

Towards Sustainable Low-Carbon Development and Green Growth in Indonesia and Asia

- Linking Research and Policy -

Synthesis Report

**- Key findings from the dialogue
between policy-makers and researchers -**

**16 February 2010
Bogor, Indonesia**



Bogor Agricultural
University



Ministry of
Environment
Republic of Indonesia

IGES
Institute for
Global Environmental
Strategies

Key Findings from the Dialogue

from the Dialogue between Policy-makers and Researchers:

Demands and Roles of Research on Sustainable Low-Carbon Development and Green Growth from Policy Perspective

1. Low-carbon development and green growth

- Low-carbon development is a good opportunity to realise sustainable development.
- Fundamental change in people's mindset is necessary to promote development and low carbon societies.
- Harmonised policies and better coordination between central and local governments, as well as across sectors, are key.
- Networking between/across local, national, regional and global levels to promote low carbon development, such as LSC-RNet (International Research Network for Low Carbon Societies), is important.

2. Collaboration between policy- and research communities

- Developing national and sectoral roadmaps is an effective approach to identify a course of actions required.
- Dynamic modeling is an effective tool to understand how policies in different sectors affect each other.
- Activating research network with better linkage with policy-makers is an immediate need for sustainable development led by the low-carbon development.
- Multi-disciplinary approach in the formulation of research is called for to meet needs in policy-making.

3. Focus areas for promoting low-carbon development

- Forestry and peat land and land-use change, followed by the energy sector are given priority.
- Sustainable forestry/land use and land use change policies must be put in place.
- Energy source must be diversified by promoting locally produced renewable energy (particularly geo-thermal source and solar power).
- To promote renewables, impact on the whole ecosystem must be understood.

4. Technologies as a fundamental element in green growth

- Technology is a fundamental element to draw positive emission scenarios while ensuring sustainable development.
- Identification, deployment and dissemination of readily available low-carbon technologies should be prioritised in short-term.
- Development of appropriate local technologies is important in the long-term.

5 Mobilisation of available financing schemes

- Scaled-up financing from international sources is fundamental to achieving the Indonesian target.
- Available sources include national budgets, finances from international sources including ODA and multilateral schemes, private sectors, and NGOs.
- Best utilisation of all available financial resources should be ensured.
- New institutional arrangements to ensure the efficient use of resource across sectors must be realised.
- Better coordination both vertically (national and local) and horizontally (across-sector) must be ensured.
- Clear signals to shift towards low-carbon development, and diffusion of good practices, are essential

6. Life-style innovation for sustainable low-carbon development

- Traditional values and practices are rich in tips for designing innovative lifestyles to enable low-carbon development, while applicability to the modern context and different localities should be also carefully examined.
- Principles of traditional society, such as ‘sufficiency,’ ‘co-existence with nature,’ and ‘cooperation’ should be re-vitalised in the current development context.
- Local and indigenous technologies, methods, and wisdom should be fully utilised in promoting Green Growth especially in sectors such as agriculture, fishery and forestry.

Foreword

In September 2009, Indonesia declared an emissions reduction target of 26% from Business as Usual, by 2020. This can be increased to 41% with international assistance.

The National Development Planning Agency, Republic of Indonesia has formulated an Indonesia Climate Change Sectoral Roadmap for 2010-2030 and plans to prioritise climate change issues in the next National Medium-term Development Plan for 2010-2014 and beyond.

These national targets and plans are expected to transform the tremendous challenge to materialise a transition towards low carbon societies into a great opportunity for green growth. However, for this purpose, policy-making with cooperation amongst policy-makers and researchers based on scientific evidence is indispensable.

To accelerate such cooperation, a meeting, *Dialogue between Policy-makers and Researchers: Demands and Roles of Research on Sustainable Low-Carbon Development and Green Growth from Policy Perspective*, was held on 16 February 2010, co-organised by the Ministry of the Environment, Republic of Indonesia and Institute for Global Environmental Strategies (IGES), Japan. With thirty two participants from the policy-making community and forty six from academia, this dialogue identified the importance of immediate actions, the obstacles and the strategies to overcome barriers. The views and knowledge were shared among policy-makers and researchers.

This report summarises key findings from the dialogue, which covered diverse issues such as interdisciplinary approach toward low-carbon development, collaboration between policy- and research communities, focused areas (e.g. forestry, peat-land, land-use change and energy sector), role of technology, financing schemes and life-style innovation. The key messages in this report identify the important issues to be focused on, helping scientists to develop future research agenda and policy-makers to enable policy-making based on scientific evidence where possible.

