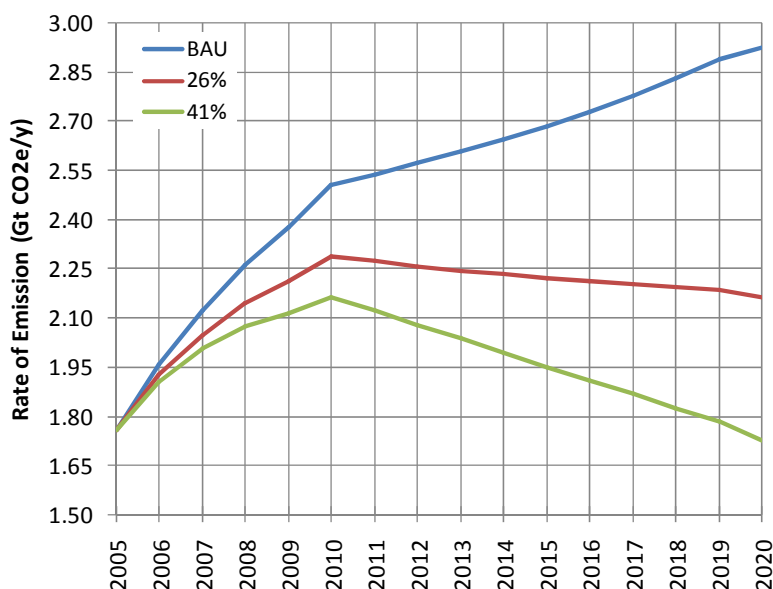
With the ERT of 26%, the level of emission from all sectors by 2020 will be about 23% above the 2005's emission level and with the ERT of 41%, the level of the emission by 2020 will be about 2% below the 2005's emission level. Assuming Indonesia is able to maintain its annual emission level until 2020 following the lines of the 26% and 41% ERT as shown in Figure 4, the cumulative total emission reduction between 2005 and 2020 will be about 5.6 and 8.9 Gt CO₂ respectively. It is planned that the efforts to reduce the sectors' emission will be started in 2010 through unilateral actions. The main contribution towards meeting the 26 percent ERT is expected to come from LUCF and peat which account for 88 percent of the planned mitigation (Figure 1.5).

For the implementation of mitigation program, the policy of Government of Indonesia is that the unilateral NAMA will be firstly prioritised based on existing mitigation actions that have cobenefits (Bappenas, 2010).

The programs/actions have to be measurable, reportable and verifiable (MRV) with a low abatement cost and already accommodated in the Medium Term Development Plan. The actions should not hinder economic growth and should prioritise public welfare especially in areas of energy resilience and food security. They also should support protection of poor and vulnerable communities, including environment conservation in the framework of sustainable development. The supported NAMA will be directed to mitigation actions that have higher abatement cost with clear and concise contract with clear executing agency. In general main mitigation programs to be implemented by sector in achieving the 26% ERT is presented in Table 1.2.

Costs for implementing mitigation actions varied across sector and within sector depending on type of mitigation technologies. For energy sector, the cost for reducing 1 ton of CO₂ varied between -22³ USD and 45 USD (MoE, BPPT and GTZ, 2009), and for LULUCF ranged between 10 and 23 USD/tC (MoFor, 2007). Recent study conducted by DNPI (2010) indicated that the cost for mitigation for Indonesia ranged from -260 up to 80 USD/tCO₂e (Figure 1.6). Large potential for reducing the emission is from forestry, peat, agriculture, power, transportation, petroleum and refining buildings and cement sectors. By 2030, these sectors can contribute to emission reduction of about 2 Gt CO₂e (about 6.3% of the required global emission reductions).

Figure 1.5: Expected emissions trajectory under BAU, 26% (unilateral NAMA) and 41% (Supported NAMA) non-legally binding emission reduction target. Source: (Drawn based on MoE, 2010a and BAPPENAS, 2010)



³ Negative cost of abatement occurs when the cost for implementing the mitigation technology is cheaper than the baseline technology.

Figure 1.6: Expected share of each sector to the ERT (Drawn from Bappenas, 2010)

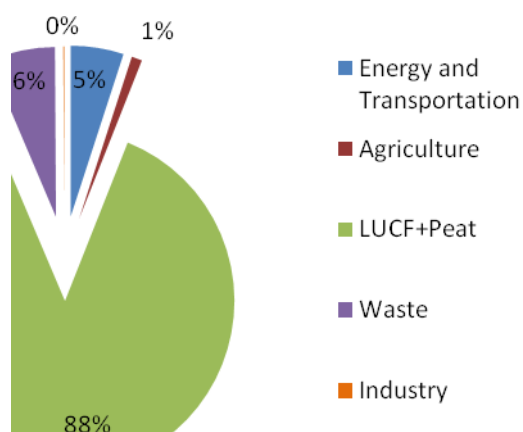
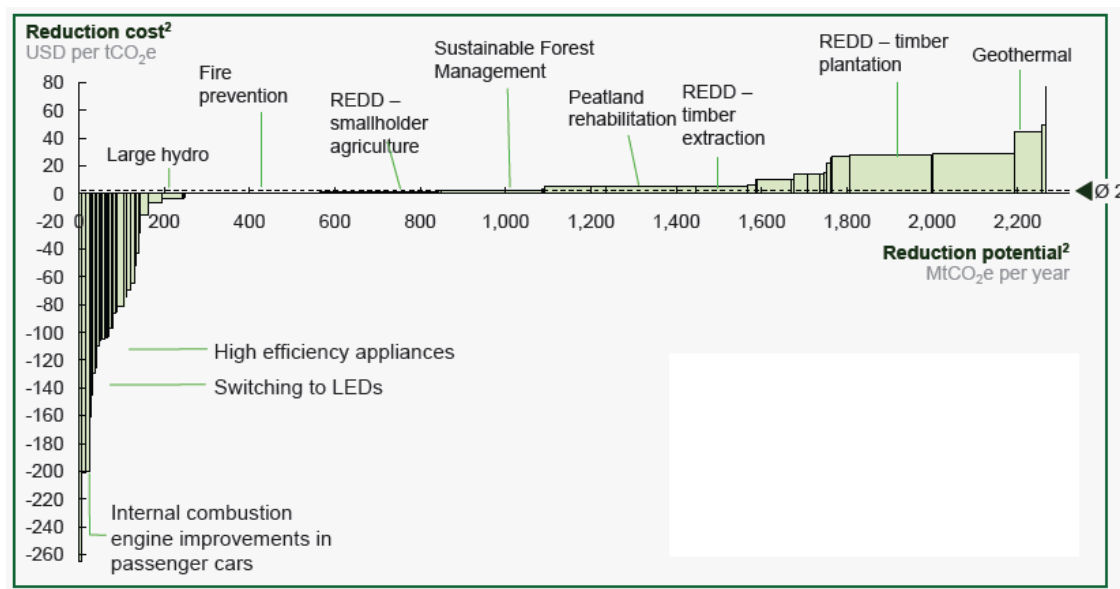


Table 1.2: Sectoral mitigation programmes for meeting the 26 percent ERT (Bappenas, 2010)

Sector	Main Mitigation Programmes	Responsible Ministries
LUCF and Peat	Forest and land fire management, improvement of water management in peat land, land and forest rehabilitation, establishment of timber plantation in degraded lands, combating illegal logging, avoid deforestation and community empowerment	Ministries of Forestry, Agriculture, Environment and Public Works
Waste	Development of regional dump site (sanitary landfill), waste management (3R) and integrated waste water management	Ministries of Public Works and Environment
Energy and Transportation	Increasing the use of bio-fuels, applying standardisation for engines with high energy efficiency, increasing energy efficiency, improving public transportation, development of renewable energy	Ministries of Energy and Mineral Resources, Transportation, and Public Works
Agriculture	Introduction of less methane emitting varieties, improving irrigation efficiency, application of organic fertilizers	Ministries of Agriculture and Environment
Industry	Improving energy efficiency and conservation, increasing the use of renewable energy	Ministry of Trade and Industry

Figure 1.7: Mitigation cost for various sectors (DNPI, 2010). Note: The width of each bar represents the volume of potential reduction. The analysis used 4% discount rate and did not include implementation and transaction cost

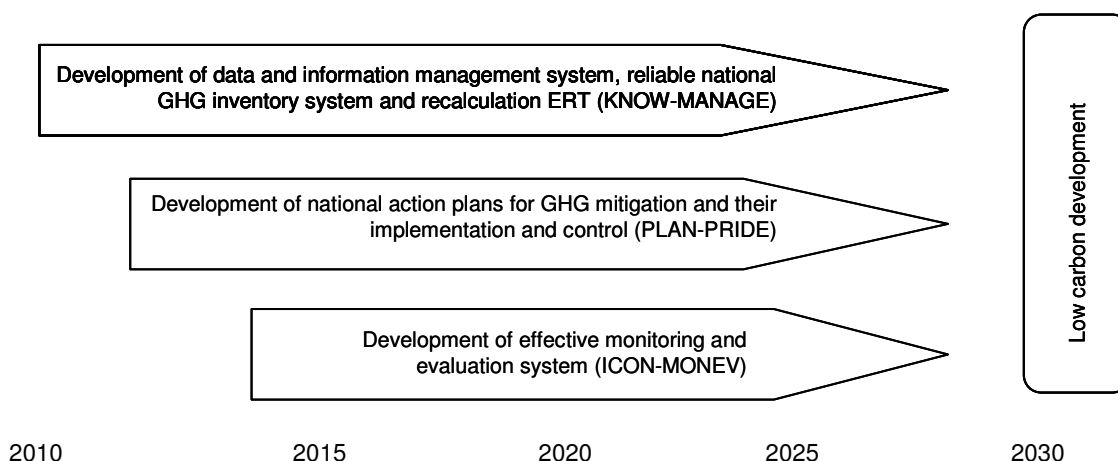


1.2.3. Sectoral Roadmap for Addressing Climate Change

As stated in the Long-Term Development Plan (RPJP) 2005-2025, climate change will be one of the main challenges for the future development of Indonesia. The failure to manage the current and future climate risk will threaten sustainability of development. To address this issue, the Government of Indonesia has developed a climate change sectoral roadmap (ICCSR) which provides policy guidance for the implementation of national adaptation and mitigation responses to climate change through the development of annual government work plans for the next 20 years (2010-2029). Each sector will use the ICCSR to develop programming strategy for each period of RPJM (Medium-Term Development Plan or Five Years Development Plan). As it is a key document, some details are included below.

In the initial period of RPJM 2010-2014, the focus of the program will be on the development of understanding and knowledge on climate change mitigation and adaptation and strengthening the capacity of institution in data and information management as well as climate risk management and greenhouse gas inventory development (KNOW-MANAGE). In the following RPJMs, the focus will be on development of planning, policy regulation and institutional (PLAN-PRIDE), and followed by the implementation of adaptation and mitigation actions and control as well as the development of monitoring and evaluation system (ICON-MONEV) to ensure effective implementation of the plans and the programs. In the context of mitigation, the final objective is to allow the sectors implementing their program using low-carbon development concept (Figure 1.8).

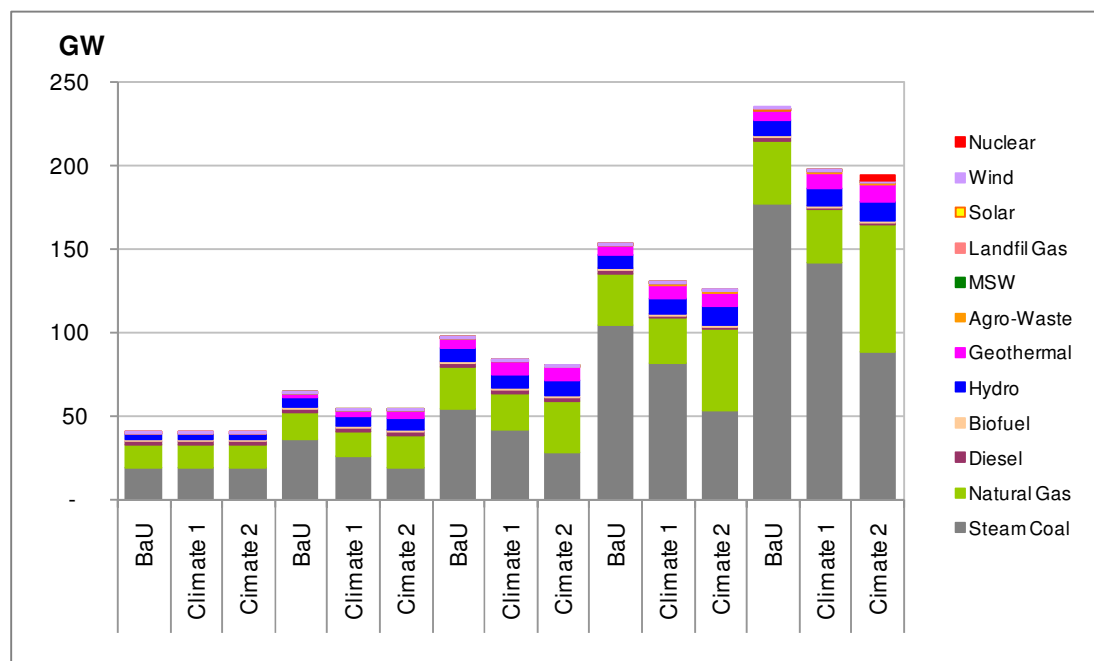
Figure 1.8: National roadmap for climate change mitigation (based on ICCSR-Bappenas, 2010)



In developing programs for climate change mitigation, the Ministry of Energy and Mineral Resources (ESDM) has developed an energy demand-supply projection up to 2030 under the absence (BAU) and in the presence of mitigation policies (CLIMATE 1 and 2). The projection is described in the Indonesian Energy Outlook 2010-2030. The energy supply was projected based on the existing policies and plans that have been committed by the GOI, namely Crash Programs I and II for Energy Development that have been covered under RUPTL (Business Plan of Electricity Supply) PT PLN 2009-2018 (PT. PLN, 2009), RUKN (General Plan of National Electricity) 2008-2027 (MEMR, 2008), and road map of bio-fuel development and utilization. By 2030, the total energy supply will reach about 4,700 Million BOE. Coal, oil and natural gases are still the main sources of the energy supply.

Under mitigation scenarios (CLIMATE 1 and 2), this sector will put additional effort in increasing energy efficiency and conservation, and increase the share of new and renewable energy in the energy mix (i.e., enhance geothermal program, micro-hydro, bio-fuel, biomass waste to energy, solar PV, wind energy and coal bed methane [CBM]), and the use of clean coal technologies namely fluidized bed, sub-critical and super-critical coal power plants. The improvements in energy efficiency under the CLIMATE1 and 2 scenarios can reach between 6% and 22% for industry, household and commercial sectors. For transportation sector the improvement may only reach 1%. Comparison of installed capacity demand of power generation between BAU and mitigation scenarios is presented in Figure 1.9. Based on these mitigation scenarios, the potential CO₂ emissions reduction in 2020 under the CLIMATE 1 and 2 scenarios will be about 18% (0.18 Gt CO₂e) and 28% (28 Gt CO₂e) of the BAU emissions respectively (SNC-MoE, 2010a).

Figure 1.9: Installed capacity demand of power generation between BAU, Climate 1 and 2 scenarios in 2010, 2015, 2020, 2025 and 2030 (SNC-MoE, 2010a)



The ICCSR has provided a detailed analysis on strategies to reduce GHG emission from the power sector and gas flaring reduction (Bappenas 2010a, 2010b, 2010c). For the power sector, the analysis in the ICCSR was focussed in Jawa Bali System (JBS) and Sumatra system (SS) since these two systems contributed to about 92% of the total national CO₂ emission from the power sector. Analysis of the potential gas flaring reduction was done as this source was responsible for the emission of about 11.5 Mt CO₂ per day or equivalent to about 3.5% of 2004 national CO₂ emission. Giving attention to these sectors will contribute significantly to the emission reductions.

For the transportation sector, the ICCSR analyzed three general strategies to reduce greenhouse gas emissions in the transport, namely (i) avoidance/reduction number of travelling, (ii) shifting to more environmentally friendly modes; and improvement of energy efficiency of transportation modes and vehicle technology (Bappenas, 2010d). The potential mitigation from these three strategies will reach about 0.89, 5.48 and 4.80 Mt CO_{2e} respectively.

In the industrial sector, the ICCSR focussed the analysis on cement production (primary key industry), and iron & steel, pulp & paper, textiles and fertilizer and other chemical products (key secondary industry; Bappenas, 2010e). These industries have been found to be the most energy-intensive industries using fossil fuels. Cement industry was rank as the 10th largest CO₂ emission source in Indonesia's inventory (excluding LUCF). The SNC (MoE, 2010a) has projected potential emission from these industries under the BAU using assumption that the GDP growth of the industrial sector was only 6.4% per year. The rate of BAU emission from this sector by 2020 would reach 62,117 Gg CO₂ (Table 1.3).

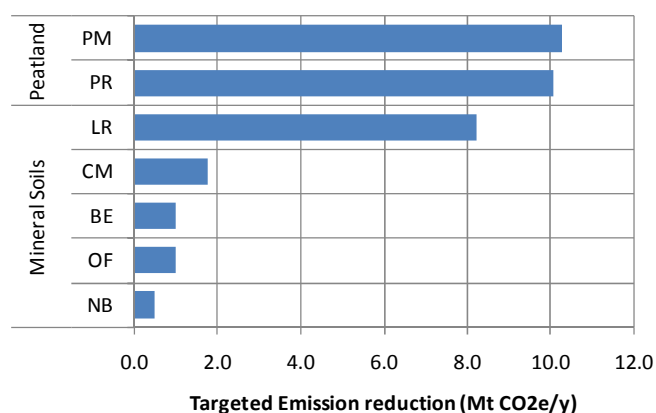
Reduction of emission from the BAU emissions in this sector can be done through the improvement of energy efficiency in production processes, and the use of new technologies, as well as change of raw materials through CDM projects (i.e., using waste as an alternative material in the cement industry; SNC-MoE, 2010a). With these efforts, the potential emission reduction from this sector may reach between 6% and 9% of the BAU emissions. With the support from the government and international public funding, the rate of the emission from this sector can reduce further up to 14% (Table A.3).

Table 1.3: Potential Emission Reduction from the industrial sector (Gg CO₂e)

Scenario	2010	2015	2020	2025
BAU	52,850	57,296	62,117	67,343
Private scenario through CDM	49,438	52,422	56,754	61,493
Reduction Potential	3,412	4,875	5,362	5,850
% Reduction	6.5%	8.5%	8.6%	8.7%
Private scenario through CDM with support from the government through dissemination program and other international funds	46,152	49,136	53,469	58,207
Reduction Potential	6,698	8,160	8,648	9,135
% Reduction	12.7%	14.2%	13.9%	13.6%

In the agriculture sector, the ICCSR described two specific programs for climate change mitigation, i.e. reduction of GHG emission from mineral soils and peat lands (Bappenas, 2010f). In the period 2011-2020, this sector targeted emission reduction of about 0.34 Gt CO₂e or about 0.034 Gt per year (40% from mineral soils and 60% from peat lands). Five technologies proposed for mineral soils are (i) the use of no burning technologies and optimizing land utilization (NB), (ii) improvement of crop management leading to less emission (CM), (iii) the use of organic fertilizer and bio-pesticide (OF), (iv) development of agriculture plantation in degraded land (LR) and (v) utilization of animal manure for bio-energy and fertilizer (BE). In peat land, the technologies include (i) the application of sustainable peat land management (PM) and (ii) rehabilitation of abandoned agriculture peat land (PR). Emission reduction target for the seven programs is given in Figure 1.10.

Figure 1.10: Targeted emission reduction in agriculture sectors for 2011-2020 (Bappenas, 2010f)



For emission reducing strategies from peatland, Bappenas has formed a inter-multidisciplinary team to identify which set of policy options offered the greatest mitigation potential (Bappenas, 2010g). This team assessed the mitigation potential of three policy sets namely (i) *legal compliance and best management practices in existing land under production*, (ii) *peat land rehabilitation and prevention of uncontrolled fires* and (iii) *revision of land allocation, forest conservation and land swaps*. The first mitigation policy has four set of mitigation measures. The four mitigation measures include (i) the enforcement of strict compliance to Kepres 32/1990 and Permentan 14/2009, in which only peatland with depth of less than 3m, mature, not acid sulphate potential, and non quartz substratum will be entitled to future concession, (ii) enforcement of zero burning policy for land clearance by companies following new regulation issued by the government (PP4/2001, UU Perkebunan 18/2004, Permentan 14/2009), (iii) enforcement of best practices for water management to reduce subsidence and carbon emissions from oxidation in peat land under cultivation (Permentan 14/2009) and (iv) application of best practices in soil management including the addition of ameliorant to reduce emissions. The second mitigation policies consists of two mitigation measures namely (i) rehabilitation of all degraded peat (grassland) and restoration of all degraded forest through hydrological rehabilitation (e.g. canal blocking), reforestation and socio-economic development, (ii) development of effective land/forest/peat fire management such as fire early warning system, particularly for controlling wild fire in extreme drought year. The third set of mitigation policies consists of three mitigation measures namely (i) reclassification of peat forest in non-forestry development zone (APL) and convertible production forest (HPK) zone to protection or conservation zone (revision of spatial plans), (ii) reclassification of remaining peat land that is not yet licensed to protection or conservation (no new licenses on peat and a revision of spatial plans) and (iii) relocation of all licenses or parts of licenses where companies have not yet initiated operations on the ground, from peat to mineral soils (land swap).

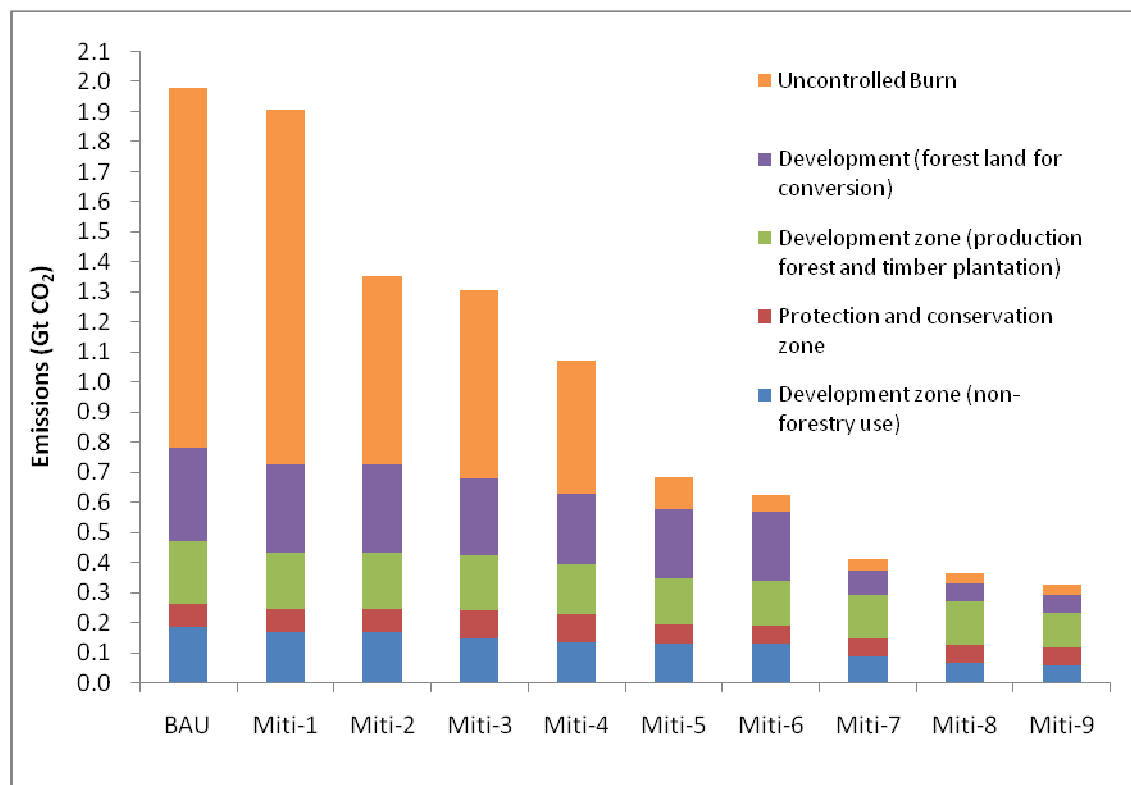
Table 1.4 shows types of emission reduction that will occur from as well as type of cost required for the implementation of the nine mitigation measures. Under the BAU, it was assumed that (i) all peat lands (non-forested and forested) in development zones irrespective of depth will be used and converted for non-forest activities such as agriculture plantation, (ii) forest area allocated for timber production will be converted for timber plantation or as production forest and subject to unplanned deforestation (agriculture encroachment) and degradation (illegal logging), (iii) protected and conservation forest will be subject to unplanned deforestation (agriculture encroachment) and unplanned degradation (illegal logging), and (iv) uncontrolled fire assumed to be the same as the mean rate of emission from peat fire estimated by van der Werf et al (2007) that occurred in 2000-2006. The study found that with the implementation of the mitigation measures, the rate of emission will decrease by about 45.81% if all mitigation actions in the Mitigation Policy 1 are fully implemented. Further decrease of about 68.46% and 83.39% can be achieved if all mitigation actions in the mitigation policy 2 and 3 are implemented respectively. Figure 1.11 presents the rate of emission reduction with the implementation of the nine mitigation measures under the three mitigation policy scenarios against BAU emission.

Table 1.4: Mitigation options, emission reductions and policy scenarios for peat land in Indonesia

Policy	Mitigation Measures	Mitigation Measures									Emission Reduction	Cost Type
		1	2	3	4	5	6	7	8	9		
(1) Best Practice	Compliance <3m	√	√	√	√	√	√	√	√	√	F, Ox, AD	T*
	No burning management		√	√	√	√	√	√	√	√	F	I,T
	Improved water management			√	√	√	√	√	√	√	F, Ox	I,T
	Ameliorant application & forest restoration				√	√	√	√	√	√	F, Ox	I,T
(2) Peat Rehabilitation, restoration & control fire	Peat land rehabilitation					√	√	√	√	√	F, Ox, AGB	I,T
	Control wild fire						√	√	√	√	F, Ox, AGB	I,T
(3) Land Allocation and Permits	Conserve forest in non-forestry development area							√	√	√	Avoided (F, Ox, AGB)	O,T
	Protect unlicensed peat land								√	√	Ox, AGB	O,T
	Land swap unused licenses to mineral land									√	F, Ox, AGB	O,I,T

Source: Bappenas (2010g). Abbreviations: Emission reduction: F =fire, Ox = oxidation, AGB = increase in above ground biomass, AD = avoided deforestation and degradation. Cost types: O = opportunity cost, I = intervention costs, T = transaction cost. * Legal compliance may incur an opportunity costs to the government because of reduced areas that may be allocated for production.

Figure 1.11: Mean rate of annual emission in the period 2006-2025 under BAU and nine mitigation scenarios (Bappenas, 2010g)



In forestry sector, ICCSR assessed the BAU and three mitigation scenarios. Emission under the BAU adopted the estimate from the SNC. The ICCSR analysed three mitigation strategies. The first mitigation strategy gave greater attention on land rehabilitation with some investment in industrial plantations, with no change in natural forest management (called as SC1). The second strategy gave greater emphasis on investment in industrial plantations and less in land rehabilitation, with no change in natural forest management (called as SC2). The third mitigation strategy directed at land rehabilitation and higher investment in industrial plantations with change in forest management, i.e. by establishing forest management units (FMU; called as SC3). The study concluded that the avoided annual emission from the implementation of mitigation strategies SC1, SC2 and SC3 were 0.106, 0.195 and 0.304 Gt CO₂ respectively (Bappenas, 2010g).

To support the implementation of mitigation program in forestry sector, Bappenas (2010h) is also developing National Strategy for REDD+ (called 'Stranas REDD+'). The document is intended to be used as basis in the preparation, implementation, monitoring and evaluation of activities related to REDD+ (Reduction emission from deforestation, forest degradation, role of forest conservation, sustainable forest management and sink enhancement). Thus this document will provide comprehensive foundation for preparing national action plan for climate change mitigation (RAN GRK) for land use, land use change and forestry (LULUCF). The Stranas defines three strategies for addressing the problems of deforestation and forest degradation. The first strategy is to meet requirements for the REDD implementation namely

development of related regulations for the REDD+ implementation and methodology. The second strategy to create enabling condition for the REDD+ implementation which include reformation of development plans for sectors related to land uses, law enforcement, stakeholder participations and institutional capacity enhancement. The third strategy is to translate the reformation of the development strategies of the sectors, particularly forestry, agriculture and mining that ensure the optimization of land uses leading to low emission.

In waste sector, the main source of emission come from industrial waste water and followed by municipal solid waste, domestic waste water and industrial solid waste. Under the BAU, total emission from these wastes in 2010, 2020 and 2025 was estimated to be about 0.194, 0.250 and 0.278 Gt CO₂ respectively (SNC-MoE, 2010a). It was assumed that the BAU emission follow historical trends. With the issuance of Law No. 18/2008 on waste management, it is expected that the future emission from this sector will decrease as municipalities are required to improve their waste management. Together with the implementation of CDM, GHG emission from this sector can be further reduced.

The ICCSR focuses the analysis on strategies for reducing emission from solid waste both in rural and urban areas (Bappenas, 2010i). Efforts for reducing emission from solid waste in the rural areas will be focussed on (i) reduction of waste production from sources, and (ii) the implementation of 3R principle in waste management and composting program (3R+composting). In urban areas, there are two additional mitigation actions namely (i) applying waste management in final disposal from open dumping to controlled landfills in small and medium-sized cities; and sanitary landfills in large and metropolitan cities (SL+CL), and (ii) landfill gas (LFG) for energy or electricity (SL+LFG). From the implementation of these mitigation actions, the expected annual emission reduction from source reduction, 3R+composting, SL+CL and SL+LFG between 2010 and 2030 are 4.5, 19.4, 2.9 and 15.9 Mt CO₂ respectively.

1.2.4. National Action Plan for Greenhouse Gas Mitigation (RAN-GRK)

At present, the Government of Indonesia under the coordination of Bappenas is still in the process of developing the national action plan for climate change mitigation which is called as RAN-GRK. The RAN-GRK is a document which further elaborates the sectoral roadmap for addressing climate change with focus on mitigation. The document will describe in more detail sectoral plans for reducing GHG emission in the period 2010-2020 with target of reducing emission by 26% of the BAU emission through unilateral actions and an additional 15% reduction through actions with international supports. RAN GRK will be used as a reference by sector, local governments or other economic actors in planning, developing, monitoring and evaluating the implementation of the mitigation actions. However, RAN GRK could be updated regularly according to the needs, scientific and policy development (Bappenas, 2010j).

The proposed mitigation programs in the RAN GRK will be prioritized based two criteria. The first criterion is that the mitigation actions should directly reduce the emission and they are measurable, reportable and verifiable. The second criterion is that the mitigation actions should have low cost and in line with development priority. The actions should not hinder economic growth and should prioritise public welfare especially in areas of energy resilience and food security. They also should support protection of poor and vulnerable communities, including environment conservation in the framework of sustainable development. This ambitious policy target can be seen to contain many elements that would be applicable to an eventual Low Carbon Development Strategies.

1.2.5. Fiscal Policy for Supporting Greenhouse Gas Mitigation

To support the implementation of climate change mitigation strategies in Indonesia, the Ministry of Finance has identified a number of short and long term fiscal policies (MoF, 2009a). These fiscal policies are expected to encourage the different sectors and local governments to develop policies and programs that lead to low carbon development, particularly for energy and land use and land use change sectors (LULUCF). The identified fiscal policies for energy sector include (i) the implementation of carbon tax/levy on fossil fuel combustion in parallel with the removal of energy subsidies and coupling the policy with access to international carbon market; (ii) introduction of complementary measures to provide incentive for energy efficient and low emissions technology. For the LULUCF sector, these include (i) intergovernmental fiscal transfer system to support and incentivise carbon abatement measures by regional government, working toward the creation of Regional Incentive Mechanism (RIM); and (ii) bring existing fiscal policy in line with carbon reduction objectives.

To develop further the fiscal policies, the Ministry of Finance has established a Task Force with assignment to develop, evaluate and implement fiscal policy and other financial instruments that can increase the capacity of Indonesian in mitigating and adapting to climate change in effective and efficient manner. This Task Force is expected to formulate optimal combination of existing fiscal policies and financing approaches that ensure the achievement of climate change programs (MoF, 2009b).

1.3. Monitoring and Reporting of Green House gases emissions

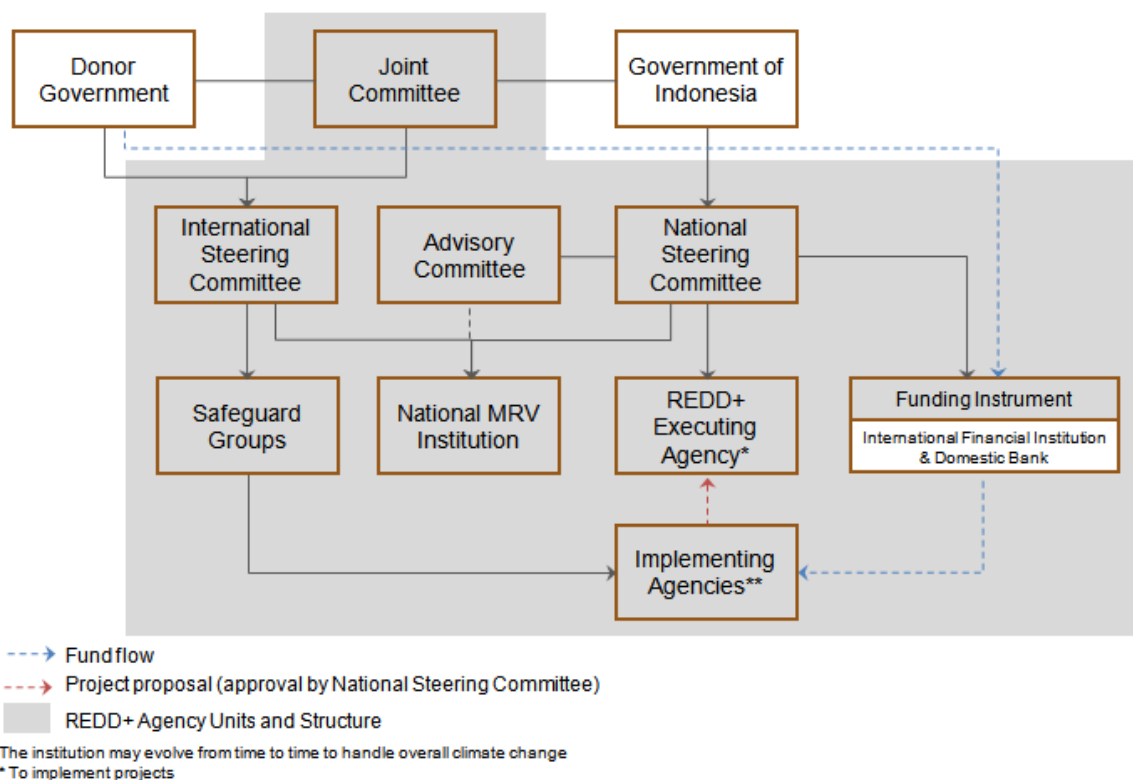
1.3.1. Institutional arrangements

The term “measurable, reportable and verifiable” (or MRV) stated in sub-paragraphs (i) and (ii) of paragraph 1(b) of the Bali Action Plan provides the parameters under which the mitigation actions by Parties should be undertaken. The MRV refers to:

1. nationally-appropriate mitigation commitments or actions by all developed country Parties; and
2. the provision of technology, financing and capacity-building which enable and support nationally appropriate mitigation actions (NAMAs) of developing country Parties in the context of sustainable development.

UKP4 (Unit Kerja Presiden bidang Pengawasan dan Pengendalian Pembangunan – President’s Delivery Unit on Development Monitoring and Oversight), has been assigned by the President of Indonesia to establish a National MRV system as a response to the Letter of Intent with Norway Government in the implementation of REDD+ program. The UKP4 has made a preliminary proposal on possible structure of governance of the REDD+ agency (Figure 1.12). The independent National MRV Institution within the REDD+ governance system will be formed to avoid sectoral conflicts of interest. The National MRV Institution will work under the International and National Steering Committees with main responsibility to monitor and report the emission reduction based on international regulation and to develop independent verification method. Both International and National SC will monitor the implementation of MRV by the National MRV institution and accept inputs from the Advisory Committee.

Figure 1.12: The governance structure of REDD+ agency (UKP4, 2010)



The framework of the National MRV Institution will be designed by the International and National Steering Committee. The National MRV Institution will work under the International and National Steering Committees. In the context of Lol with Norway, the members of the International SC will be determined by the Government of Norway and the National SC will be chaired by the Chairman of UKP4 and the members will be the Chairman of Bappenas, Minister of Forestry, and Minister of Finance. The members of International and national SCs will be broadened later by including other international donors and other national institutional depending to scope of mitigation activities. This means that the establishment of the National MRV Institution is not intended only for accommodating the Lol with Norway government but has a broader scope (beyond the forestry sectors). In the context of the Lol, it is planned that the MRV institutional system for REDD implementation will be established in November 2010.

At present the MoE is in the process of developing national GHG inventory system called SIGN (Sistem Informasi Gas rumah kaca Nasional-National GHG Inventory System) as mandated by Law no 32/2009. JICA has agreed to provide support for development of the SIGN. This SIGN will provide GHG emission profile (showing the historical emissions) and GHG emissions status (emission level in particular year) of all sectors as defined in the IPCC guidelines and develop a GHG Inventory Report to be submitted to the UNFCCC. The SIGN should be part of the MRV system since it will be responsible for reporting the profile and the status GHG emission to the UNFCCC. However, from the discussion with the stakeholders done by the project team, it is clear that there is still confusion related to the institutional arrangement of MRV for REDD+ and MRV for other national mitigation actions and linkage between MRV institutions with the SIGN.