Taking this opportunity, we would like to express our sincere appreciation to National Development Planning Agency, Republic of Indonesia which led the dialogue in the keynote speech by presenting a roadmap to Low-Carbon Development in Indonesia. We would also like to add our profound gratitude to Bogor Agriculture University and Bandung Institute of Technology for their considerable efforts and contributions in planning and preparation as well as all other speakers and participants in the meeting.

Our greatest hope is that the momentum born from this meeting will further continue towards a significant forum for collaboration toward Sustainable Low-Carbon Development between Indonesia, Japan and other Asian countries.

Masnellyarti Hilman
Deputy Minister,
Ministry of Environment
Republic of Indonesia

Hironori Hamanaka
Chair of the Board of Directors,
Institute for Global Environmental Strategies
Japan

Acknowledgement

This Synthesis Report draws together findings from the dialogue between policy-makers and researchers in Indonesia and neighbouring countries who are taking action to realise low-carbon, sustainable development in Indonesia. The dialogue took place as a meeting, entitled *Dialogue between Policy-makers and Researchers: Demands and Roles of Research on Sustainable Low-Carbon Development and Green Growth from Policy Perspective*, on 16 February 2010, co-organised by the Ministry of the Environment, Republic of Indonesia and Institute for Global Environmental Strategies (IGES), Japan at IPB International Convention Centre, Bogor, Indonesia. This meeting was realised as part of a two-day meeting entitled Sustainable Low-Carbon Development in Indonesia and Asia: A Dialogue between Policymakers and Scientists on Green Growth, with the purpose of bringing together policy-makers and researchers to have better understanding of Sustainable Low Carbon Development and Green Growth.

The issues covered in this report are the following, which would be of great interest to policy-makers and researchers in making the transition toward Sustainable Low-Carbon Development;

1. Low-carbon development and green growth
2. Collaboration between policy and research communities
3. Areas to focus on for promoting low carbon development
4. Technologies as a fundamental element in green growth
5. Mobilisation of available financing schemes
6. Life-style innovation for sustainable low-carbon development

I would like to take this opportunity to express our profound gratitude to all speakers and participants from the government of Indonesia and academia for their contribution to the meeting. I would also like to add our sincere appreciation to Ms. Masnellyarti Hilman, Deputy Minister, Ministry of Environment, Republic of Indonesia, and Bogor Agriculture University and the Bandung Institute of Technology for their guidance and support to materialise this dialogue. Special gratitude goes to Prof. Rizaldi Boer in Bogor Agriculture University for his guidance in planning this dialogue, since he made a considerable effort to coordinate this meeting.



Shuzo Nishioka
Secretary General / LCS-RNet Secretariat

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Overview of the Meeting

Sustainable Low-Carbon Development in Indonesia and Asia: Dialogues between Policymakers and Scientists on Green Growth, was held in Bogor, Indonesia on 16-17 February 2010, co-organised by the Ministry of the Environment of Indonesia and Institute for Global Environmental Strategies (IGES), with 32 participants from the policy-making community and 46 from academia. The topic for the first day was *Dialogue between policy-makers and researchers: Demands and Roles of Research on Sustainable Low-Carbon Development and Green Growth from Policy Perspective*, aiming to familiarise researchers with current trends in policy and acquaint policy-makers with what researchers can offer to strengthen policy. It also sought to build strategies for future studies between policy-makers and researchers in Indonesia. This report, *Towards Sustainable Low-Carbon Development and Green Growth in Indonesia and Asia: Linking Research and Policy*, is a synthesis report of the key findings from the first day of this meeting.

In the opening remarks, Ms. Masnellyarti Hilman (Deputy Minister, Ministry of Environment of Indonesia) referred to the voluntary mitigation target of Indonesia to reduce emissions by 26% below the level of business-as-usual by 2020, and mentioned MRV (Measureable, Reportable, and Verifiable) monitoring and evaluating mechanism formalised by the Ministry. Following this was the keynote speech made by Ir. Umiyatun Hayati Triastuti, MSc (Deputy Minister, National Development Planning Agency), in which she presented scenarios and roadmaps in Indonesia. In session 1, presentations by policy-makers in Indonesia were made on financial/fiscal policies, low-carbon development studies to shape the climate change agenda at the national and provincial level, and green economy, followed by a presentation by the Japan International Cooperation Agency on Japanese policy for low-carbon society. Session 2 consisted of presentations on framing, methodologies, scenarios and models for sustainable low-carbon development in Indonesia and Japan to clarify what the research community can provide to policy-makers. In Session 3 researchers in Indonesia presented their research findings that provided various implications for designing policies to achieve sustainable low-carbon development and green growth. Session 4 focused on modelling and scenario research with a back-casting approach in Indonesia, Thailand, China, India and Japan. Session 5 started by introducing the outcomes of the first annual meeting of International Research Network for Low Carbon Societies (LCS-RNet) in October 2009, followed by the overall discussion of the key findings of this meeting in Indonesia.