As stated previously, Indonesia will implement NAMA as unilateral (target of 26% emission reduction from BAU emission) or supported actions (target of additional 15% emission reduction). On the other hand, mitigation actions may also be done through carbon market mechanisms. The status of emissions reported in the National GHG inventory should capture all these initiatives. If the status of the emissions being reported is already below the baseline, the implementation of NAMA has resulted in lower emission than the BAU emission. The question will be how much of the emission reduction occurred in that year is from unilateral, supported or carbon market mechanisms. Therefore, there is a need to develop registry system who will register all mitigation actions being supported by developed countries and via carbon market. This system will track all emission reductions measured from the supported actions and carbon market mechanisms. Nevertheless, the discussion on the registry system is still limited. So far, the national registry system has been mentioned in Minister Forestry Regulation P.30/Menhut-II/2009 on Guidance for REDD Implementation. The National Registration is an institution that has task to conduct the registration of all REDD activities. However, up to now the National Registration has not been developed yet. During stakeholder consultation workshop, it was mentioned that the role of KOMNAS MPB (National Commission for CDM), an institution which issues host country approval to any CDM projects, could be expanded to act as National Registration Institution.

Based on the above condition, it is apparent that the development of institutional framework for MRV is urgently required. At least three types of institutions will be needed at National Level namely Independence National MRV Institutions, National System for GHG Inventory (SIGN) and National Registry System.

1.3.2. Institutional Process for the Development of a National GHG Inventory and links to mitigation activities

Based on Law no 32/2009, the Ministry of Environment is mandated to coordinate and to develop National GHG Inventory. As previously mentioned, at present the Ministry of Environment is in the process of developing the National System for the GHG Inventory. Learning from the development of GHG Inventory in the Second National Communication, the role of sectors in the development of the inventory is still limited. The calculation of the emission estimates from all sources was done by experts from university and research agencies. The sectors which were represented by the Working Group on Inventory provided assistance to the experts in accessing to some of activity data required for the inventory.

The process of developing the National GHG Inventory in the SNC follows five stages (Figure 1.13; SNC-MoE, 2010a). First stage was identification of methodology and good practices for the preparation of the Inventory and identification of activity data. The Ministry of Environment officially requested the activity data for each sector and the experts collected this data, as well as the emissions/removal factors from various publications and research agencies. The second stage was the development of the inventory. The Working Group provided the support to fill some gaps in activity data if necessary. The third stage was consultation process and internal review in which the results of the inventory were discussed with the members of the working group to check the estimates, activity data consistency and emissions/removal factors. Through discussion with the member of the working group and resource person in relevance sectors, the levels of uncertainty in activity data and emission factors were determined. The fourth stage was reporting and reviewing the inventory. After the consultation, the expert finalized the report following the IPCC format and UNDP Country Office reviewed the Inventory by inviting international experts. The final stage was revising and publishing the inventory. Based on the inputs from the review process, the inventory experts made

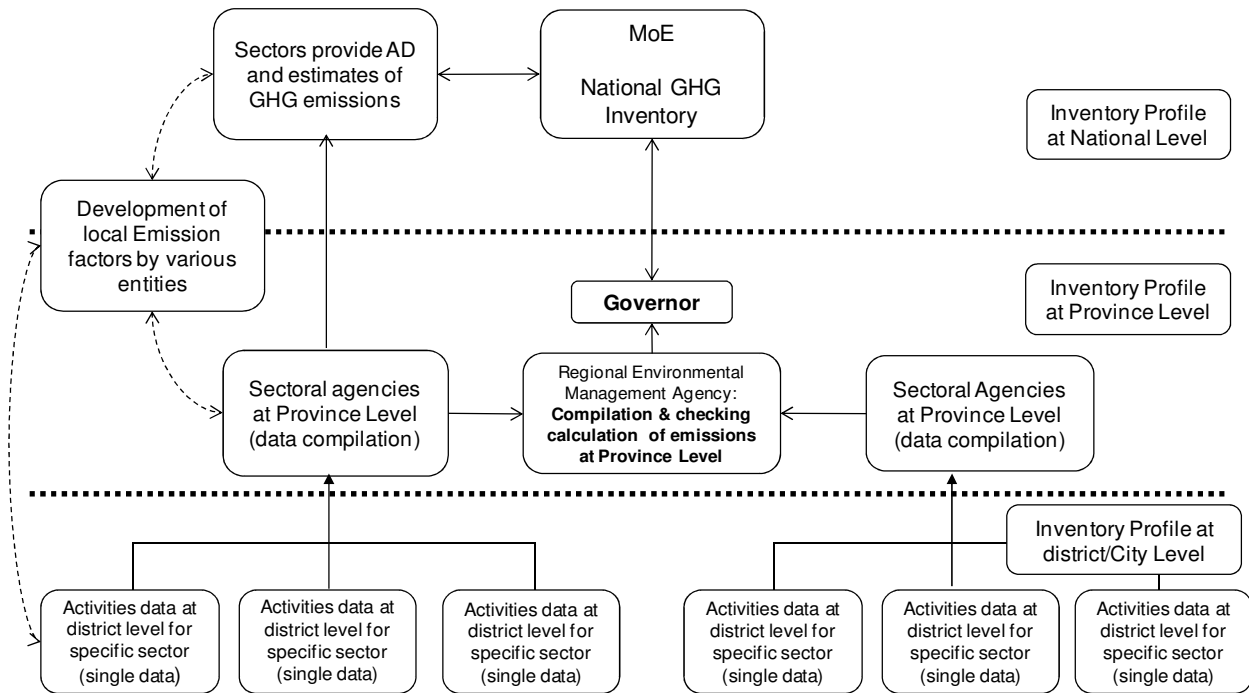
revision in the calculation and finalized the Inventory report. The Ministry of Environment sent the Inventory Report for getting final approval from the relevance sectors.

Figure 1.13: Institutional Process in developing national GHG Inventory (Based on SNC-MoE, 2010a)



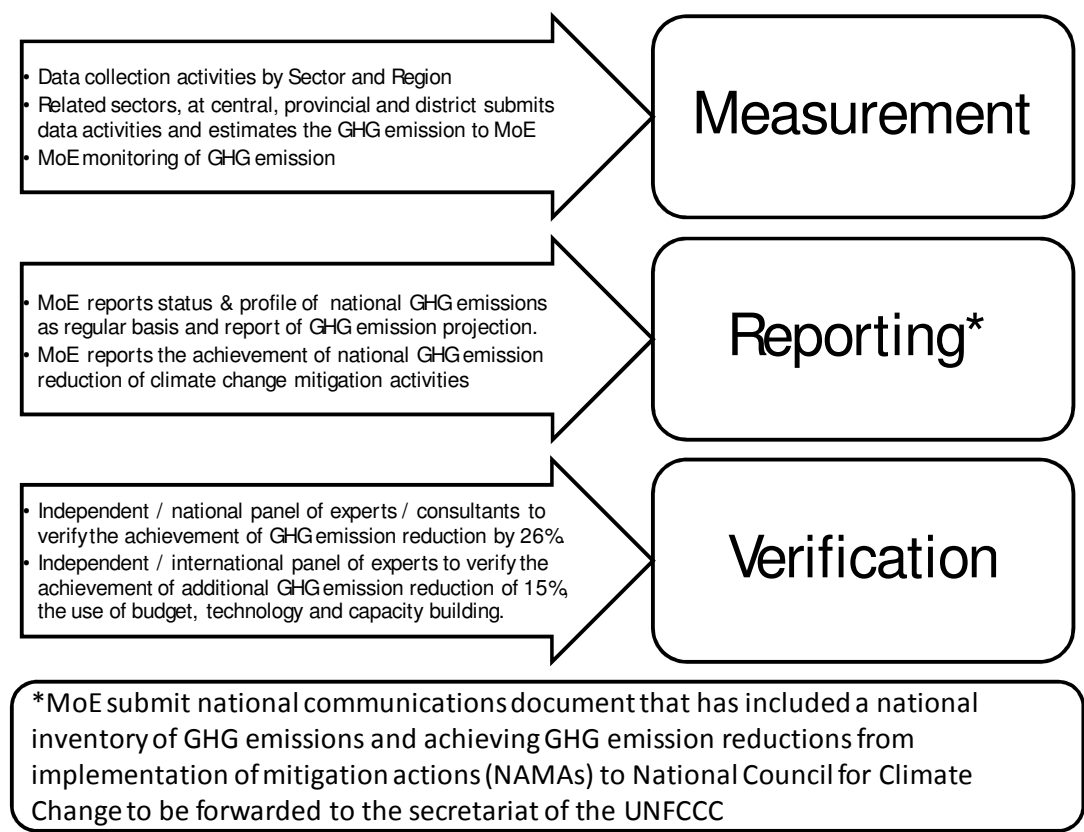
To institutionalize the process of GHG inventory development, the Ministry of Forestry as previously mentioned is developing the National System for the GHG Inventory (Sistem Inventarisasi Gas Rumah Kaca Nasional or SIGN). Presidential Regulation on SIGN is still being prepared. It is very likely that local governments and sectors at national level may need to assign or develop a division (department) that will be in charge in preparing the GHG inventory, line ministries and local governments will have the responsibility to collect and analyse GHG emission data in their respective areas and report it to the State Minister for the Environment as a coordinator in the preparation of Indonesian National Communications to the UNFCCC. The planned institutional process in the development of GHG Inventory under SIGN is presented in Figure 1.14.

Figure 1.14: Planned Institutional Process for the development of GHG Inventory (MoE, 2010b)



In the context of the implementation of mitigation actions as defined in the RAN-GRK, each sector and local governments are also required to submit the report of the resulted reduction of the emission to the Ministry of Environment (MoE, 2010b). Each sector and local government may need to develop internal verification process to verify their achievement of reducing their emission from the BAU emission before being verified by the independence verifiers. This report on reducing emission policies and measures will be included as part of the National Communication to the UNFCCC. Figure 1.15 presents the summary of the process for measuring, reporting and verifying the GHG emission as well as resulted reduction of emission from the implementation of mitigation actions under RAN GRK from sectors and local governments (MoE, 2010b).

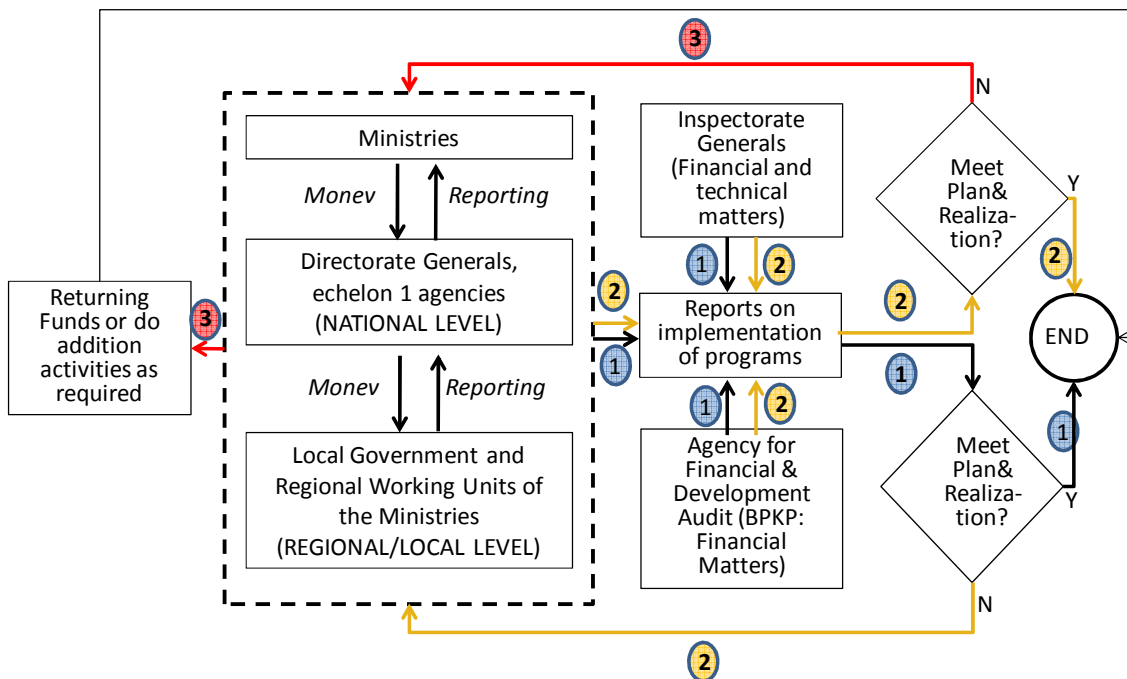
Figure 1.15: Summary of MRV process being planned by the Government of Indonesia (MoE, 2010b)



Appendix 2. Current MONEV System

The agencies responsible for conducting the MONEV are Inspectorate General and BPK (Agency for Financial Auditing). In the monitoring and evaluation process, the inspectors from the Inspectorate General in each Ministry and the BPK will assess and review four aspects of the program implementation based on the program/activity reports prepared by the sectors. In addition to that an accountability report called LAKIP (Laporan Akuntabilitas Kinerja – Performance Accountability Report) should also be made by high level officials to justify performance of the organization they are headed. The four aspects being reviewed include the following: (i) adequacy of management control system to ensure that the budget was used effectively, efficiently and economically, (ii) effectiveness of the implementation of programs/activities and the way funds were used, (iii) compliance to legislation and regulations, and (iv) achievement of programs/activities objectives. In the case, the inspectors found any deviation in the program implementation in term of achievement of program objectives and fund utilization, the program implementers have to respond and provide clarification (yellow line 2). If the explanation and clarification do not satisfy the inspector, the project implementers have to return part of the fund or do additional activities as required (red line 3). In the case part of the fund has to be returned, the project implementers return the fund to the State Account at the Ministry of Finance through the appointed bank.

Figure 2.1: Process of Monitoring and Evaluation



Appendix 3. Methodologies and uncertainties in emission inventories and projections

Table 3.1: Methodologies used in current works on GHG emissions inventory of energy sector (Boer et al., 2010)

No	Year	References	Institution	GHG Emissions Data		Methodology	
				Historical	Projection	Emission inventory	Emission Projection
1.	2009	Indonesian Energy Outlook 2009	Pusdatin-MEMR	1990-2008	2010-2030	Tier 2, IPCC 2006	System Dynamic Model (Developed by Institut Teknologi Bandung)
2.	2009	Indonesian Second National Communication (SNC)	MEMR-MoE UNDP	2000-2005	2010- 2025	Combination of Tier 1 and Tier 2, IPCC 2006	Energy (similar to Indonesian Energy Outlook 2009). Industrial and waste sectors (econometric)
3.	2009	TNA		2005	2010-2025	Tier 1, IPCC 2006	Markal/MAED Model (BPPT)
4.	2008	Indonesian Energy Outlook 2008	Pusdatin-MEMR	-	2010-2030	Tier 1, IPCC 1996	Markal/MAED Model (BPPT)
5.	2006	Handbook of Energy and Economic Statistics of Indonesia	Pusdatin, MEMR	1990- 2005	-	Tier 1 IPCC 1996	-
6.	2009	Indonesia's GHG Abatement Cost Curve	DNPI&McKinsey	2005	2020 & 2030	Not enough information	Not enough information
7.	Mar 2010	Indonesia Climate Change Sectoral Roadmap	Bappenas	2005	2010-2030	Uses available data in Handbook of energy and Economic Statistics of Indonesia 2006	Econometric Approaches
8.	Feb 2010	Low Carbon Society Scenario Toward 2050: Indonesian Energy Sector	ITB, IGES, Kyoto University, NIES, and Mizuho	2005	2010-2050	Tier 2, IPCC 2006	ExSS - GAMS 23.3 (General Algebraic Modeling System) for Indonesian case (ITB and Kyoto University)
9.	Apr 2010	Draft: Developing Vision for LCD Options in Indonesian Energy Sector	WWF Indonesia	2005	2010-2050	Tier 1, IPCC 2006	LEAP (Econometric Approaches)

Table 3.2: Assumptions used in GHG emissions projection in energy sector (Boer et al., 2010)

Study	Socio-Economic Parameters	Baseline (BAU)	GHG Emissions Projection
Indonesian Energy Outlook 2009 (2010 – 2030)	Population and growth (BPS 2009) GDP (2005 bases) and the growth will increase gradually up to 7% in 2011 and 7.2% after 2015 (National Summit)	BASE case scenario is business as usual (BAU); assuming that the development will continue according to the historical trend. Natural energy efficiency and existing national (government and private) plan are considered as components of BaU scenario.	There are two alternative scenarios, namely: <ul style="list-style-type: none"> • Optimal scenario is energy conservation and energy supply security. • Climate scenario: considered as component of energy outlook scenario in SNC study. It considered max renewable and efficiency energy, less GHG emissions technology (increase gas, introduce nuclear and IGCC)
SNC	Similar to Indonesian Energy Outlook 2009	Similar to Indonesian Energy Outlook 2009	There are two alternative scenarios, namely <ul style="list-style-type: none"> • Outlook scenario is similar to climate scenario of Indonesian Energy Outlook 2009 • Perpres scenario: uses energy mix target in 2025 of the Perpres
TNA	Population Growth 1.05% GDP 6.49%	BASE case scenario is business as usual (BAU); assuming there are no energy conservation and no energy efficiency measures, electricity generation is fully based on coal fired power plant.	There are 4 alternatives scenario, namely: <ul style="list-style-type: none"> • Energy Efficiency 15% (RIKEN) scenario • Energy Efficiency 20% (RIKEN MAX) • Alternative Power Plant (PEMBALT) • Carbon Capture and Storage (CAPTURE) scenario (application of advanced thermal power plant with CCS Technology)
Indonesian Energy Outlook 2008	Population Growth 1.05% GDP 6.49%	Similar to TNA	There is one Alternative Scenario (ALT), which assume that max energy efficiency, new (nuclear, CBM, and coal liquefaction) and renewable energy, and less carbon energy tech
Handbook of Energy and Economic Statistics 2006	No projection (historical data 1990 – 2005)		

Study	Socio-Economic Parameters	Baseline (BAU)	GHG Emissions Projection
Indonesia's GHG Abatement Cost Curve	International data for Population and GDP data		
Indonesia Climate Change Sectoral Roadmap	Refers to Handbook of Energy and Economic Statistics of Indonesia		
LCS 2050: Energy Sector	<p>BAU & Moderate: Population and growth (BPS 2009). GDP 7% Growth (National Summit)</p> <p>High growth: population and growth (BPS)</p> <p>GDP 9% Growth (follows current development of developed countries)</p>	<p>BASE case scenario is business as usual (BAU); assuming that current development trend and society orientation (peoples lifestyles and activities) will continue until 2050. Natural energy efficiency and existing national (government and private) plan are considered as components of BaU scenario.</p>	<p>Two alternative development scenarios :</p> <ul style="list-style-type: none"> • Moderate: economic development will be the same as BAU but the society is more efficient in energy utilizations compared to the BAU, calmer, slower, nature oriented. • High growth: economy will grow at much higher rate compared to those of the BAU but more efficient and less carbon energy systems, Indonesia is to reduce emission to comply world's LCS target (0.5 ton C per capita) in 2050, the society is more active, quick changing, technology oriented.
Vision for LCD Options Energy Sector		<p>BASE case scenario is business as usual (BAU); assuming that current development trend will continue until 2050.</p>	<p>There are two alternative scenarios, namely:</p> <ul style="list-style-type: none"> • Demand-Side Management Scenario • Clean Technologies in Power Generation

Table 3.3: Estimates of historical and projected GHG emission from various studies in Indonesia (Boer et al., 2010)

No.	Year	References	Institution	GHG Emissions Data Availability		Key Sources	Total Emissions Gt CO ₂ e		
				Historical	Projection		2005	2020	2005/ 2030
1.	2009	Indonesian Energy Outlook 2009	Pusdatin-MEMR	2000-2008	2010-2030	Energy sector	0.298	1.03	1.57 (2025) 2.3 (2030)
2.	2009	Indonesian SNC	MEMR	2000-2005	2010-2025	Energy sector	0.370	1.00	1.43 (2025)
			MoE UNDP			All sectors under IPCC 2006 (energy, waste, industrial process, AFOLU)	1.76	2.950	4.2 (2025)
3.	2009	TNA	BPPT	2005	2010-2025	Total	0.363 (2006)	0.956	1.324 (2025)
4.	2008	Indonesian Energy Outlook 2008	Pusdatin-MEMR	-	2010-2030	Energy sector	0.301 (2006)	0.747	1.50 (2030)
5.	2006	Handbook of Energy and Economic Statistics of Indonesia	Pusdatin, MEMR	1990- 2005	-	Energy sector	0.293	-	-
6.	2009	Indonesia's GHG Abatement Cost Curve	DNPI	2005	2020 & 2030	Energy (power, transport, cement, building)	0.220	0.660	1.36
						Total (forest (incl. peat fires), power, transport, cement, and building)	2.230	2.820	3.60
7.	March 2010	Indonesia Climate Change Sectoral Roadmap	Bappenas	2005	2010- 2030	Energy(transport, industry, power, residential)	0.293	0.490	0.67
						Forest (including peat fires)	1.4	1.7	2
						Total	1.693	2.190	2.67
8.	Feb 2010	Low Carbon Society Scenario Toward 2050:	ITB, IGES, Kyoto U., NIES, Mizuho	2005	2010 - 2050	Energy Sector	0.299	-	3.929 (2050)

No.	Year	References	Institution	GHG Emissions Data Availability		Key Sources	Total Emissions Gt CO ₂ e		
9.	April 2010	Draft: Developing Vision for LCD Options in Indonesian Energy Sector	WWF Indonesia	2005	2010-2050	Energy Sector	0.380	-	3.8 (2050)
10.	2007	National Action Plan on Climate Change (RAN MAPI)	Ministry of Environment	NA	NA	NA	NA	NA	NA
11	2008	Low Carbon Development Options (2008),	World Bank	NA	NA	NA	NA	NA	NA
12	2009	National Economic, Environ. & Devel. Study for Climate Change	DNPI	NA	NA	NA	NA	NA	NA

Note: Ministry of Energy and Mineral Resources has also produced emission projection from 2010-2030 based on Indonesia Energy Outlook 2008. The projected emission under this the Energy Outlook 2008 for 2006, 2020 and 2030 were 0.310, 0.747 and 1.50 Gt CO₂e respectively.