Active discussions through the dialogue between policy-makers and scientists were made and key findings from the discussions were synthesized in this report with the six headings indicating the research areas necessary for policy-making to realise low-carbon societies: Low Carbon Development and Green Growth; Collaboration between Policy- and Research Communities; Focus Area for Promoting Low-Carbon Development; Technologies as Fundamental Element in Green Growth; Mobilisation of Available Financing Schemes; and Life-style Innovation for Sustainable Low-carbon Development.

The second day of the meeting focused on *Consultation: Is Indonesia in a good position for Low Carbon Development?*, aiming to assess opportunities and challenges for sustainable low-carbon development in Indonesia. It featured six panels focusing on specific sectoral issues including agriculture, LULUCF and energy sectors, technology transfer, domestic institutions and traditional values and practices.

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Agenda

Dialogue between Policy-makers and Researchers:

Demands and Roles of Research on Sustainable Low-Carbon Development and Green Growth from Policy Perspective
Tuesday, 16 February, 2010

CD including files of the presentations is available, which can be also downloaded from
<http://www.iges.or.jp/en/cp/activity20100216.html>

Opening: Background, scope and visions of the workshop (Chair: Rizaldi Boer)	
	<i>Welcome Address</i> Yonny Koesmaryono, Vice Chancellor, Bogor Agricultural University (IPB)
	<i>Opening Remarks 1</i> Shuzo Nishioka, Institute for Global Environmental Strategies (IGES)
	<i>Opening Remarks 2</i> Masnellyarti Hilman, Ministry of Environment of Indonesia (KLH)

Keynote Speech (Chair: Rizaldi Boer)	
	<i>Indonesian Response to Climate Change: Roadmap to Low Carbon Development</i> Umiyatun Hayati Triastuti, MSc. National Development Planning Agency (BAPPENAS)

Session 1 - Research expectations from SLCD/GG policies (Chair: Rizaldi Boer)	
Scope:	To present policy makers' plans for SLCD/GG strategies and demands on SLCD/GG research depending on their focuses.
S1-1	<i>Financial/Fiscal policy to support implementation of climate change programs</i> Singih Riphath, Ministry of Finance, Republic of Indonesia
S1-2	<i>Low carbon development studies in Indonesia</i> Doddy Sukardi, National Commission for Climate Change
S1-3	<i>Green economic study in Indonesia</i> Sulistiyowati, Ministry of Environment, Republic of Indonesia (KLH)
S1-4	<i>Mid-Long term targets in Japan and Hatoyama-initiative</i> Masako Ogawa, Japan International Cooperation Agency (JICA)
	Discussion

Session 2: Framing SLCD/GG research in Asia (Chair: Shuzo Nishioka)	
Scope:	To frame what can be provided from research community for SLCD/GG policies in Indonesia and Asia
S2-1	<i>Research Needs for SLCD/GG</i> Rizaldi Boer, Bogor Agricultural University
S2-2	<i>Sustainable Low Carbon Development Scenario and Low Carbon Cities</i> Mikiko Kainuma, National Institute for Environmental Studies (NIES), Japan
	Discussion

Session 3: SLCD/GG research in Indonesia (Chair: Shuzo Nishioka)	
Scope:	To present each topic of research in Indonesia to make implications for SLCS/GG policies
S3-1	<i>Energy Scenario in Indonesia</i> Retno Gumilang Dewi, Institut Teknologi Bandung, Indonesia
S3-2	<i>Green growth: System Dynamics of Sustainable Industry and Finance in Indonesia</i> Muhammad Tasrif, Institut Teknologi Bandung, Indonesia
S3-3	<i>Energy Policy for Addressing Climate Change in Indonesia</i> Maritje Hutapea, National Energy Council, Secretary General of National Energy Council Indonesia
S3-4	<i>Forestry Policy for addressing climate change in Indonesia</i> Nur Masripatin, Centre for Forest Socio-Economic Research, Indonesia
	Discussion