Appendix 4. Summary of interviews with stakeholders and sectors

Date and Interviewees	Summary of the Meeting
<p>30 June 2010: (GTZ PAKLIM, Bappenas, and Ausaid</p>	<p>MOE (Deputy 3) already requested a support from GTZ for MRV-related activity (developing the concept of MRV Indonesia). TOR has been developed since 2008 but there is no follow up action as MOE is still waiting for a legal/political decision (Presidential Regulation related to RAN-GRK)</p> <p>RAN-GRK (Rencana Aksi Nasional – Penurunan Emisi Gas Rumah Kaca/National Action Plan – GHG Emission Reduction) includes sectoral policies to achieve the 26% target, and can be seen as the predecessor to unilateral NAMAs. It has 2 components: (i) Main component is the list of activities, which are able to provide significant contribution to net-GHG emission reduction such as reducing deforestation, increasing carbon sequestration, sustainable peat land management, energy mix policies, waste management, etc; (ii) Supporting component: related Research, Mapping, Inventory and MRV.</p> <p>RAN-GRK was developed by national budget, so the finance for these actions has been secured. In a provisional decision in the first draft of RAN-GRK, MOE will take care of the inventory and MRV activities, but some sectors i.e Energy and Transportation are unhappy with this. They are questioning the capacity of MOE to monitor their activity. On the other side, if sectors are requested to do their own inventory, sectors are also wondering where the resource is coming from (financial resources, human resources, capacity).</p> <p>During the first meeting related to RAN-GRK, there is also another issue discussed related to the MRV system. It is not agreed yet, whether LULUCF will have a separated MRV body with other sectors. RAN-GRK will be revised as soon, government expected to launch the doc in August 2010. Revision is related to: (i) REDD+ as forestry NAMA; (ii) Baseline; (iii) RAN-GRK relation with NAMA. Wed 09 July will be the first Kick-off meeting for RAN-GRK revision. The methodologies and assumptions with which the sectors estimated ex-ante emission reductions (adding up to 26%) will be looked at.</p> <p>To develop a good system of MRV (whether it is an independent body, MOE, or other) we need: (i) strong leadership, (ii) institutionalizing national GHG inventory system, (iii) clear indicators to be MRVed, (iv) better data situation, (v) clear relation between NAMAs/RAN-GRK/required MRV, (vi) communication to the sectors</p> <p>AUSAID activities related to MRV currently are INCAS (Indonesia National Carbon Accounting System) and FRIS (Forest Resources Information System). These activities are involving DNPI, LAPAN, Ministry of Forestry, BMKG, MOA, MOE. 2 million used up to now and allocate 8 million usd for the next 3 years. AUSAID mostly working in the area of forestry, will be working together with UNREDD, FCPF, Norway on land use monitoring</p> <p>Based on AUSAID experiences, as long as we give the capacity building program to the right target (institution who has related mandate), the program will run smoothly and work well (trained people/unit will apply the knowledge).</p> <p>Some other initiatives mentioned during the meeting were:</p> <ul style="list-style-type: none"> • Another program in Bappenas is Green Economy Paper, which has similarities with RAN-GRK, etc. • UK is planning to provide a satellite and training (already signed the MOU with Bappenas), more or less it costs 100 million Pound sterling. • For future MRV it is important to examine existing monitoring and evaluation system • Bappenas has also signed an MOU with Japan for LCDS, and with GTZ for LCD Plan.

Date and Interviewees	Summary of the Meeting
	<ul style="list-style-type: none"> • Training by universities to local governments could be a way to develop capacity for MRV. An example where training is needed is use of equipment for measuring agricultural emissions. • A key capacity building activity would be to train people to manage data. • In industry the data situation is ok for most subsectors, except e.g. food and textile. • REDD+ could be supported NAMAs. MRV should make clear which activities are 'additional'
<p>2 July 2010 Ministry of Energy & Mineral Resources</p>	<p>MRV system</p> <p>Pusdatin gets all the energy data from PLN (state electricity company), mining industries, Pertamina (oil & gas company; production and consumption of fuels), which are used for the GHG inventory. Issues are the accuracy and the availability of activity data, as well as data management. Issues related to data:</p> <ul style="list-style-type: none"> • heating value of coal differs, and is often not known accurately; • often IPCC default factors are used for oil and gas production, but local emission factors are needed. • Detailed composition data of primary fuels • Data are revised often; there are statistical differences e.g. b/w sales and consumption of electricity. How to get better consumption data? <p>A big database is going to be established on types of oil and gas with their characteristics (the data is there with Pertamina but now with MEMR).</p> <p>Independent power producers sell electricity to PLN.</p> <p>With regard to unilateral NAMAs, international best practice should be followed by the Indonesia. The Government can supervise MRV done by companies.</p> <p>Indonesia has two companies with the competency to do verification (audits). Question is what tools do we have to verify data.</p> <p>Institutional setup: Pusdatin understands the sectors and the data much better (than e.g. Min of Environment), and publishes the data. Its ok to give insight to MoE about the data and methodologies. Suggestion: create an online MRV system, managed by a central agency (e.g. under MoE) where all sectors put in their data. Could be an efficient way to setup an MRV system. This will also be an incentive for the current institutions to be more empowered.</p> <p>Challenge: ensuring 26% reduction is 26% reduction</p> <p>Capacity building</p> <ul style="list-style-type: none"> • MEMR needs CB for MRV, e.g. for technicians on technical aspects. There is a lot of knowledge on energy, but the connection to GHG emissions is new. • Energy efficiency in electricity production is promoted by the Energy Drive Programme. PLN has tools to monitor energy efficiency, and has experience with energy audits, but training on institutional matters and methods to measure efficiency is needed. Data on macro level are there but more detailed activity (and elasticity) data are needed (there is an ongoing process to improve the coverage), as well as dedicated software to manage energy efficiency measurement. • How to calculate non-CO₂ emissions from energy production? • QA on data • How to set up a good monitoring process • Verification: which things, whom, and how? • Types of capacity building: training (in-house), joint programmes, installation of measuring equipment and usage
<p>05 July 2010 Remote Sensing Data Centre, LAPAN</p>	<p>LAPAN is only concerned with providing data and information from remote sensing data to sectors that relate to LAPAN activities, such as Ministry of Forestry, Ministry of environment, Ministry of Marine and Fisheries, and National Meteorology and Climatology Agency. They are not directly dealing with carbon accounting, GHG emission, and other issues related to carbon.</p>

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	<p>LAPAN just attended a seminar in Mexico on 22nd – 24th of June 2010 held by UNREDD. Beside Indonesia, there are also representatives from Congo, Tasmania, and Tanzania. The workshop discussed the development of forestry MRV system on each country, Indonesia has selected Kalimantan and Sumatera islands as their demonstration site. Currently, LAPAN has finished an assessment for Kalimantan collaborated with Wageningen University, the result will be presented on next COP meeting November 2010.</p> <p>We have been involved with INCAS (Indonesia National Carbon Accounting system) activity since 2009, collaborating with Australian Gov. and Indonesian Ministry of Forestry. This activity focuses on carbon accounting system at national level on LULUCF sector. LAPAN priority is in on forestry sector. One useful capacity building activity in this programme was providing a standard for data collection and processing, with quality control. Actually LAPAN is not only dealing with forestry sector, but also with Natural Resources, disaster management, marine and fisheries. We provide data for the sectors that need those kinds of data. INCAS consists of 4 Working Groups: biomass, soil, peat land , and Remote Sensing. LAPAN is included in remote sensing WG.</p> <p>The type of data that we provide especially in forestry sector is data related to land cover change. In INCAS we will have a time series data of land cover change from 1999 to 2010. The satellite data is coming from LANDSAT 7 ETM (it covers 185 km x 185 km with 30 meters resolution). We had several problems in providing the information by using satellite data, such as cloud cover. Therefore, mostly we have more than one scene (piece of image) of satellite image in one site to generate the most accurate data/information for each year. We also have a problem to classify information in very remote area, because they didn't have any field control on that point/site. Basically, in providing the data/information of LULUCF from satellite data, LAPAN is only doing it on computer by using remote sensing program, they did not do any field truthing/monitoring. That is why, the result should be compared/confirmed to the result from Ministry of forestry. HiRes remote sensing is needed for areas where ground-checking is not possible. To solve the problem of classifying information on remote area, actually LAPAN has requested collaboration with international institutions in order to get high resolution satellite data such as IKONOS on the remote area, but sometime it is difficult since the price of these satellite data is very expensive.</p> <p>LAPAN also desires to use Radar technology that can penetrate clouds, we also need a capacity building in using these technology. We suggested that this activity can support us in this issue. In general the technology for measurement of land use changes is developing constantly, and it's important to use the most up to date equipment. They have R&D collaboration with TU Berlin and Wageningen University (the Netherlands).</p> <p>Further capacity building in the form of (short) training or formal education programmes for data processing and interpretation would be welcome. At the moment LAPAN classifies land according to two classes: forest and non-forest. They plan to introduce more (6) classes (note: the classification of the Ministry of Forests is again different). They strive to be able to use Tier 3 methodologies.</p>
<p>05 July 2010 METI (Masyarakat Energi Terbarukan Indonesia – Indonesia Renewable Energy Society)</p>	<p>Ms. Endah repeated many times that Indonesia is currently not ready to accept any international cooperation due to the limitation of our capacity and data records.</p> <p>In any case we are currently conducting a number of activities with international support, most of them are based on unreliable data which leads to the wrong planning and implementation. For example, a geothermal project has been started 20 years ago, but as of today the policy and technical aspect are still improving, not ready yet.</p> <p>European aid offered some support for renewable energy activity in Indonesia 2 years ago. The offer is refused, considering that our capacity is still far from ready to manage required activities</p> <p>The most important aspects in conducting any program is: (i) Good quality of data, (ii) strong leadership, (iii) coordination among related stakeholders/sectors, and (iv) commitment from related sectors</p>

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	<p>Related to the MRV plans, she agreed that MOE could not force to conduct GHG inventory, MRV and all activities by themselves. The calculation should be conducted by each sector. We need to respect sectors' ownership to data.</p> <p>She also emphasized to improve our own capacity. As a big nation, we should be able to do many things by our own capacity. Do not keep relying on donors, other big countries support, etc.</p> <p>International cooperation should be channelled formally through the related government office.</p> <p>Donor and government office (national implementer) should actively be involved in the capacity building process to ensure it goes well, not only give the financial support and let the national implementer to conduct the activity</p>
<p>07 July 2010 Secretariat of National Energy Council</p>	<ul style="list-style-type: none"> • DEN is assigned to provide guidance/direction in formulating policy for MEMR, not to conduct project/activity. • With regard to president regulation (Perpres) no. 5/2006 concerning primary energy mix for year 2025, DEN is currently preparing a draft policy for the 2050 energy mix target. In the policy draft, it is planned to (i) give larger share of renewable energies, (ii) focusing on clean energy technology, (ii) reduction on fossil fuel subsidy. The new policy is planned to be release by end of this year. <p>MRV:</p> <ul style="list-style-type: none"> • The Government of Indonesia has also set a monitoring & reporting system for its programs and activities. The system is called Monev and aims to assess the program/activity's achievement, and has similar objectives and characteristic to an MRV systems, and could perhaps be further developed into an MRV systems • In every government's program and activities under ministries, reports on its implementation and achievement should be made. This report is mainly used to monitor the use of government's budget on the program/activity. This report will later on be verified by the Inspectorate General of each respective ministry for internal verification. • External verification will randomly (not to all program and activities) be conducted by BPK (Badan Pemeriksa Keuangan → Agency for Finance Investigation) for its financial aspect, and by BPKP (Badan Pengawas Keuangan dan Pembangunan → Board of Finance and Development Control) for broader aspects including the program/activity's technical matters. • In addition to the program/activity report, an accountability report called LAKIP (Laporan Akuntabilitas Kinerja – Performance Accountability Report) should also be made by each echelon 2 or higher level's officials in order to justify performance of the organization they are headed. The LAKIP will later on be verified by Inspectorate General under the respective ministry. • Mrs. Maritje considers monev as a good system but improvements will still be needed especially in terms of verification. • For verification system, it was thought that rather than having international verifier, or assigned an existing government/private accreditation body, it is better to have domestic independent verifier body which involves multiple parties (government, private, and academician). Significant issues will be in determining: (i) the coordinator/leader of the verifier body, (ii) which data is considered as accurate to serve as reference (considering different institutions releases different data results). <p>Data collection (case on rural electrification program):</p> <ul style="list-style-type: none"> • Data is mostly incomplete, especially data from rural or remote areas. Sometimes there are also discrepancies between data collected by various institutions → different source of collection, different data result.

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	<ul style="list-style-type: none"> • Mrs. Maritje gave an example on rural electrification program (note: prior to the National Energy Council, she worked in Directorate General of Electricity and Energy Utilization). There are so many areas have no access to electricity. During identification process for the program, there was lack of support data such as local resources that might be developed into electricity (water source and stream, wind, biomass waste, etc). That kind of data was either not exist or incomplete. In other cases, if such data exist and being complete, its accuracy was doubted since there was no verification system of the data. • For post installation of power plants, training for local operator was conducted on maintenance and reporting. However, both maintenance and reporting did not work well due to limited supporting budget provided by local government. This is not the only case. Lots of programs did not sustain/continue due to lack of maintenance and monitoring fund. • In general, there is no system on data distribution (who have authority to release data and in what stage, sometimes data is distributed while still raw/under process). <p>GHG Inventory:</p> <ul style="list-style-type: none"> • Ministry of Environment is currently developing SIGN (Sistem Inventarisasi Gas rumah kaca Nasional – National GHG Inventory System). it was suggested for the system to involve various sectors and parties, applied standardized format for data collection and reporting, and to ensure sectors' commitment for support. <p>General</p> <ul style="list-style-type: none"> • Mrs. Maritje highlighted the following issues as hindering the success of most programs and activities in Indonesia: <ul style="list-style-type: none"> – Insufficient fund → one of possible solution is by inviting public and private involvement. Example : in improving energy efficiency : government has set target to achieve energy elasticity < 1 and have allocated funds for an energy audit program especially for industries, but lack of funding for follow-up/continuation of the audit's results. As for possibility to have international support, Mrs. Maritje suggested to simplified mechanism in accessing the support and provides it with low interest. – National budget cycles: usually financial resources are only allocated for 1 year (then it's handed over to the local government), which can be a threat to the continued operation of investments in energy systems. International support and public-private partnerships could improve the sustainability of the investments. However international funds such as the WB or GEF are hard to access due to difficult and time-consuming procedures. – Lack of data accuracy. Example: in increasing the shares of renewable energies : policy is available, but lack of data on potential renewable energy' resources – Over dated data. Ministries usually release annual data relevant to their tasks and authorities, but these data (e.g. data year 2009) usually being released in the second half of the consecutive year (e.g. after June 2010), which make it less useful in designing programs for respective year (e.g. year 2010). Some ministries even had to use data releases by international institutions (US embassy, IEA, etc). <p>A recommendation to overcome data issues is to improve the existing Data and Information Centres' capacity at the Ministries, especially in terms of technology and human resources. There is also a need for more standardisation in data collection, for which training could be useful.</p>
<p>07 July 2010 Climate Change Working Group of the Ministry of Forestry</p>	<ul style="list-style-type: none"> • The importance of MRV in Indonesia was stressed but also issues to be solved were highlighted, namely : <ul style="list-style-type: none"> – Who will coordinate the MRV activities? Min. of Environment is currently the one being assigned to design Indonesia's MRV system so maybe MoE can take the lead. – How to integrate various sectors? – Consideration on different levels of system implementation (national and sub national). He suggested to first developing the MRV system at district level. – At the local level, which institution will conduct the monitoring and reporting? There are

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	<p>several candidates such as BAPPEDA (Local Development Planning Agency), Forestry agency and Environmental Agency at district level.</p> <ul style="list-style-type: none"> – To whom they will Report the MRV? The report should go to national level, how is the procedure? – With regard to leakage and permanence, we should also do MRV on other district (neighbour), how do we manage this, which agencies will be responsible? – The authority of those agencies? How far local agencies can implement the activity? What kind of policies is needed? – MRV is very complex in Indonesia. Any system should be based on a solid understanding of the issues. – The level of detail in MRV, how detailed should it be? What kind of data is going to be used? High resolution or middle, what sample plot size is needed? Only aerial or also terrestrial? Do we have enough capacity to do that? <ul style="list-style-type: none"> • MRV issues can be distinguished into two different groups: technical aspects and policy aspects. • Ministry of Forestry have developed two systems to collect and monitor forestry and its carbon related data such as forest cover and deforestation rate. These systems, called FRIS (Forest Resource Information System) and INCAS (Indonesia Carbon Accounting System) is currently managed by Directorate General of Planology. • MoFor conduct forest monitoring in every 4 years. Copenhagen Accord mandates developing country to do the monitoring in every 2 years, which is costly for a country like Indonesia. Currently MoFor have no specific agencies responsible for conducting MRV for GHG emission, both at district or provincial level. MoFor have BPKH (regional forest planology agency) in several regions to monitor forest condition. • A special agency (an existing one) is needed to conduct MRV at local level. The MRV system should be implemented in two ways, the first is based on spatial/island, and second one is sectoral based, which means that each sector such as forestry, agriculture and etc, should create their own (internal) MRV system. Agreement among the sectors is needed, what system should be adopted? • Capacity program is still needed at district level in terms of how to do monitoring of the forest condition (technical aspect), including appropriate sampling. Another possibility is to strengthen the existing agency such as BAPPEDA in performing the monitoring. We have enough capacity in central/national level, BPKH is the MoFor institution at district level that have already enough capacity in doing monitoring. So, the problem is how to integrate this institution with local agencies. The head of BPKH's grade/level in not as high as the grade/level of District agencies/Governor, it will become a problem when coordinating different agencies. A challenge is also how to integrate the KPDH and LAPAN data systems. • Currently MoFor does not have any ongoing capacity building program, but they are currently planning to implement those kinds of activities in collaboration with Australia, and Japan. Mostly, the past and ongoing capacity building activity is implemented together in a package with big program/project, not focused on training program only. • Training in technical aspect is more appropriate. Such as training for spatial planning collaborated with ITC in the Netherlands, it was very useful. Potential participants for trainings can include indigenous people, local universities and NGO's, and local private sectors. • Monitoring should not only focus on the changes in land cover and forest conditions, but also the drivers of the changes (such as road construction, illegal practices, encroachment). • Peatland should be treated in specific ways as it is unique ecosystem. Now we have already the policies on how to utilize and manage peatland, but it still needs to be elaborated and developed since peatland is contributing significantly to Indonesian GHG emissions. • There is still inconsistency in data of forestry in Indonesia. So we need to synergize all of the data. • Currently, data in forestry sector is trying to fulfil the requirements for Tier 2 in accordance to IPCC guideline. We need a brief assessment of cost and benefit analysis in using low and high

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	<p>technology, so we can compare which one is more appropriate to Indonesia condition in term of cost/budget.</p> <ul style="list-style-type: none"> • We have several ongoing Demonstration Activities on REDD, such as in Berau District collaborated with TNC, Merang district with GTZ, in Kalimantan with Australian Gov. Those DA is demonstrating the suitable methods and strategies in each district. • Indonesia has committed to voluntary reduce its emission 26%, and 41% with international support. If all the sectors is discipline to do their task (running the low emission program, and planting trees), and have high commitment, I believe that we can achieve the target. • Indonesia should make a plan to achieve the target, each Ministry should create their own plan and target, and differentiate which one is unilateral effort and which one is supported by international finance. • The goal of verification is to increase transparency and accountability. • Verification system of the 26% target should be separated from the other additional 15%. The 26% is our own matter. The institution that can do the verification for the 26% should come from national institution. This institution should be transparent and accountable, based/referred to IPCC guidelines, so there is no suspicion for that. For the 15%, the MRV system should be agreed between the donors and Indonesia Gov., in what level the MRV should be implemented. • However it is recommendable that for unilateral and supported NAMA the MRV is largely similar (if agreed with donors). A methodology for this is needed. • MRV guidelines should take into account the complexities of an archipelago country like Indonesia. • Regarding LOI with Norway, we still develop and discuss the strategies. We are still on preparation phase now. • There was a draft of Presidential Decree that regulates the MRV system, but this policy is only assigning some institution to do MRV system. As an MRV system is very complex it is not enough is only assign the institution. The draft is still under development. • MRV system can be used as an input to develop better policies. • Regarding Reference Level for REDD mechanism, we still develop that, not yet finished. Suggestion to come to Directorate General of Planology to get more detail. RL is a big issue in negotiating process of UNFCCC. • MoFor is currently having not enough historical data. Now, we collaborating with Australia within INCAS to solve that. • There is a need for better GHG projections under different scenarios (the RAN-GRK does this partly)
<p>15 July 2010 Fiscal Policy Office – Ministry of Finance</p>	<p>General perception/understanding on MRV:</p> <ul style="list-style-type: none"> • MRV is an activity in monitoring, reporting, assessment, evaluation and verification in order to obtain the truth on a report/information. MRV will be conducted by independent institution, how local's (district & province) relation with national is still discussed. • Every sector supposes to have their methods in MRV. • For local level MRV system, seems it will be performed by local institutions and then compiled in provincial level. There is still a question on institutional setting, it might be better for the MRV to be performed by sectors. • Climate change is a global issue. Measurement should then be acknowledged by international community. The question is how can national standard (if any) approved by international standard. • MoFin is quite familiar with the concept of MRV, they had experience with Monev. <p>LoI with Norway:</p> <ul style="list-style-type: none"> • On the LoI, reward will be given on performance based. The Fiscal Office considered the LoI as loss since based on their internal calculation the carbon value is about US\$ 1/tCO₂. MoFin have

Date and Interviewees	Summary of the Meeting
	<p>performed an assessment in which the appropriate value should be around US\$ 15/tCO₂. However, the Lol has been a national commitment and need to be supported. Mechanism for fund distribution has to be prepared.</p> <ul style="list-style-type: none"> Regarding the 3 institutions stated in the Lol, it is considered as might create more complexity as there are already many institutions handling the issue such as DNPI, MoE, and MoF. <p>Voluntary emission reduction target:</p> <ul style="list-style-type: none"> For voluntary emission reduction target (ERT), funding to fulfil the commitment can also come from private, not only from state budget. Government can facilitate, for example in providing exemption for customs and tax. MoFin have developed a policy to facilitate private on Fiscal Policy on Climate Change (no. 17 year 2008). Verification for ERT should be conducted by national verifier by following international standard, or being supervised by an international body. <p>Climate Change related Fund:</p> <ul style="list-style-type: none"> There are several programs handling bilateral and multilateral funds, i.e : (i) Pusat Investasi Pemerintah – PIP (State Investment Centre); (ii) Indonesian Green Fund – IGF Indonesian Climate Change Trust Fund – ICCTF faces a constraint in the progress since donors are having less trust in it <p>General</p> <ul style="list-style-type: none"> There was once a scheme for environmental tax. This scheme can be used to control industries. For example, say that each industry will have an emission boundary and emission reduction will be certified, this will encourage them to limit or reduce their emission. MoFin has an international cooperation centre under the District Cooperation Body - BKCSI (Badan Kerjasama Kabupaten Seluruh Indonesia). Previously climate change issue has not been considered, but now it will become part of BKCSI's consideration and discussion MoFin is in the process of establishing a Climate Management Unit (CMU) assigned to formulate climate change related activities from international and sectors and identify study and country needs. The CMU is expected to be established on August 2010.
<p>July 15th 2010</p> <p>MRV Meeting Consultation at Thamrin Plaza, attended by representatives from ICRAF (World Agroforestry Centre), The Samdhana Institute, JICA, Ausaid, EU, FAO, UN REDD, CCROM, CERindo, Ministry of Forestry</p>	<ul style="list-style-type: none"> Brainstorming concerning current status MRV in Indonesia, the latest issue is about UKP4 who has several meeting with ministerial/ sectoral line to organize MRV. Australian government has cooperation with Ministry of Forestry related to REDD+ program through INCAS (Indonesia National Carbon Accounting System). Funding for INCAS about 8 million (2010-2012). A national carbon accounting system is required to estimate the GHG balance not only for forestry (state owned) land of private lands in Indonesia but also other land uses. In general, forestry has institutions in 3 levels responsible for monitoring, i.e: such as district and province (forestry agency), regional (through DG Planologi's regional office, called BPKH), and national (through DG Planologi). EU in cooperation with ICRAF have some projects in Papua, aims to improve forest condition which also include Low Carbon Development's aspect. Letter of Intent (Lol) between Gol and Norway mentioned the need of settings for 3 three institutes, i.e: institutional, financing, coordination of REDD+. At present Indonesia has 235 landsat images cover, Ministry of Forestry will hold training on forest cover next August 2010. Regarding database identification, ICRAF has single database (with consistency data), wood density database, also help the quality control aspect. Another issues that need to be further discussed are : definition of forest, whether palm or bamboo included as tree; and how to treat the emission of above ground biomass.

Date and Interviewees	Summary of the Meeting
	<ul style="list-style-type: none"> • Through INCAS, there are supports to improve the infrastructure, hardware, software in managing data related to REDD+. • NFI (National Forest Inventory) was not being designed for carbon accounting system, but for inventories of forestry data such as area and plantation activities. • Bakosurtanal have data for soil characteristic in Java • INCAS future objective is to provide transparent data from national to sub national level, at present district (BPKH) already done inventory. • FCP (Forest Carbon Partnership) divided in 2 systems, (1) INCAS which identify carbon, biomass, and Climate Change related information; and (2) FRIS which covers forest data. • At this moment, forest inventory data such as tree measurement is performed every 3 years, but for next year it will be conducted every year with support from BPKH.
<p>July 16th 2010 Focus Group Discussion on establishment Climate Change Center in Indonesia DNPI</p>	<ul style="list-style-type: none"> • US government perspective is launching forest partnership and peat land, in other hand support technical expertise (centre) for development of MRV. • While UKP4 take discussion on MRV system, but in this discussion DNPI also would like to give their contribution in terms of MRV technical capacity. • So far, Indonesia has initiation to establish three agencies in the lights of climate change, there are financial institution; REDD+ institution; and MRV institution. • Before the establishment of Climate Change centre in Indonesia, the critical point could be identify in the beginning for example the challenge related database (gap, quality of database), policy from government, and improvement coordination among sectoral. • As illustration, Climate Change centre will support on MRV control, translating information related with climate change, also link information flow from national through sub-national level. • In addition, JICA/ Hokkaida University doing research in land cover inventory with collect individual data, introduce the technology, water content, and monitoring system. • Information from German Embassy, they doing the same land cover inventory conducted by University of Gottingen and University of Munich with specific location in Makassar. • Ministry of Agriculture will implement adaptation and mitigation on peat area and non peat area in 4 provinces (South Kalimantan, Central Kalimantan, Jambi, and Riau). • Ministry of Agriculture also would like to initiate courses on MRV for agriculture expert and local people training. • As conclusion, with this discussion US Team can understand the Indonesia perspective on climate change institutional and put some inputs regarding with climate change center establishment.
<p>21 July 2010 Ministry of Industry's Research and Development</p>	<ul style="list-style-type: none"> • In terms of climate change mitigation, MoInd is suppose to have GHG related data of these three areas : (i) energy used in production process, (ii) GHG emitted in production process (aside from energy related data), (iii) industrial waste • There are 3 major issues highlighted by the MoInd representatives as need to be further clarified, i.e: <ul style="list-style-type: none"> – Clarity on MRV mechanism. Which decision/policy will be treated as reference, UNFCCC, IPCC, or others? – The local-national relation, especially considering local government's capacity in MRV. Can local government provide full support to implementation of national policies on MRV? There are still gaps on the level of knowledge between local and national government – Coordination between sectors, such as between line ministries • Every industry (company) performs monitoring of their production, but not all of them monitoring their energy consumption in terms of power. They are mostly only keeping record on their fuel consumption. They also do not differentiate records between energy data in their power plant (captive, if any) and energy used in production process. • Every directorate in the Ministry of Industry has production data of their respective industrial

Date and Interviewees	Summary of the Meeting
	<p>sector (for example, fertilizer industries is under the Directorate of Agro Industry and Chemical). However, not all of these data has been compiled in the ministry's data centre or any specific database, which creates difficulty in accessing it since it is also not easy to contact each directorate and asking for such data. So far, data from cement industry is the most complete data.</p> <ul style="list-style-type: none"> • Each Directorate usually has set a standardized format for reporting of data. Unfortunately, this format is sometimes changed by industry or there's different perception/assumption by industry on how to fill the format (parameters are reported in different unit or period, etc). • Most industry associations also requires their members to submit annual data especially production data. At this moment, cement industry is the most advanced industry in terms of data collection and other activities related to climate change mitigation. Some of the cement companies have conducted CDM projects and therefore have performed a sort of GHG inventory. • In year 2010, Ministry of Industry plans to conduct GHG inventory in the following industries: Pulp and paper, Steel, Ceramics, Sugar, Petrochemical, Textile, Cooking oil, Fertilizer • In these industries, MoInd will provide experts to assist the industry in conducting GHG inventory. Internal staff should also be provided by each industry (company) in order to build internal capacity in GHG inventory. • At this moment, MoInd has no mechanism in validating emission factor (EF) used in calculating GHG emissions from industrial processes, they are still learning on the mechanism from the one being conducted by the industries (for example cement, as they have developed their emission factor) • In local level, industry related data such as production data is compiled by the local Agency for Industry and Trade, while environmental related data such as waste are usually being directly handled by the Environmental Agency. However, in some areas such as Sumatera and East Java, the local Agency for Industry and Trade are also collecting the environmental related data. This agency also performs verification to the industry related data. • With regard to the voluntary emission reduction target (especially the 26%), a specific target is needed by taking into consideration each industry's level of awareness and capacity. • MoInd rep also raised a suggestion in the need to have a working group involving inter-Directorate that aims to verify industrial data. At this moment, even internal MoInd itself sometimes obtain their data from Indonesian Statistical Bureau since the bureau's data is considered more complete and accurate.
<p>04 August 2010 Agency for Research and Development on Agriculture and Land Resources</p>	<p>General</p> <ul style="list-style-type: none"> • Agricultural sector covers several sub-sectors, i.e: <ul style="list-style-type: none"> – Peat and plantation/estate – Animal husbandry – Paddy field <p>Low Emission Agricultural Program:</p> <ul style="list-style-type: none"> • The following strategies has been set to reduce emissions from agricultural sector: <ul style="list-style-type: none"> – Utilization of abandoned lands for lands extensification, instead of clearing used lands (such as forest) – Application of no-burning land clearing method instead of slash and burn method in clearing lands – Improvement of land management for existing palm oil plantation. The activities including improvement of drainage system and the use of ameliorant. – For reducing methane emissions from paddy field, the strategies are among others: (i) selection and identification of paddy variety; (ii) development of new variety; (iii) water management, for example by using intermittent irrigation system; (iv) application of organic fertilizer

Date and Interviewees	Summary of the Meeting
	<ul style="list-style-type: none"> – For livestock, short term strategy to reduce methane emission from its enteric fermentation is by modifying its diet • In RAN-GRK there are 9 programs, six of it are focusing on mineral soil while others are focusing on peat. • Budget has also been allocated for achieving emission reduction target under RAN-GRK. However, the mechanism in distributing and utilizing the budget is not quite clear. Utilization of state budget in a sector depends on sectors' priorities. If activities targeted to reduce GHG emission is not within the sector's priority, then it is likely to be implemented soon. <p>Data collection:</p> <ul style="list-style-type: none"> • Most of the agricultural activities are implemented at the local level. Funds for implementation of agricultural programs under the Ministry of Agriculture (MoA) are distributed to locals through Local Agricultural Agency, these funds are called "deconcentration funds". Local agency is then obliged to submit reports on the activities (and other information considered relevant asked by MoA) to the MoA. • Not all of agricultural related data are complete (being archived well). The most complete data is on rice production as it is closely related to food security. <p>MRV:</p> <ul style="list-style-type: none"> • Things related to internal issues on a program (budget, management) should be audited by Inspectorate General within MoA. However, Prof. Las suggested that things related to climate change issues (ER, activity data) may also be audited by an independent team e.g. consisting of representative of the Inspectorate General, experts, and maybe MoE. • Regarding emission factor, researches related to measurement of GHG emission are being started. It is expected that the researches can come up with local emission factor value.
<p>06 August 2010 Yayasan Pelangi Indonesia</p>	<p>General</p> <ul style="list-style-type: none"> • Instead of deciding on a target then breach it into programs, emission reduction target is supposed to set by adjusting to the development rate. First set the development direction (including population rate), and then streamline the climate change issues, see which areas can reduce GHG emissions. • Difficulty level in collecting data in a sector may vary. For example in energy sector, data collection on supply side is easier than data collection on demand side. • With regard to Lol with Norway, it was felt it is impossible to reach the targeted emission reduction by using only the amount of funds agreed on the Lol, alternative funding should be searched. <p>Transportation sector:</p> <ul style="list-style-type: none"> • Transportation is one of contributing sector to Indonesia GHG emission but inventory on this sector is difficult since it involve lots of humans, which cause lack of proper recording. • Data collection on this sector is not continuous but incidental, for example when there is a development plan. • Based on her experience involving in Transjakarta program, she informed that data collection is conducted by following CDM approved methodologies. So far, available data is on passenger load per corridor and fuel consumption. <p>RAN-GRK:</p> <ul style="list-style-type: none"> • The voluntary emission reduction target in which the programs are described in RAN-GRK can create a burden for Indonesia in front of international community. • Calculation of costs for reducing GHG emissions (such as calculation of abatement cost) often does not include costs for risks and opportunity cost. For example, in calculating cost for forest rehabilitation, does it have included opportunity cost if the lands were used for business activities? Usually the calculation is mainly around the cost for planting and maintenance.

Date and Interviewees	Summary of the Meeting
	<ul style="list-style-type: none"> In preserving peat area, has the condition of communities surrounding area been considered? To some extent, they might need development to take place, in which consequences may disrupt peat area. <p>MRV:</p> <ul style="list-style-type: none"> Main challenges for sectors in implementing MRV are in (i) identifying the type of activity data to be collected and (ii) defining local emission factor MRV should be seen per sectors as each has its own level of readiness. It was suggested that an independent MRV body can act as sort of data collection centre and developing guidelines and standards (quite similar to the role of US-EPA) Capacity building on MRV should at first focus on introduction to relevant data, i.e : in each sector, identify possible activities potential to reduce emission, and identify relevant data need to be collected from that kind of activity
<p>20 August 2010 Indonesian Committee for World Energy Council</p>	<p>General</p> <ul style="list-style-type: none"> Management of climate change issues should be embedded into existing system that may contribute to reduction of GHG emissions, and not necessarily by creating new system. PLN obtained electricity for its grids by developing power plants and purchasing electricity from IPP (Independent Power Producer). <p>Data collection:</p> <ul style="list-style-type: none"> For power plants connected to PLN's grids, data on electricity production, operating hours including production halt due to maintenance and repair are submitted using standardize format through an online system. The data is then submitted by PLN to both the Directorate General of Electricity and Energy Utilization and the Centre for Energy Data and Information. <p>RAN-GRK:</p> <ul style="list-style-type: none"> Calculation of costs for reducing GHG emissions used in some studies (such as least cost options study) usually does not include costs for risks and opportunity cost it only includes direct production costs such as installation. <p>MRV:</p> <ul style="list-style-type: none"> MRV body is not an operational body. Instead, it serves to maintain the MRV system. Highlighted point is that system for MRV should empower the existing system and not creating a new system. In each sectors, it would be good to set indicators for evaluation, therefore we will have standard A scheme should be developed to manage flow of data for MRV. For example in electricity case, can data be submitted directly to MRV body or can be submitted through the Ministry of EMR? And which is the reporting source? The power plants, PLN, or users?
<p>20 August 2010 (Directorate General of Planning – Ministry of Forestry</p>	<ul style="list-style-type: none"> Ministry of Forestry has implemented a monitoring, evaluation, and reporting system called monevlap. However, the evaluation is currently performed internally by Ministry of Forestry's Inspectorate General or by the Bina Produksi Kehutanan (Forest Production Development). An ideal institution for national – local MRV could be as follows : <ul style="list-style-type: none"> Evaluation/validation part can be performed by a national independent body such as UKP4. Activity reports should be accompanied by coordinate of the activity's location and therefore site visit can be made by the evaluator. The UKP4 personnel are professionals and coming from different background to enable them in dealing with multiple sectors. With regard to international cooperation, currently MoFor have established an agreement with Australia for developing INCAS (Indonesia National Carbon Accounting System). Another agreement is with EU for REDD activity, conducted in cooperation with ICRAF and started from November 2009 to November 2011.