Session 4: Models, Scenarios and Back-casting for SLCD/GG policies (Chair: Retno Gumilang Dewi)	
Scope:	To present applications of quantitative modelling research tools for road-mapping
S4-1	<i>Low Carbon Policies and Actions in City level</i> Sirintornthep Towprayoon, The Joint Graduate School of Energy and Environment, Thailand
S4-2	<i>Scenario/modeling/back-casting tools and examples of low carbon cities</i> Kei Gomi, Kyoto University, Japan
S4-3	<i>Alternate policy scenarios and modelling results for India (country level analysis) & Ahmedabad (city level analysis)</i> Prasoon Agarwal, Indian Institute of Management Ahmedabad (IIMA), India
S4-4	<i>Impact of Modelling Approach on National Policy in China</i> Kejun Jiang, Energy Research Institute, China
S4-5	<i>Screening barriers and actions for policies based on modelling result</i> Junichi Fujino, National Institute for Environmental Studies (NIES), Japan
	Discussion

Session 5: Further research actions for policy making (Chair: Rizaldi Boer)	
Scope:	LCS-RNet and policy recommendations
S5-1	<i>Result of LCS-RNet Bologna Meeting</i> Shuzo Nishioka, IGES, Japan
	Overall Discussion: Key Findings of Bogor Meeting
S5-2	<i>Synthesis report of Bogor Meeting</i> Rizaldi Boer, Bogor Agriculture University
	Discussion

Closing Remark	
	Rizaldi Boer, Bogor Agriculture University

Synthesis of Findings

1. Low-carbon development and green growth

Low-carbon development is a good opportunity to realise sustainable development.

Low-carbon development provides opportunities for the young people of Indonesia especially. With the initiative of the government to support local governments, private sectors and people in Indonesia, the optimal utilisation of their energy sources and lands can be achieved in sustainable manner. Active participation in international arrangements to fight against climate change will provide the young generation of Indonesia with various opportunities to obtain skills and knowledge in various areas including technologies, information technologies, and governance. It will become a firm basis of the country for its future Green Growth.

Targets are already set.

Indonesia announced its bold voluntary target to reduce emissions by 26% below the level of business as usual by 2020 prior to the COP 15 of the UNFCCC held in Copenhagen in December 2009, and officially submitted a voluntary target to the UNFCCC secretariat in January 2010. That is the indication of the strong commitment of the Indonesian Government to act as a responsible member of the G20. With the international framework of nationally appropriate mitigation actions (NAMA) to be set, Indonesia is prepared to set a target of 41 % by 2020.

Implementation framework and centre agency were set.

In Indonesia, the National Council on Climate Change has been helping to shape Indonesia's debate on climate change to coordinate national policies amongst ministries and industrial sectors, develop and coordinate carbon trade mechanism, monitor and evaluate GHG reduction progress. The Action Plan for the Reduction of GHG Emissions is coordinated by BAPPENAS (the National Development Planning Agency). The National Development Plan for 2010 – 2014 will already reflect the sectoral national roadmap for low-carbon development. As for finance, a formal climate change policy centre may soon be created to support the funding of climate change programmes in

the Ministry of Finance replacing the current climate change work group.

Fundamental change in people's mindset is necessary to promote development and low-carbon societies.

As Indonesia expects economic growth, together with a growing population, a business-as-usual scenario indicates Indonesia's net emissions will reach 3.3 GtCO₂ in 2025. Indonesia's emission per capita by all sectors in 2005 was over 2 tonnes C/capita, and it is expected to increase to 3.05 tonnes C/capita as BAU in 2020, among which 1.04 tonnes C/capita comes from the energy sector alone. Another study indicates that those emissions from the energy sector will reach ten times more by 2050. To achieve a 26% reduction target, for example in the energy sector, 1.04 tonnes C/capita must be reduced to 0.77 tonnes C/capita, or a 41% reduction, and emissions by 2020 would be 0.62 tonnes C/capita.

There is a need to shift the mindset of the country, people and various parts of society towards low-carbon development with full awareness of the damages caused by climate change to the socio- economy. To achieve such a drastic emission reduction, conventional efforts for the environment through 3R; recycle, reuse, and reduce, are not enough. Society as a whole must face a more fundamental and innovative approach by re-imagining and redesigning their business.