Date and Interviewees	Summary of the Meeting
	<ul style="list-style-type: none"> • INCAS is developed in cooperation with LAPAN (National Space and Aeronautics Agency) and covered several areas, i.e : land management, peatland, remote sensing, biomass, soil, etc. MoFor act as INCAS' leading agency since 70% of area covered by INCAS is under state forest area. LAPAN is responsible for remote sensing activity. • MoFor is currently conducting forest monitoring once per three years, while under INCAS monitoring will be conducted annually. • With regard to Lol with Norway, first stage of the implementation will be conducted in five provinces, i.e Jambi, Riau, Central Kalimantan, East Kalimantan, and Papua, with main focus on nature forest and peatland. • Under INCAS, there is assistance for improvement of BPKH (regional DG Plan office) capacity since its condition is varied between regions. • Dr. Ruandha mentioned several following barriers that may hinder development of MRV: <ul style="list-style-type: none"> – Implementation of mitigation actions in forestry sector is still ineffective due to the Ministry staff's different level of understanding on the issue – Mitigation has not yet being incorporated in forest area planning – Variations of data issued by different institutions. For example, forest coverage data released by MoFor and MoE shows a different number. – Unclear guidance for implementation of activity. For example, MoFor use IPCC guidance for GHG inventory, which guidance should be used for MRV? The level of understanding on the guidance is also varied between the ministry's staff. • It was suggested for locals to be given portion/responsibility to work on activity within its area, for example in developing forest map. Evaluation of the activity can be performed by independent party from outside the area.
<p>25 August 2010 Ministry of Public Works (Directorate of Penyehatan Lingkungan Pemukiman)</p>	<ul style="list-style-type: none"> • On August 9, 2010, a Task Force for Climate Change Mitigation and Adaptation was established in the Ministry of Public Works through the Minister Decree. The Task Force is responsible in coordinating mitigation and adaptation activities. • For GHG emission reduction, its activities, from planning to implementation are conducted by each respective directorate generals, who is also keeping records of the activities. • At this moment, several cooperation has been and are going to be established with donor agencies such as: <ul style="list-style-type: none"> – KfW for feasibility study on national waste management program – World Bank for Programmatic CDM – JICA for regional scale waste management in Makasar (South Sulawesi) • MoPW highlighted the need on general guidance for GHG emission reduction in national level, for example, it may be developed by Ministry of Environment. Later on, its breakdown to local level can be assisted by sectors. • Similar with other ministries, MoPW also implementing monev (monitoring and evaluation) system to its programs and activities. • With regard to MRV, MoPW feels the need for tools and human resources with expertise on MRV issues, therefore trainings are needed. • On RAN-GRK, waste sector is targeted with emission reduction of 0.048 Gton CO₂ by 2020. To achieve the target, a budget has been allocated but the number is not sufficient to finance all activities planned. The reduction is prioritized to be implemented in big cities such as Bandung, Surabaya, Jakarta, and Semarang. However, since Jakarta has already its own budget, the city will not be financially assisted through MoPW's budget. • In data collection issue, since the decentralization policy was in effect, MoPW have difficulty to gain access to local municipal waste data such as the number waste collected and managed in dumpsites, coverage area for waste collection, etc. The difficulty happens because local government feels that they have no obligation to report such data to MoPW. • MoPW identified the following factors as barriers in implementation of GHG emission reduction programs :

Date and Interviewees	Summary of the Meeting
	<ul style="list-style-type: none">- Less operational fund to manage daily activities- Lack of local government's awareness in improving municipal waste management- Lack of qualified human resources• MoPW have also listed several areas which requires improvements with regard to the implementation of GHG emission reduction programs<ul style="list-style-type: none">- Data on operational and maintenance of municipal waste management activities- Improvement for facilities in 3R (reduce, reuse, recycle) program, construction of large scale dumpsite and integrated (regional) dumpsite- Communication and coordination system between local and national government in monitoring waste management activities.- Technical assistance and guidance for implementing MRV

Appendix 5. Report on National Workshop MRV: Strengthening existing

□ Developing Countries Monitoring and Reporting on Greenhouse Gas Emissions, Policies and Measures

27th August 2010, Sari Pan Pacific Hotel Jakarta

The National Workshop on MRV was held at Sari Pan Pacific Hotel in Jakarta on the 27th August 2010 (see Appendix F – Agenda). The event was attended by 93 participants from national and local government offices, NGOs, private sector and development agencies (see Appendix G – List of Participants).

The workshop was a continuation of an introductory workshop on MRV held at May 21, 2010. The workshop was aimed at disseminating findings from interview conducted within the Scoping Study on MRV, collaboration between Indonesia and European Union.

The study will provide concrete recommendations on the structure and elements for a subsequent capacity building programme to start being implemented by January 2011 - the period of implementation of the contract will be 18-24 months from this date - with a view to assist Indonesia 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.

Opening Remarks

The workshop was opened by remarks from Mr. Julian Wilson, Ambassador/Head of Delegation of the European Union to Indonesia and Brunei Darussalam, who highlighted the importance of having a clear mechanism on MRV. Another remark was delivered by Mrs. Liana Bratasida, Ministry of Environment's Assistant Minister for Global Environmental Affairs and International Cooperation who expressed her wish to have the Scoping Study delivered concrete recommendations for MRV development, for example by recommending the sector, level and/or targeted area for the MRV capacity building activity.

MRV Implementation on Indonesia – Norway Lol

The topic was presented by Mr. Heru Prasetyo from UKP4 (Unit Kerja Presiden bidang Pengawasan dan Pengendalian Pembangunan – President's Delivery Unit on Development Monitoring and Oversight), an institution assigned by the president to follow up the preparation and setting of MRV indicated in Indonesia-Norway's Lol on Cooperation on Reducing GHG Emission from Deforestation and Forest Degradation. One important point raised by Mr. Heru is to see the amount of money mentioned in the Lol as a reward for efforts in implementing REDD+ and not solely as a payment/price of credits generated by the REDD+ activity. Funding from Norway was only one source of the financial support expected by GoI for the implementation of mitigation programs.

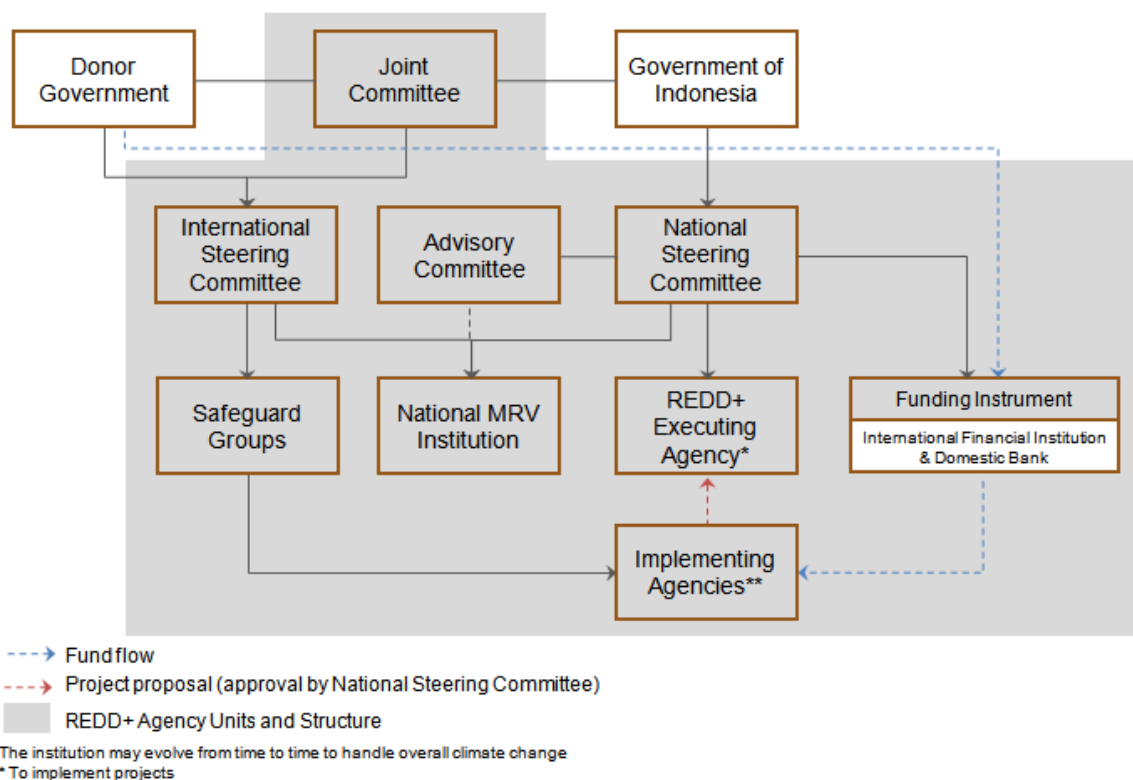
International Progress on MRV

Mr. Thibaut Portevin, Program Manager for Natural Resources and Environment on the European Delegation delivered a presentation about EU perspective on MRV. He mentioned the benefits in having an MRV system highlighting that a transparent MRV system can provide access to financial support. He gave the historical perspective on MRV beginning from the Bali Action Plan. He linked financial and technical support and the importance of the National Communications and highlighted the need 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. Asked about the possibility of having a completely new EU MRV system for NAMA, Mr. Portevin said that the current system is running well and therefore is possible to be adopted if such specific MRV for NAMA is required.

International Donors and other MRV Initiatives

The presentation was delivered by Mr. Farhan Helmy from the National Council for Climate Change (DNPI). He focused the presentation on the preparation of REDD+ implementation. He introduced a preliminary structure of governance of the REDD+ agency (see Figure 5.1). This is part of the response of the Government of Indonesia to the LoI with Norway Government. He added that the establishment of new National MRV Institution within the governance system is very important to avoid conflicts of interest between sectors. The framework of the National MRV Institution will be designed by the International and National Steering Committee. The main responsibility of this institution is to monitor and report the emission reduction based on international regulation and to develop independent verification method. The National MRV Institution will work under the International and National Steering Committees. In the context of LoI with Norway, the members of the International SC will be determined by the Government of Norway and the National SC will be chaired by the Chairman of UKP4 and the members will be the Chairman of Bappenas, Minister of Forestry, and Minister of Finance. The members of International and national SCs will be broadened later by including other international donors and other national institutional depending to scope of mitigation activities. This means that the establishment of the National MRV Institution is not intended only for accommodating the LoI with Norway government but has a broader scope (beyond the forestry sectors). At present the DNPI is still in the process of collecting inputs from various stakeholders on the design of the MRV system. A number of roundtable discussions on the MRV will be continued. It is planned that the MRV institutional system for REDD implementation will be established in November 2010.

Figure 5.1: The governance structure of REDD+ agency



Mr. Helmy stated that in the context of MRV, the international support will be directed to cover activities related to: (i) institutional framework (IF), (ii) technology provision (TP), (iii) Baseline Data Creation (BD), (iv) Proof of Concept "Implementation at Provincial level (PC), (v) Capacity Building (CB). The technology provision includes the improvement or establishment of basic IT infrastructure, GIS and remote sensing modelling tools and database management to facilitate an open, flexible and scalable database system. Baseline Data Creation will be directed to support the government in developing databases on existing condition and trends (covering social, economic and environmental aspects) at national and targeted provinces at appropriate scale based on GIS and spatial/remote sensing data, especially on land use and land cover changes. "Proof of Concept " Implementation at Provincial level (PC) is directed to assist various stakeholders in developing their capacity in using methodologies consistent with the Intergovernmental Panel on Climate Change (IPCC) guidelines for measuring, reporting, and verification. Capacity Building (CB) will be for developing capacity of wide range of stakeholders at national and local level through training activities. The training will apply Proof of Concept "Approach in using GIS, remote sensing, as well as modelling tools, with the emphasis of low carbon development strategy including spatial planning. A number of important activities dealing with MRV which are underway and going to be implemented in the next four years as shown in Table 5.1.

Table 5.1: A number of initiatives/projects related to MRV systems development in the forestry sector in Indonesia

Project and Size (USD)	IF	TP	BD	PC	CB	Remarks
Indonesia-Norwegian Partnership on REDD+ (2010-2014)	•	•	•	•	•	Preliminary stage
Indonesia-USA Comprehensive Partnership Program to Support Climate Change Center (2010-2011)	•	•	•	•	•	Preliminary stage
Indonesia Carbon Accounting System (INCAS) (2009-2011), Indonesia-Australia	•	•	•	•	•	On-going
Other initiatives (NGOs) at project scale	•	•	•	•	•	On-going)

In the discussion Ms. Liana Bratasida asked about the connection of the funding institution going to be established under the LoI Norway and other initiatives such as ICCTF (Indonesian Climate Change Trust Fund), Government Investment Centre and Indonesia Green investment Fund being established by the Ministry of Finance. At this stage such connection is still not clear but it will be part of the process. Further discussion is still needed.

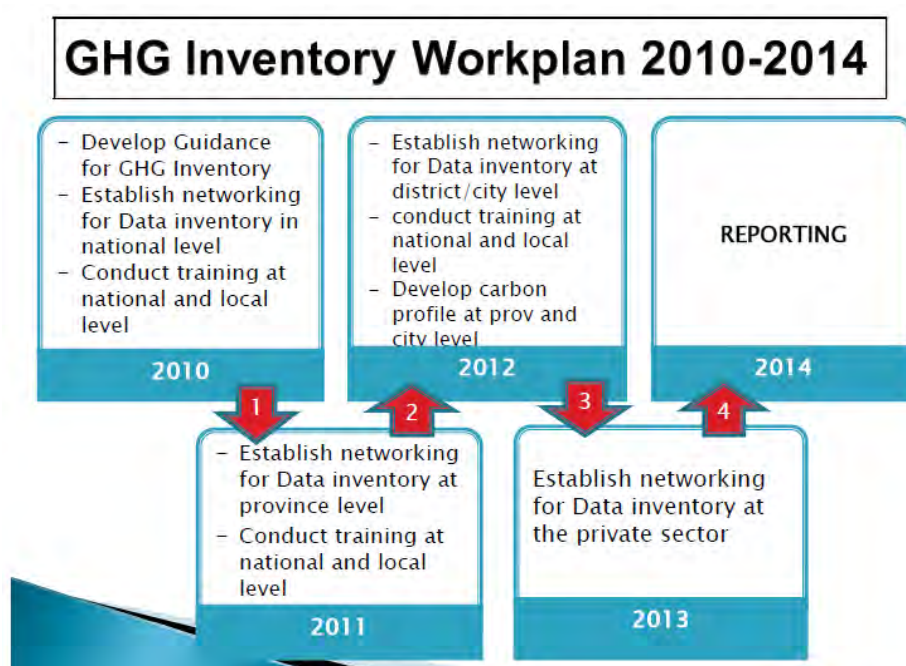
Plans and Program to Support Development of SIGN

The presentation was delivered by Mrs. Sulistyowaty, Assistant Deputy on Climate Change Impact Control. Based on Law no 32/2009, the Ministry of Environment (MoE) is responsible for coordinating the inventory of GHG emissions, and in this regard the MoE is now developing an inventory system called SIGN (Sistem Informasi Gas rumah kaca Nasional-National GHG Inventory System)., Support from JICA for establishing the SIGN has been secured.

Mrs. Sulistyowaty presented the following guideline and work plan in designing SIGN.

No.	Activity	Detail activities	Responsible institutions
1	Inventory	<ul style="list-style-type: none"> Identify GHG emission sources Compiling activity data: field visit and reported data by industry 	Related government institutions at national level and environmental Institutional at local government level
2	Measurable	<ul style="list-style-type: none"> Use IPCC worksheet template Tier assignment Emission factor 	KLH & related government institution at national level and environmental institution at local government level
3	QA / QC	<ul style="list-style-type: none"> To assure data quality being submitted by local government To assure date quality before submitted to KLH 	<ul style="list-style-type: none"> National level: KLH Local Government
4	Verifiable	<ul style="list-style-type: none"> Verify GHG emission data Verify mitigation activity 	National level: Independent team
5	Reportable	<ul style="list-style-type: none"> District / city level will report to Provincial level 	Environmental institution at

No.	Activity	Detail activities	Responsible institutions
		<ul style="list-style-type: none"> Provincial level will report to National (KLH) 	local government level and related sectors at national level will report to KLH



Currently, MoE is developing Standard Operational Procedure and Technical Guidance derived by simplifying the 2006 IPCC Guideline. Further steps planned are among others:

- Development of local emission factors
- Agreement on which methodology used as reference
- Institutional arrangement, especially among government institutions
- Development of Standard Operating Procedure on GHG Inventory (how to collect activity data, performing QA/QC, and developing report)
- Development of technical guidance to ease sectors in data collection and calculation process
- Organization of training series for national and local government institutions

Institutional Design and Modelling for MRV at Local Level

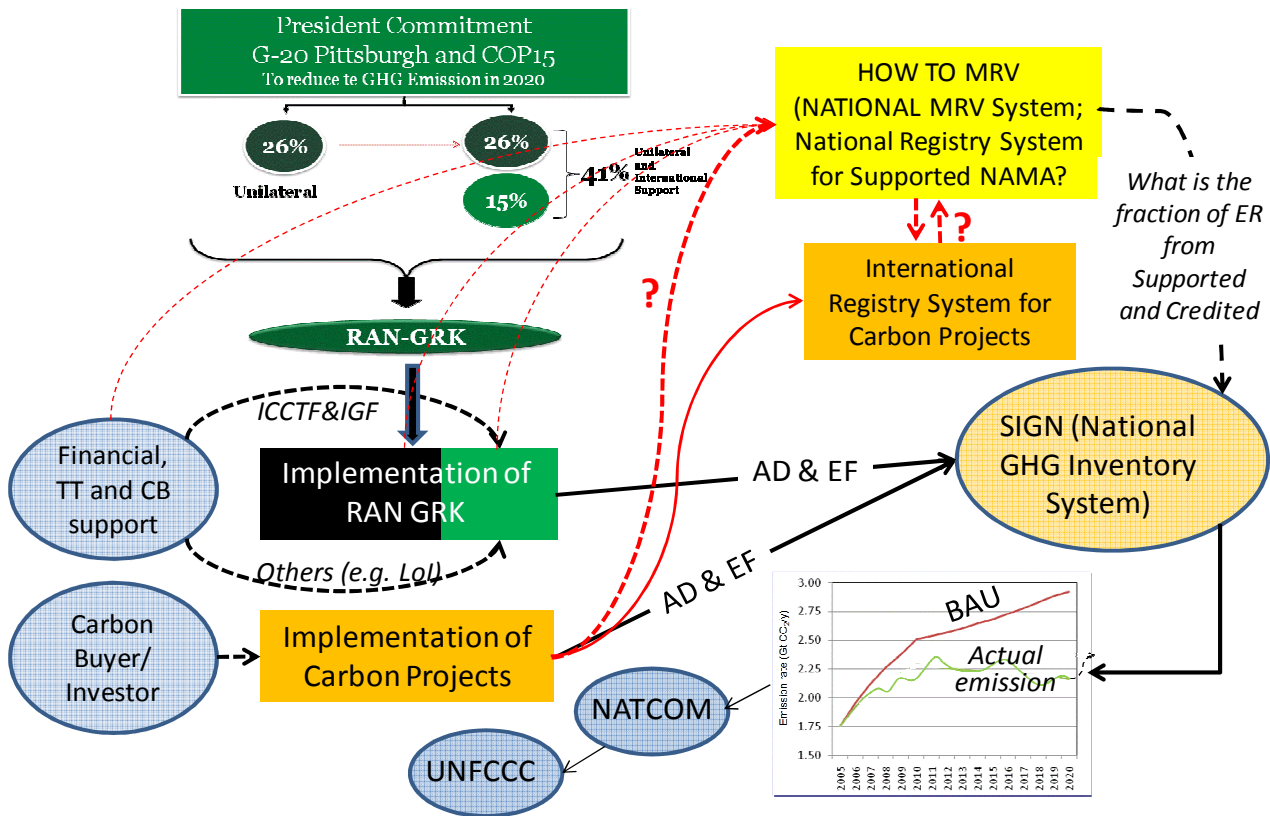
This section was presented by Mr. Humala Pontas, a representative from Central Kalimantan’s provincial government. He explained the initiatives undergo in Central Kalimantan with regard to MRV especially in REDD. At present the Government of Central Kalimantan Province has established REDD Commission and Provincial Council for Climate Change. There are two important programs being implemented in the province namely REDD demonstration activities supported by AusAID and a Low Carbon Growth Strategy developed supported by DNPI and McKinsey.