Despite the projected increase of the emissions on a per capita basis, the economic status of Indonesia still allows many poor communities to exist, and many of those are not connected to the electricity supply. Therefore, pathways towards sustainable low-carbon development must be pro-poor, pro growth and pro jobs.

In policy-making in Indonesia, also considering the optimal use of the limited resources available, mitigation and adaptation policies must be harmonised. In this regard, any low-carbon growth plan must take a holistic approach where economic growth and CO₂ mitigation can go hand in hand.

Targets are set and policies are to be in line with sustainable low-carbon development. For the

implementation phase, more realistic target setting is called for, where close cooperation between policy-makers and research community is crucial.

It is important and effective to develop a national Roadmap to set a course of action.

It is important to develop a national roadmap with scenarios catering for its data and assumptions, since countries differ in various aspects including their developmental, geo-political, aspirational and cultural contexts. Finding a direction for research to serve as a good input to draw national and sectoral roadmaps towards sustainable low-carbon societies involves behavioral changes, energy use and land-use management, and others.

Harmonised policies and better coordination between central and local governments, as well as across sectors, are key.

The environmental policies of Indonesia have a sectoral basis to focus on the main issues, such as forest conservation, river basin management, waste management, etc., and those must be integrated under the mitigation and adaptation policies of climate change that must cover the promotion of renewable energies, energy efficiency improvements in energy sector, urban and rural sustainable development, and economic growth, to achieve efficient and substantive outcomes with efficient use of the resource available. Harmonisation of key policies and coordination of them vertically and horizontally have to be strengthened.

Decentralised system of Indonesia is the advantage to promote sustainable low carbon development.

Indonesia's administrative system can be characterised in terms of decentralisation. There are 33 provinces with more than 300 districts that have been entrusted with autonomous governance in accordance with their levels. Indonesia may well take this as the advantage to promote sustainable low-carbon development. As indicated by various studies, exercises and pilot projects done inside and outside of Indonesia, cities and localities are better units to test experimental measures for low-carbon than the national level.

In Indonesia, most of the power has been given to the local governments. In addition, considering diversified cultures and historical backgrounds of different provinces, it is important to design and implement policy measures and actions that focus on local level, not national level. However, local governments have

not yet been well prepared to develop their own mitigation scenarios, nor designing science based low-carbon policies. If there is research catering to local level with activity data and parameters that describe local characteristics in various ways, then policies can be designed in more efficient and effective ways. For this, there needs to be some application of common methodologies to local areas and a summing up of the results to know national level would be desirable.

A national level cost curve for abatement activities could inspire a provincial level case study of low-carbon development.

2. Collaboration between policy- and research communities

Importance of interaction between policy-makers and researchers, as well as the multi-disciplinary approach to tackle SLCD, is underlined.

In the example of Japan, the government has been supporting climate change related research by providing e.g. the creation of a Global Environmental Research Fund and Asia Pacific Network for Global Change research. The government has called for researchers to design a roadmap to consider how Japan's mid-term target of 25 % reduction from 1990 level can be achieved. In this way, policy-makers are strong supporters of the research, as well as main clients/beneficiaries of the research for their science-evidenced policy-making (which eventually makes policies more transparent, verifiable and result-oriented).

Integrated models can capture interactions and interconnections among different sectors.

With integrated modelling, it can be seen how certain policy in one sector will affect emissions of other sectors. For example, in one model study of LUCF sector, expecting that the decrease of emissions from forest degradation, the increase of reforestation, and the need for agriculture and settlement development will remain constant, it is projected that the net emission from LUCF will decrease to 1.3 Gt by 2020. However, the result may be very different if the population growth and the land use change that may associate with the economic growth are reflected in the projection. Economic and population growth projections must be carefully developed to be incorporated in national scenarios.

The barriers to implementing solutions identified through modelling approaches differ between local and national levels. Integrated modelling may be well designed to provide a useful insight into these problems.

Dynamic modeling is an effective tool for policy studies with the understanding of external factors.

Other external factors, such as policies of other countries, affect domestic policies because the world has already experienced policies promoting bioenergy sources. The impacts of the global economy on Indonesian economic growth and its projection, the change of the characteristics of the economy, the composition of industry sectors e.g. service or manufacturing, also all affect the scenario development.

For Indonesia, which will go into the transition with new types of energy mix, dynamic modelling that could incorporate a set of structural mechanisms would help in the understanding of the systematic impact of internal and external factors. Dynamic models show disequilibrium dynamics that prevent a smooth economic transition, are sensitive to major uncertainties, and also analyse policies for the economy, as well as the energy and environment systems of the country.

Backcasting approach is more suitable for developing countries where continuous development is expected.

Model-based back-casting approaches can be used to identify sets of policies and measures that are necessary to achieve green growth. They provide the opportunity to consider various interdependent processes that are often ignored in the conventional modeling approaches. When their economies are expected to continue to grow, backcasting approaches are more suitable for developing countries than developed countries.

Activating research network and dialogues with policy-makers to establish better linkage between scientific community and policy-makers in designing strategies for sustainable low-carbon is an immediate need.

“Back-casting” can be a time-consuming and data intensive process, and research on all influential sectors and other factors must be incorporated. Hence it could be difficult for local governments to apply. On the other hand, in conducting model simulations, it is

desirable to apply assumptions that are developed in a participatory manner. This way, the policies identified would be readily acceptable by the policy makers and practicable for local communities. The cooperation and the support amongst national and local governments and the research community are highly important.

Multi-disciplinary approach in the formation of research is called for to meet needs in policy-making.

In addition to the scenarios and roadmaps studies, the implementation of policies and measures identified requires different disciplines and expertises such as leadership to promote, innovations, willingness to change behaviour and participation, and others that are not reflected in the modelling processes, must be considered.

Research shedding light to local levels is also important for Indonesia.

It has been identified that over 150 reduction opportunities from LULUCF, peat, agriculture, power, petroleum, transportation, buildings and cement sectors, by up to 2.7 Gt per year by 2030, meaning a 5 % global abatement is needed. Another study focusing on Kalimantan region shows more reduction potential than the national level studies. Studies enable efficient policy measures focusing on priority areas by region which may be desirable to further increase the mitigation potentials in the regional levels, and consequently in the national total.

Scientific studies on e.g., how to adopt inter- and intra annual changes of natural/climate conditions with various causes including El Nino, could also help.

3. Focus areas for promoting low-carbon development

Climate change measures in LULUCF, especially forest and peatland, and emissions from practices and land management of those lands, and energy sector including renewables are given higher priorities in Indonesia, similar to some other Asian or tropical rain forest countries.

LULUCF:

Around 60% of the country area is forest covered. The top three policies out of seven, to support Indonesian

reduction target of 26% by 2020 are LULUCF sector related, namely, peatland management, reduction of deforestation and land degradation, and carbon sequestration projects in forestry and agriculture.

Indonesia has a Climate Change Action Plan in Forestry sector under RENSTRA (Strategic Plan) that covers the reduction of deforestation and forest degradation, avoiding/reducing forest conversion for other uses, illegal logging, forest fire, and forest encroachment, carbon sequestration programme, and sustainable forest management.

Emissions reduction target from LULUCF sector needs to be set in the national development context.

The land use policies may affect other sectors. Likewise, the need for land in other sectors affects LULUCF sector heavily. Understanding on those interactions between forestry and other sectors, as well as their policy formations, is essential in designing low-carbon development in Indonesia. Coordination with other sectors' mitigation/adaptation policies must be ensured, e.g. the establishment of new oil palm plantation (agriculture policy related) on forested land (forestry related) must be avoided. For this purpose, conversion of peat land forest for agriculture land (including oil palm plantation) must comply with forest land use policy. Incentives or disincentive to palm oil industries to avoid plantation on forest land must be sought.

Sustainable forestry/land use and land use change policies must be put in place.

LUCF and peat fire combined consists of 60% of national GHG emission of Indonesia.

Mitigation is already a mainstream of the forest policy of Indonesia. It is expected that a decrease of emissions from forest degradation, an increase of reforestation, and the need for agriculture and settlement development will remain constant, and there is a study projecting that the net emission from this sector will begin to decrease by 2020.

The main legal references for forest management in Indonesia are forestry and biodiversity conservation related¹. Timber and other forest product are important for the Indonesian economy. Forests also protect watershed and livelihoods of local people. Indonesia has set eight priority areas in forestry, and all of them are related to climate change, either directly or

indirectly. Those include: rehabilitation of degraded forest; forest protection, and fire management. Mitigation and adaptation policies will be set at the centre of those priority areas in the next 5 year plan of the Ministry of Forestry, Indonesia.

Peatland and forest fires could be prevented by more appropriate land management.