He emphasized the importance of having a simple MRV system which is streamlined into the existing monitoring and evaluation (MONEV) system. The spirit of having a good MRV system is to deliver the promises of good governance and accountability in an open and transparent climate. The Governor of Central Kalimantan already asked for assistance and sent several agencies CEO to UKP4 (Working Unit for the President on Development Control and Monitoring, Unit Kerja Presiden Bidang Pengawasan dan Pengendalian Pembangunan) office to learn how to improve the current system. He added that the current textual and numeric off line/paper data based system have to be changed into an internet-based visual, spatial and coding data system. With this system, the data will be easily accessed and open to the public. From the discussion, it was revealed that the improvement of current MONEV system is urgent including the data management system.

Key Findings and Recommendation from the Scoping Study on MRV

As national expert on the Scoping Study, Dr. Rizaldi Boer presented recommendations and findings the study. The presentation started by describing the current institutional system in collecting activity data and GHG inventory, with a case study on agriculture sector. In his presentation, it was mentioned that Reporting National GHG Inventory is an obligation of any Party to the convention. In this context for the non-Appendix 1 Parties, it is encouraged to establish a national system for the GHG inventory. This system will estimate the profile (showing the historical emissions) and the status of GHG emissions (emission level in particular year) of all sectors as defined in the IPCC guidelines and develop a GHG Inventory Report to be submitted to the UNFCCC. The status of emissions in a particular year will depend on mitigation actions being implemented by the sectors. In this context the mitigation actions could be done with support from developed countries or through carbon market mechanisms or as unilateral actions. The status of emissions reported in the National GHG inventory already captures all these initiatives. If the status of the emissions being reported is already below the baseline, the question will be how much of the emission reduction occurred in that year is from unilateral, supported or carbon market mechanisms. Therefore, there is a need to develop registry system who will register all mitigation actions being supported by developed countries and via carbon market. This system will track all emission reductions measured from the supported actions and carbon market mechanisms. Thus the contribution of unilateral mitigation actions of the total emission reduction reported by the GHG inventory will be known. He provided an illustration and the connections between among the system components as shown in Figure 5.2.

Figure 5.2: Possible structure of a national MRV system for Indonesia (Source: presentation Rizaldi Boer)



During the discussion, it is clear that there is confusion related to the institutional arrangement of MRV for REDD+ and MRV for other national mitigation actions and how the MRV institutions will link with the national system for GHG inventory (SIGN). Referring to the IPCC GL 2006, MRV is not only measure the emission reduction and carbon stocking but it will measure and monitor all enabler condition component to achieve the emission reduction targets.

During the discussion, it was agreed that a good MRV system is required to gain international recognition on the achieved emission reduction from the action implemented by countries. The question is whether a single and independence institutional system is required for this. Participants stated that at present all sectors at all levels already have monitoring and evaluation (MONEV) system. All programs implemented by sectors are subject for review by the Inspectorate General (in term of achievement of the program following the performance defined indicators) and by Agency for Financial Audit or BPK (in term of financial audit). The new thing is to add new indicator in the review process namely GHG emission. The issue is how an entity can measure, review and report the emission reduction from the implementation of the programs that meet international standards. Thus MRV development is only a matter how the current system can be improved to gain international recognition. It is suggested that the Independent National Entity who will be responsible for implementing MRV should be designed to be an entity that will do internal review to ensure that the MRV process implemented by the entities related to the GHG emission meets the international standard. Thus the presence of new National MRV institution is important to ensure that the

country will pass from the international independent verification process. Up to now, the form of the National MRV Institution as well as its role and function is not defined. Discussions, workshops and capacity building on this issue are still underway and continue. A number of agencies with support from different international development agencies have been implementing the discussion and plan to do a number of capacity building activities on MRV. To some extent the initiatives implemented by the agencies are not integrated and coordinated well. It is very crucial that these similar initiatives should be well coordinated and integrated to produce a positive and valuable outcome.

On general findings, gaps/needs identified for MRV development are: (i) different understanding of sectors on MRV issue and how to establish it, (ii) who will operate and coordinate the two trust funds for international support, (iii) Lack of a strong institutional framework to allow for regular elaboration of National GHG inventories, and (iv) no clarity on the connection between the national system for GHG Inventory (SIGN) and the MRV system. As for sectoral findings, common gaps found are in lack of activity data, especially high quality data, and lack of local knowledge and capacity in performing emission monitoring.

Breakout session on Forestry and Agriculture

The session was opened by presentation from Ministry of Agriculture, represented by Mr. Prohaasto Setyanto, and Ministry of Forestry, represented by Mr. Ruandha.

Mr. Setyanto explained that the Ministry of Agriculture has proposed mitigation programs with an emission reduction target of about 130.574 million ton CO₂ from mineral soils and about 204.182 million ton CO₂ from peatland. The proposed budget for meeting this emission reduction target is over 15 trillion IDR. The Ministry of Agriculture has established a Working Group on Climate Change who is assigned to formulate plan and strategy for the implementation of MRV. He further stated that the existing institutional mechanism applied in monitoring and evaluating (MONEV) system will be adopted in establishing the institutional mechanism for MRV. Establishing a new institution for MRV should be avoided as it may require high cost. At present, Directorate General is responsible agency for monitoring and evaluating the implementation of programs in its respective directorate. To improve the accuracy of GHG emission measurement from various land uses, the National Research and Development Agency on Agriculture Land Resources has set up a plan for developing emission factors from various land use categories. A Mobile Environmental Service Vehicle (MES-V) for supporting the activities has been ordered. Practical methods for measuring the emission from rice fields, agriculture plantations and peat land are being developed by the Agency for Agriculture Research and Development (AARD).

Mr. Astunadi, the head of Research Agency on Hydrology and Agroclimate, stated that the system for collecting activity data in the agriculture sector has also been well established, particularly for rice cultivation. The crop planting areas are reported on regular basis (every two weeks) as these data is required for fertilizer supply. In recent years, field observers in some of the districts have been equipped with GPS to improve the accuracy of measuring rice planting areas at the village level. Some participants suggested that to further improve the accuracy the use of remote sensing technology in combination with field observation is needed and also the use of an electronic system for transferring the data from the field to district, province and ministry. Capacity building on the use of electronic system for data transfer, efficient data archiving system and mechanism for data verification as well as development of baseline is required.

Mr. Ruandha from the Ministry of Forestry stated that the Ministry of Forestry is now developing MRV. It was stated that the monitoring system for land use and forest cover changes will be done at four levels namely national, province, district, and management unit levels. The frequency of the monitoring will be every one year at National, Provincial and District level and every six months for the unit management level. The resolution of land use and forest cover maps being produced for national, province, district, and management unit levels will be 1:250,000 (or one grid is equivalent to 200 ha), 1:100,000 (equivalent to 25 ha), 1:50,000 (equivalent to 6.25 ha) and 1:25,000 (equivalent to 2 ha). The monitoring will be prioritized at locations where the REDD+ programs are implemented and areas with high risk of deforestation. The REDD programs are targeted to reduce illegal logging, agriculture encroachment, land/forest fire, to improve land use/forest management through revision of spatial plans and implementation of improved silviculture systems and certification, to increase carbon stock in degraded forest through forest restoration and in degraded lands through planting activities. For verification, the Ministry of Forestry will collaborate with Google Earth and use ultra light survey. Mr. Ruandha further stated that the important element for capacity building in which EC could support was the introduction of technologies for monitoring and assessing forest degradation. Trainings for technical staff at local level on the use of any software required for quantifying emission reduction consistent with IPCC are also needed such as ALU software (Agriculture and Land Use) developed by Colorado State University-USA.

Mr. Pontas, local government representative, stated that based on his experience in Central Kalimantan, the effective approach for capacity building is through the implementation of pilot programmes at the local level with support from international experts. The details of a large scale capacity building programme may not be required at this stage as through the pilot the important element of MRV as well as technologies to be transferred which allowing local governments to implement MRV effectively can be identified as the pilot projects go. Comparative studies to other countries who already established good MRV system are also required. Other participants also recommended implementing pilot project on capacity building for MRV at provincial level as various components of MRV

Breakout session on Energy, Industry, and Transportation

The session was opened by presentation from Ministry of Industry, represented by Ms. Lilih Handayani, and Ministry of Energy and Mineral Resources, represented by Mr. Rinaldi.

Mrs. Lilih explained the plan for the inventory of GHG emission being developed by the Ministry of Industry. The mechanism comprises several steps, i.e : (i) collection of activity data and information on industry sector, (ii) reporting of the data and information, (iii) analysis, (iv) verification for the result of the analysis, (v) validation of GHG emission from industry sector. Future plans are to develop an MRV mechanism agreed by stakeholders, establish coordination between government offices on MRV, and do a capacity building programme for officers in national and local governments on the type of GHGs, its measurement and calculation method, and its reporting mechanism.

Mr. Rinaldi described the status of GHG emissions from energy by sub-sectors i.e: transportation, industry, households, commercial, and power plants. He also presented the list of programs for GHG emission reduction efforts on energy efficiency, development of renewable energies, and fuel switching activities.

A question was raised on the flow of data from companies to Ministry of Industry. Mrs. Lilih explained that currently there is no formal mechanism to regulate companies for sending their activity data (such as

production and fuel consumption) to the Ministry of Industry. If there is a need for such data, Ministry of Industry will sometimes ask the data to the respective industries' association or obtain it from the Indonesian Statistical Bureau.

Responding to a question from a construction services provider, Mrs. Lilih explained that currently there is an award for the most environmentally friendly industry for which the criteria are available in Ministry of Industry. However, there is no training for environmental friendly construction methods (such as selection of construction material) provided by the Ministry of Industry.

On the transportation sector, it was acknowledged by participants of the discussion that obtaining data on the sector, especially for land transportation, is difficult since it involves individuals and there is currently no system able to records individuals' transportation activity such as daily trips. As for the vehicles, no records are available on the efficiency of vehicles used, distance travelled, and its emission level. For air and sea transportation, Indonesia is subjected to regional and international standard in operation and it tries to fulfil the standards. At the moment, there is an international cooperation in establishing environmental friendly airports.

In waste sector, Ministry of Public Works is encouraging dumpsites to reduce its methane release by reducing its organic waste, for example by implementing composting program. Ministry of Public Works will also prepare guidelines for locals/dumpsites on methods for reducing GHG emissions.

With regard to capacity building needs, there are a few suggestions:

- From Mrs. Lilih (Ministry of Industry) : training should be done in actor (sector) level since they are the ones who understand the process and kind of data available or at least have access to the currently unavailable data. The selection for sectors targeted for training can be based on the amount of GHG emissions, sector who released high CO₂ and other GHGs.
- From Mrs. Kati (Ministry of Public Works): capacity building should be done in sectors at the national level since they are the one providing guidance for among others, ground implementation.
- From Mr. Ibnu Najib (Ministry of State-owned Enterprises): capacity building should be done in parallel for both national and local level). In local level, MRV can take into consideration the existing local mechanism and local wisdom, while the national level can coordinate the local works/initiatives and developing guidance.

Appendix 6. Agenda National Workshop, 27th August 2010

10:00 – 10:30	REGISTRATION
10:30 – 11:00	I. OPENING and INTRODUCTION
10:30 – 11:00	Keynote Speeches and Opening Remarks
	Julian Wilson, Ambassador/Head of Delegation, Delegation of the European Union to Indonesia and Brunei Darussalam
	Liana Bratasida, Assistant Minister for Global Environmental Affairs and International Cooperation, Ministry of Environment
11:00 – 11:15	MRV Implementation on Indonesia-Norway Lol
	Heru Prasetyo, UKP4
11:15 – 11:30	International progress on MRV
	Thibaut Portevin, Program Manager, Natural Resources and Environment, European Commission
11:15 – 13:30	II. MRV in Indonesia
11:15 – 11:30	Plans and programs to support development of SIGN
	Sulistyowaty, Ministry of Environment
11:30 – 11:45	Questions and Answer session
11:45 – 13:00	Friday Prayer/Lunch Break
13:00 – 13:15	International donors and other MRV initiatives
	Farhan Helmy, DNPI
13:15 – 13:30	Institutional Design and modelling on MRV at local level
	Humala Pontas, Central Kalimantan Government
13:30 – 16:00	III. Sectoral progress on MRV and Capacity Building Needs
13:30 – 14:00	Draft MRV in-country report: key findings and recommendations

	Rizaldi Boer, Director of Centre for Climate Risk and Opportunity Management (CCROM), Bogor Agricultural University
14:00 – 14:30	Question and Answer session
14:00 – 16:00	Breakout sessions: Introduction by Stefan Bakker, ECN 1) Forestry and Agriculture; Opening presentation by Ministry of Forestry (Ruandha) and Ministry of Agriculture (Prihasto Set-yanto), Guiding questions by facilitator and project team (Rizaldi Boer) 2) Energy, Industry, and Transportation; Opening presentation by Ministry of Energy (Suharyati) and Mineral Resources, and Ministry of Industry (Lilih Handyaningrum), Guiding questions by facilitator (Moekti Soejachmoen and Syahrina) and project team (Stefan Bakker)
16:00 – 16:30	Coffee Break
16:30 – 17:30	IV. Feedback session and general discussion Masnellyarti Hilman, Deputy for Nature Conservation Enhancement and Environmental Degradation Control, MoE Liana Bratasida, Assistant Minister for Global Environmental Affairs and International Cooperation, Ministry of Environment
16:30 – 17:30	V. Closure
17:55	Breakfasting

Appendix 7. List of participants, national workshop

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Appendix 8. Memo on capacity building, as distributed at national workshop



Workshop on Measurement, Reporting and Verification, 27 August 2010

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

Climate change is a critical priority area for Indonesia's environmental and economic development agenda. The European Commission has commissioned a study entitled "Developing countries monitoring and reporting of greenhouse gas emissions, policies and measures", in short the MRV Scoping Study. The objective of this scoping study is to prepare recommendations for a capacity building project to be carried out in 2011 and 2012. It is implemented by Euroconsult Mott McDonald, Ecoprogresso, the Energy research Centre of the Netherlands, Bogor Agricultural University and CERIndonesia.

After a general introduction on MRV in Indonesia, based on desk research, this memo includes examples of cooperation opportunities, resulting from the understanding of the project team of recommendations made by different stakeholders interviewed between June and August 2010 and additional recommendations based on desk research and the team's work in other countries. By no means they intend to represent nominal proposals from any such stakeholders, of the Indonesian Government or of the European Commission.

Workshop participants are invited to provide critical feedback, complement, delete and add to the items the project team has recollected below. The issues identified and the related recommendations are split into two categories 1) forestry + agriculture and 2) energy, industry and transportation. Participants are also invited to provide written comments to rizaldiboer@gmail.com, Syahrina@cerindonesia.org and bakker@ecm.nl.

Background: MRV, NAMAs and LEDS in Indonesia

Indonesia is among the international front-runners when it comes to climate change mitigation, with the unilateral voluntary target of 26% in 2020, and 41% with international support. These reductions are to be achieved in the context of sustainable development. Sectoral policies are being identified in e.g. the Sectoral Roadmap and the National Action Plan on GHG Reduction (RAN-GRK). The actions in the latter are likely to be further "translated" into NAMAs. MRV is an integral part of these policies, however further clarity on the exact implementation is needed. An institutional structure for MRV is currently under discussion, and the exact roles of the National Climate Change Council, the Ministry of Environment, other Ministries, and lower-level governments in this context remain to be specified.

National Communication and GHG inventory

Indonesia is about to submit its 2nd National Communication, including a GHG inventory. There seems to be a high level of confidence in the GHG inventory figures reported for certain sectors such as energy; however, for other sectors, particularly LULUCF, agriculture and waste, significant uncertainties seem to exist in both the recorded activity data and the default emissions factors that are used. There are some existing MRV capacity building programmes that aim to improve the level of confidence in LULUCF data and given the large contribution of this sector to total emissions this needs to remain a high priority. The large impact this sector is likely to have on achieving national emissions targets will make verifiable figures vital, particularly when considering multi-lateral support for mitigation. Further factors weighing on the verifiability of the national inventory are the range of reporting formats, data collection methodologies, delays in data collection and data relevance across sectors. Standardised timely reporting practices and an increased focus on the collection of specific activity data related to GHG emissions would significantly improve the reliability and quality of the national inventory. An increased mandate for data collection centres at the ministries, giving more power to proactively obtain data and verify its quality, would aid in improving data timeliness and completeness, and be an important step in the eventual implementation a formal quality assurance and quality control system. The internationally supported SIGN (national GHG emission inventory) programme is being planned to improve the current inventory.

Low-emission development strategy

A review of the available literature and government reports reveals 13 existing studies with possible relevance for an Indonesian Low-emission Development Strategy (LEDS) covering the national GHG inventory and mitigation actions, climate change programs and policies, and low carbon development. At this stage however none of these can be considered as a broadly accepted, government-owned LEDS. A key challenge is to align those different studies and implement the policies at the national, provincial and local level while inter-sectoral coordination is also required.