GHG emissions from peat fires account for 13 % of the national total. Carbon stock loss and emissions due to forest and peat fires are caused by both natural and anthropogenic reasons. Those for anthropogenic reasons, such as traditional practice of clearing land for fishery and safety from wild animals, are associated with the development issues including market, institutional or government failure. Therefore, to tackle this issue, more effective management of production forest as well as a more strategic approach for sustainable peat land management are needed.

For example, legal boundaries of protected areas must be clarified. Rationalisation of boundaries of production forest would also be effective. Capacity-building of production forest management, local community for land management, as well as proper management of oil palm industries are also crucial.

REDD-plus is expected to provide fund.

Indonesia expects REDD-plus to provide financial resources which is necessary to go beyond RENSTRA, providing actions and incentives which result in emissions reduction, carbon stock conservation and carbon stock enhancement.

Energy:

Energy is the largest sector of Indonesia when LUCF sector is excluded. Both population and economic growth is expected to cause an increase in energy consumption; emissions from energy sector in Indonesia may reach 10 times the current emission level by 2050.

Indonesia's emission per capita in all sectors in 2005 was over 2 tonnes C/capita, and it is expected to increase to 3.05t C/capita as BAU in 2020, among which 1.04 tonnes C/capita will come from energy sector alone. Another study indicates those emissions from the energy sector will reach ten times more by 2050. In the meantime, with its 26% reduction

¹ The Law No. 41/1999 on Forestry and Law No. 5/1990 on Biodiversity Conservation

target, 1.04 tonnes C/capita from energy sector must be reduced to 0.77 tonnes C/capita, or with 41% reduction, emission by 2020 would be 0.62 tonnes C/capita, which is still above the global target of 0.5t C/capita.

As per capita energy intensity for Indonesia is projected to be higher than the world target, energy efficiency improvement is indispensable for the low-carbon development.

About 96.7 % of the Indonesian energy mix is fossil origin. Oil is still the dominant source of energy although the ratio of it in the energy mix tends to decrease. So far, the alternative fuel to oil has been coal, and any increase in coal use may deteriorate GHG emissions in Indonesia.

Energy source must be diversified by promoting locally produced renewable energy

To achieve its sectoral emission reduction target by 17% before 2020, Indonesia is now allocating budget for utilisation of more natural gas for transportation and residential use, improvement of energy efficiencies, geo-thermal, biofuels, etc. Indonesia has a large potential of renewables, mainly from geo-thermal and biomass, followed by solar, micro-hydro, etc. Their use by shifting from fossil fuels uses is crucial for the National Action Plan for GHG emission reduction in Indonesia.

Indonesia already sets targets to promote renewables to increase its ratio in energy mix to 17% by 2025. However, the government gives subsidies on both fuel and electricity prices that are considered as a major barrier for other source of energy including renewables to be promoted. To achieve the 17% renewable target, it is crucial for Indonesia to promote policies and measures prioritising renewables and/or adjusting renewable pricing. Despite the strong private sector in Indonesia, the government has already started to take various measures such as subsidies on biofuels. The consistent external pressure to remove subsidies on fossil fuels as a strong signal towards the sustainable low-carbon future would support Indonesia to diversify its energy mix by promoting more renewables.

The absence of the appropriate financing schemes for promoting renewables is also considered as a barrier. As the Indonesian government tends to focus on project-based financing, new financial schemes such as loans, especially those that put more focus on small

and medium sized project-based financing, would be necessary to promote renewables.

Energy efficiency improvement, energy conservation, and conversion to renewable are inter-related with economic growth.

One study indicates that, with a BAU scenario, by 2050, the energy demand will increase by 8.2 times and the associated emissions will increase by 12.5 times, both compared to 2005 levels. With moderate economic growth, with current policies and regulations, efforts to increase efficiency will lead to 33% energy conservation and 53% emissions avoidance. Low energy conservation and emissions avoidance due to moderate economic growth will limit efforts in improving energy efficiency and investment in infrastructures related to energy supply – demand. With high economic growth, high energy demand and high emissions are expected. However, LCS is achievable in terms of emissions avoidance without sacrificing high economic development due to better infrastructure (with efficient and low carbon emitting energy systems) by higher level of investment.

To promote renewables, impact on the whole ecosystem must be understood.

Promotion of renewables such as hydro power and biofuels requires cross-sectoral policy-planning with the understanding of the whole ecosystem. As for hydro, micro hydro systems may be especially appropriate. However, water reservoirs are not enough. To secure water reservoirs, more trees need to be planted, which must have an impact on bio fuels and land-use policies.