Emission projections

There remains some uncertainty regarding the methodology used to estimate future Indonesian GHG emissions. This forecast of BAU emissions is a critical aspect of Indonesia's climate change mitigation plans as this forms the reference point for the national emissions reduction target. While the Second National Communication includes the most complete emissions modelling performed to date in Indonesia, a number of assumptions are open to interpretation including; i) the choice of which existing policy measures are considered as BAU; ii) the level of future LULUCF emissions under BAU; iii) the structure of Indonesia's economy in the future and iv) the interaction between sectors which is not accounted for in the SNC. Just as reported emissions should be verifiable and transparent, so should the projections of future emissions, particularly if international support is sought to pursue measures beyond the 26 percent unilateral target.

Current and future capacity building activities

Capacity building can help Indonesia to further develop its MRV system and enhance its ability to embark on a low-emission development path. There is a number of ongoing unilateral activities and systems to build on, and a host of internationally funded activities related to MRV capacity building, however, most of

these targeting the forestry sector, several of which include REDD programmes on the provincial level. It might be interesting for Indonesia if some of the future capacity building activities focus further on non-forestry sectors, and issues such as projections of emissions, estimation of achieved emission reductions, and the planning, development and implementation of NAMAs, whereby added value to SIGN needs to be ensured. The first results of the MRV gap analysis, and possibilities for international cooperation are included below. A general question related to the EC capacity building project is whether to focus on the national or the sub-national level and if the latter, support pilot-NAMAs at the districts, province or cities level and assist in establishing the MRV system? How could sites be selected?

Forestry and Agriculture

Sector	Gaps/needs	Proposal for cooperation	Potential concrete actions	Questions to workshop participants
General/national	Lack of a strong institutional framework to allow for regular elaboration of National GHG inventories; no clarity on the connection between the national system and the sectoral and local levels	Exchange of experience in establishing national systems for GHGI (in collaboration with SIGN)	<ul style="list-style-type: none"> • Workshops to facilitate discussion on institutional setup • Comparative studies to other countries on institutional setup • Dialogue with local governments for getting inputs in defining effective National MRV and GHG Inventory system and assist the establishment of sectoral and local MRV system by improving current monitoring and evaluation (MONEV) system (e.g. as part of the pilot NAMAs) 	What may be a good process for this? What will be the main role of the National Institution for MRV and GHG Inventory (e.g. more on coordination role/ internal verifier body ensuring the sectoral and local MONEV meet international requirement, registry body for supported NAMAs etc) and working relationship with sectors and local governments? How can cooperation with ongoing activities be maximized?
	Understanding of sectors on NAMA and associated MRV varies, and some sectors have no definite plan for developing the MRV system; for international support two trust funds have been established: not clear how these will operate and coordinate	Develop NAMA framework for Indonesia to enhance understanding of the issue across the board	<ul style="list-style-type: none"> • Prepare pilot-NAMAs, monitor implementation and impact, draw lessons learnt, involving ministries, researchers and private sectors • Exchange of experience with other countries (e.g. Amazon fund in Brazil etc) 	Which activities would be suitable for pilot-NAMAs? How can cooperation with ongoing activities be maximized? How can MRV of support (finance, technology, capacity building) be carried out?
Forestry	High uncertainty in current emissions from deforestation, due to lack of and inconsistency in activity data and lack of field testing	Collaboration with international institutes to acquire high resolution satellite data	<ul style="list-style-type: none"> • International exchange of data and capacity building to use radar technology; • Setting up national and regional data management and interpretation system including training on IPCC guidelines 	Which specific activities can the EC support in addition to ongoing programmes? Which stakeholders should be involved?
	High uncertainty for Reference level of future emissions (i.e. baseline) due to uncertainty in policies and time series	International exchange best practices and methodologies for of baseline setting	<ul style="list-style-type: none"> • Workshops, including with the participation of other forestry countries (e.g. Brazil, Mexico) on best practices and methodologies • Joint work for the review of all available data and projections 	How can we add value to ongoing activities?

Sector	Gaps/needs	Proposal for cooperation	Potential concrete actions	Questions to workshop participants
	Detailed knowledge about costs of mitigation and potentials of emission reduction options	Exchange of knowledge on methodologies for estimation of costs and determination of co-benefits of emissions reduction measures.	<ul style="list-style-type: none"> Workshops to exchange assumptions and outcomes Hands-on Training on methodologies Joint-work on costs and potential of mitigation options 	Should such an exercise be done with each different sectoral ministry, or should it be done with one coordinating ministry? If so, which ministry would coordinate?
	Lack of provincial/local capacity level to monitor emissions and its drivers	Support to develop local capacity and exchange of knowledge	<ul style="list-style-type: none"> Training on technical aspects, such as monitoring forest condition -based on pilot-municipalities 	How to select the target areas?
Agriculture	High uncertainty of activity data and emission factors	Improving data collection system particularly for key sources such as rice cultivation, animal husbandry and peat, and aligning with SIGN	<ul style="list-style-type: none"> Joint training programmes at the local/provincial level Workshops to share results among regions 	Which stakeholders should be involved? What are the key uncertainty areas?
	No clear understanding and capacity to develop BAU emission projections (sectoral, sub-national, project level)	Exchange of experiences in establishing BAU emission projection across sectors and facilitate the process of establishment of an integrated BAU emission projection (all sectors) at national, sub-national level	<ul style="list-style-type: none"> Hands-on training on methodologies Joint-work to establish emission projections Workshops to share experience and discuss assumptions and outcomes 	Who will coordinate the joint works? Do you apply certain approaches/methods for developing the BAU emission projection? How can cooperation with ongoing activities be maximized?

Energy, industry and transportation

Sector	Gaps/needs	Proposal for cooperation	Potential concrete actions	Questions to workshop participants
General/national	Lack of a strong institutional framework to allow for regular elaboration of National GHG inventories; no clarity on the connection between the national system and the sectoral and local levels	Exchange of experience in establishing national systems for GHGI (in collaboration with SIGN)	<p>Workshops to facilitate discussion on institutional setup</p> <p>Comparative studies to other countries on institutional setup</p> <p>Dialogue with local governments for getting inputs in defining effective National MRV and GHG Inventory system and assist the establishment of sectoral and local MRV system by improving current monitoring and evaluation (MONEV) system (e.g. as part of</p>	What may be a good process for this? What will be the main role of the National Institution for MRV and GHG Inventory (e.g. more on coordination role/ internal verifier body ensuring the sectoral and local MONEV meet international requirement, registry body for supported NAMAs etc) and working relationship with sectors and local governments? How can cooperation

Sector	Gaps/needs	Proposal for cooperation	Potential concrete actions	Questions to workshop participants
	Understanding of sectors on NAMA and associated MRV varies, and some sectors have no definite plan for developing the MRV system; for international support two trust funds have been established: not clear how these will operate and coordinate	Develop NAMA framework for Indonesia to enhance understanding of the issue across the board	the pilot NAMAs) Prepare pilot-NAMAs, monitor implementation and impact, draw lessons learnt, involving ministries, researchers and private sectors Exchange of experience with other countries (e.g. Amazon fund in Brazil etc)	with ongoing activities be maximized? Which activities would be suitable for pilot-NAMAs? How can cooperation with ongoing activities be maximized? How can MRV of support (finance, technology, capacity building) be carried out?
Electricity	Lack of activity data on off-grid or captive systems; inconsistent data; lack of QA; Lack of data collection & management systems; Lack of consumption data	Partnership on data collection and interpretation system	Technical training and joint programmes on data collection, GHG emissions Training on data verification and QA/QC including international standards and development of guidelines	How can cooperation with ongoing activities, particularly SIGN, be maximized?
	Lack of data and monitoring system for rural electrification programme	Develop pilot-NAMA including MRV system with baselines, emission reduction estimation, and monitoring of implementation	Joint work to develop MRV framework Hands-on training on methodologies	How can the existing rural electrification policy be used?
	Lack of detailed knowledge on potential of renewable energies at local level	Design of a dissemination system to local stakeholders	Review existing data and dissemination programme	Is there such work already done for any sort of renewable energy? Is there a type of RE which should be given priority?
Industry	Uncertainty in industrial process emissions and EFs; Lack of details especially in smaller subsectors; no single database for all data; no validation of emission factors; data verification;	Determination of National Emission Factors for selected key sources Setting up a national database for activity data	Training on methodologies for determination of EF Joint work on review of existing information Hands-on training and support on collecting information, setting up an inter-sectoral database and application of QA/QC procedures on such data	For which sources should priority be given in determining national EF? Is this work better suited to be done at national level or is there a sub-national division which should be taken into account?
	Lack of knowledge for the estimation of the effects of energy efficiency measures	Partnership on methods and data	Training & learning by doing, using methods and dedicated software, based on and cases in sectors, both for ex-post and ex-ante efficiency calculations	Which subsectors would be suitable? Which stakeholders to involve? Are there ongoing or planned policies that can be piloted?
Transportation	Lack of detailed and consistent bottom-	Setting up framework transport	Joint programme with international experts,	How can cooperation with ongoing

Sector	Gaps/needs	Proposal for cooperation	Potential concrete actions	Questions to workshop participants
	up activity data and monitoring system	data collection	MoT and local agencies	activities, particularly SIGN, be maximized?
	Lack of capacity for developing ex-ante and ex-post emission reduction estimates	Sharing of best practices and models for emission reduction estimates	Joint work on the development of national or local/city pilot-NAMAs including MRV in cooperation with international experts	How can cooperation with ongoing activities, particularly SIGN, be maximized? How to select the cities/provinces?
Fossil fuel production	Uncertainty in current emissions, particularly non-CO ₂ emissions	Support for emission estimates and monitoring	Training programme on IPCC guidelines and joint work for GHG inventory and local emission factors Joint programme involving companies, government and international experts	How can cooperation with ongoing activities, particularly SIGN, be maximized?
	Absence of detailed emission reduction plans and capacity to make detailed emission projections and reduction scenarios	Capacity building for policy making and its MRV; Support for modelling	Development of pilot-NAMAs for the sector in cooperation with international experts Hands-on training and workshops for exchange of knowledge on planning and designing emission reductions in this sector.	Would CDM project developers be able to provide useful knowledge and experience? How can cooperation with ongoing activities, particularly SIGN, be maximized?

Appendix 9. Written inputs from stakeholders on MRV capacity building proposals, October 2010⁴

Inputs on Proposal Capacity Building on Measurable, Reportable, and Verifiable (MRV)

From the Directorate of New and Renewable Energy and Energy Conservation,

The Ministry of Energy and Mineral Resources

⁴ These comments were incorporated in the capacity building proposals in Chapter 5.

Issues	Gap/Barrier	Classifications	Type of Capacity Building & Potential Concrete Actions	Focal Stakeholders	Other Stakeholders involved	Ongoing related initiatives
	Limited understanding on off-grid/non-electricity renewable energy project that can be identified as NAMAs by local government and other stakeholders	Policy	Develop capacity of local government and related stakeholders in identifying off-grid/non-electricity renewable energy projects as NAMA, such as bio-energy (bio-fuel, biogas, biomass) project	Ministry of Energy and Mineral Resources	Ministry of Agriculture, Ministry of Forestry,	Internal program from the government
	No capacity to measure the emission reduction from the off-grid/non-electricity renewable energy project	Methodology/Technology	<ul style="list-style-type: none"> Determination of emission factors Workshop and training on emission reduction calculation 	Ministry of Energy and Mineral Resources	Ministry of Agriculture, Ministry of Forestry, CSO	
	Limited capacity to measures emission reduction from energy efficiency appliances utilization in residential and commercial sector	Methodology/Technology	<ul style="list-style-type: none"> Determination of emission factors Workshop and training on emission reduction calculation 	Ministry of Energy and Mineral Resources	PLN, IPP, EE Industries	JICA Project on Implementation of Practical demand side management with MEMR

Inputs on Proposal Capacity Building on Measurable, Reportable, and Verifiable (MRV)

Issues	Gap/Barrier	Classification	Type of capacity buildings and potential concrete actions	Focal stakeholder	Other stakeholders involved	Ongoing related initiatives
GHG Inventory	Lack of database, capable human resources, methodology to support MRV activities.	Data and human resources management and Methodology/Technology.	Setting up mechanism for data integration from local to central government. Setting up database for emission, mitigation and adaptation activities. Training / OJT using method and software. Develop MRV methodology for mitigation and adaptation action.	MoPW, MoE, Local government.	University	

Inputs on Proposal

Capacity Building on Measurable, Reportable, and Verifiable (MRV)
From the Directorate General of Electricity and Energy Utilization,
Ministry of Energy and Mineral Resources

Issues	Gap/Barrier	Classification	Type of capacity buildings and potential concrete actions	Focal stakeholder	Other stakeholders involved	Ongoing related initiatives
GHG Inventory	Lack of knowledge for the new version of emission factor calculation in electricity	Methodology/ Technology	Determine of Source data from all of central electricity on connection grid. Training & learning by doing, using methods and dedicated software.	Ministry Energy and Mineral Resources		
	The estimation of the effects of energy efficiency measures	Methodology/ Technology	Training & learning by doing, using methods and dedicated software, based on and cases in sectors, both for ex-post and ex-ante energy efficiency calculations	Centre for Industry - Ministry of Industry, Ministry Energy and Mineral Resources		

Inputs on Proposal Capacity Building on Measurable, Reportable, and Verifiable (MRV)
From the Ministry of Public Work

1. MRV capacity building in national and local level on solid waste and waste water management sector, including methodology for GHG emission measurement, its calculation and reporting.
2. The capacity building to be implemented in the form of "on the job" training, including training on utilization of relevant tools.
3. Capacity building for various sources of carbon emissions related to LULUCF such as peatland, etc. Including provisioning and training on spatial data needed and any software for analyzing it.
4. With regard to annex on GHG Inventory issue, gaps/barrier faced should be added, such as lack of databases, human resources, and methodologies to support MRV implementation. Furthermore, it is suggested for relevant stakeholders (MoE, local government, MoPW, and universities) to:
 - Develop integrated data mechanism from local government to central government
 - Development of database for activities related to emission, mitigation, and adaptation
 - "On the job" training for mitigation and adaptation
 - Development of MRV method for mitigation and adaptation

Inputs on Proposal Capacity Building on Measurable, Reportable, and Verifiable (MRV)
From GHD (Consulting Company based in Jakarta)

Need for Monitoring Reporting Verification (MRV) of Emission Reduction

In the last G-20 meeting as well as in the last COP-15 meeting in Copenhagen, Indonesia has committed to reduce GHG emissions unilaterally by 26% in 2020 and an additional 15% with international support. Since then the National Planning Agency Bappenas has been developing low-carbon strategy with roadmaps for various sectors, including Forestry, Transport, and Industry etc. The targets may be ambitious, but may not mean much if they cannot be properly Monitored Reported and Verified (MRV) according to established technical methods. MRV therefore is fundamental for any scheme to achieve emission reduction targets, be it national or sectoral.

MRV – Institution/Agency

At present there is no clearly identified Institutional structure for MRV activities. Existing agencies such as MOE, DNPI or DNA could potentially become the National Carbon Registry Agency with a properly developed MRV-infrastructure. Alternatively, a new Central MRV Agency could be created which will be responsible for coordinating and driving the MRV activities at all levels and may be modified and linked to the current Indonesia's monitoring & evaluation system (MONEV).

MRV – Technology Transfer

Technically MRV will vary from sector to sector. For example, MRV for the Forestry sector will be totally different from that for the Industry (eg Cement Industry) sector. Currently there is no established methodology for MRV in any of the major sectors in Indonesia. Consistent, uniform and acceptable technical method of gathering the right data by a specific sector and reporting in a uniform format are the essential ingredients of MRV. Wherever possible, internationally established and accepted methodologies should be used. For instance, CDM under the Kyoto Protocol requires certain established MRV to be followed by the (DOE). These methodologies may be accepted and applied instead of creating new MRV.

Another excellent example of the international MRV initiative is that by the global Cement Sustainability Initiative (CSI).

The CSI recognised that “Getting the Numbers Right” (GNR—see attached) is crucial for the cement plants. Having the detailed and accurate data will enable the cement plants to identify the factors that can impact emissions, and use this information to develop potential climate mitigation strategies.

Current AFD-study by GHD of the Cement sector indicated that only 20% of the cement plants follow the CSI –protocol in Indonesia. Technology transfer and capacity building will be required, in addition to financial support, for all Cement plants in Indonesia to comply with the MRV as per internationally established CSI-protocol.

MRV – Capacity Building

MRV for each sector entails two basic components, viz. technical and administrative or legal. To implement MRV program in any sector effectively in Indonesia, both technical and legal capacities need to be strengthened. Workshops with focussed and hands-on training in methods of monitoring and reporting for various sectors are necessary. Sector-specific MRV training is required. There are a few bilateral projects in the Forestry sector and in the Cement sector where MRV training is included. For example, in case of AFD Cement sector Emission Reduction project, training in the CSI-protocol was also included. However, concerted and coordinated efforts will be required through appropriately funded programs such as the EU for proper Capacity development, for both private and public sectors.

Project Based MRV-Institution & Capacity Building

Unlike in many developed countries where Institutions are first built and then follows the capacity development and project implementation, experience has shown that in the developing world project-based institutions and capacity building are more effective. A pilot project provides the foundation and acts as the stepping stone to develop capacity and relevant institutions. The process follows almost the reverse order compared to the conventional process in the advanced countries. The project-based development will allow the process to develop in a smaller scale with low budget and will help to develop confidence without being too overwhelmed due to complexity of the technical matters. The progress will be steady and geared towards training the trainers.

The current AFD – Emission Reduction Scheme for Cement industry, being implemented by GHD, can be an example of a pilot project for a project- based Institution and Capacity building for MRV in the cement sector. Similarly, the JICA project in Central Kalimantan on the use of RADAR for measuring emissions from peatland can be a pilot project for the forest sector MRV.

Appendix 10. List of abbreviations

ACM	Agriculture, construction and mining
BAKOSURTANAL	National Coordination Agency for Survey and Mapping
BAPLAN	Forestry planning agency under Ministry of Forestry
Bappenas	National Planning Agency
BAU	Business as usual
BPK	Financial auditing agency
BPS	Bureau of statistics
CDM	Clean development mechanism
CRF	Common Reporting Format
CSO	Civil Society Organization
DNA	Designated National Authority?
DNPI	National Climate Change Council
DSM	Demand side management
EE	Energy Efficiency
ERT	Emission reduction target
FRIS	Forest Resource Information System?
GTZ	German Technical Cooperation
ICLEI	International Local Environmental Initiatives
IPP	Independent Power Producer
ICCSR	Indonesian Climate Change Sectoral Roadmap
INCAS	Indonesia National Carbon Accounting System
JICA	Japan International Cooperation Agency
KOMNAS	Komisi Nasional
LAPAN	Indonesia Space and Aeronautics Agency
LEDS	Low-emissions development strategy
LUCF	Land use change and forestry
MEMR	Ministry of Energy and Mineral Resources
MoE / KLH	Ministry of Environment
MoFoR	Ministry of Forestry
MONEV	Monitoring and evaluation system
MoPW	Ministry of Public Works
MoT	Ministry of Transport
MRV	Measurement, reporting and verification

NAMA	Nationally appropriate mitigation action
OJT	On the Job Training
PLN	Perusahaan Listrik Negara (Electricity State Company)
Pusdatin	Pusat Data dan Informasi (Centre for Data and Information)
QA/QC	Quality assurance/quality control
RAN-GRK	National Action Plan on GHG reduction
REDD	Reducing emissions from deforestation and degradation
REL	Reference emission level
SIGN	National System for the Inventory of GHG
SNC	Second National Communication
SOP	Standard operating procedure

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