4. Technology is a fundamental element for green growth.

Technology is a fundamental element to draw positive emission scenarios while ensuring sustainable development for Indonesia.

Identification and deployment of readily available low-carbon technologies should be prioritised.

Since mitigation efforts in the short-term, mainly led by the transfer of available technology, may be offset with the increasing energy demand, mid-term and long-term strategies for technologies are important. In addition, there are large uncertainties, especially of the new breakthrough technologies for their feasibilities and timing to be made available in the market. The

identification of which technology is economically feasible and when it will be made available, are important considerations in cases where the resource is limited.

There is a clear need to develop strategies on 1) how to accelerate the utilisation of both already available technology and technology still under research to materialise GHG reduction, 2) how to distribute such technologies, and 3) how to develop local low-carbon technologies. Identification of available resources for R&D is also important.

In the energy sector, Indonesia puts focus on the improvement of energy efficiency of existing systems and facilities, efficiency of home appliances, and efficiency of technologies in other sectors. Priority is put on the promotion of renewables such as geo-thermal and solar cells and waste to energy use. Technologies such as integrated coal gasification combined cycle (IGCC), and the mass transport system using renewable energy are also considered very important for Indonesia. Indonesia is also looking at the potential of the agriculture sector, i.e. CH₄ reduction from organic agriculture, such as system of rice intensification (SRI) by improving agriculture engineering to control water levels and flooding for rice paddies and by minimising the fertiliser use.

Technology transfer

International arrangements, such as NAMA, REDD-Plus, and CDM projects, are expected to serve as vehicles for technology transfer. They are also expected to offer good opportunities for young generations for training and obtaining know-how through technology-transfer. They will eventually develop the capacity to develop local technologies that will be indispensable for the Green Growth. However, it is still not clear what kind of technology is suitable for the Green Economy.

The issues around intellectual property rights still need to be clarified.

In mid- and long-term, development of appropriate local technologies and transfer of LC technology is also important.

Short-term mitigation efforts by transfer of available technologies may be off-set by an increasing energy demand due to positive population and economic growth: thus, mid-term and long-term strategies for technologies are important. There are large uncertainties, especially regarding the new

breakthrough technologies. The identification of which technology is economically feasible and when it will be made available, are important where the resources for R&D are limited.

In addition, how to finance the introduction of new technologies is an issue that needs to be addressed. One thing to note is the Indonesian government's initiative to support companies in their exploration stage of geo-thermal. Exploration of geo-thermal sites is costly and companies must face the risk of ending up with nothing from the sites. Therefore, the government support is indispensable for this type projects.

As dynamic model studies show, the efforts to reduce a negative loop and create a positive and continuous environment for national capacity are important. It would be desirable to have long-term development planning so as to lead to a positive loop to create capacities of technology development and mastery, which in turn, leads to desired imports and desired foreign exchange reserves to increase investment.

Carbon capture and storage (CCS) should be considered as a transitional technology, not a breakthrough or permanent solution to free mankind from fossil-dependency. Meeting the 17% renewable target will be essential for Indonesia to slow the rate of growth in carbon dioxide (CO₂) emissions, while CCS could yield a significant deviation beyond that target. CCS is also an effective and desirable technology for Indonesia due to its geographical characteristics. National Energy Council refers to a scenario which implements CCS from 2017 or from 2022. However, the availability and the timing of the CCS are still very uncertain.

5. Mobilisation of available financing schemes

Indonesia estimates IDR400 trillion will be needed to achieve Indonesia's 2020 voluntary mitigation target of 26 % reduction.

Scaled-up financing from international source is fundamental to achieve Indonesian target.

The current funding mechanisms in Indonesia for climate change consist of two main pillars; APBN (the State Budget) and non-APBN that consists of ODA (mainly grants) through bilateral- and multilateral- channels, and funds from NGOs (Foreign/ Local) and business (mainly CSR). However, they are

not enough to finance policy measures for low-carbon and R&D that will be necessary to achieve 26% target.

As for the domestically available fund, Indonesia considers its policy options for the climate change such as private-public partnership to avoid risks in investment for large-scale projects such as the geo-thermal energy; taxes and subsidies, e.g. reallocation of energy subsidies to renewables, reallocation of sectoral budgets for climate change programmes, optimisation of the existing climate change related budget. Implementation of measures to promote renewables (e.g. non-tariff barriers on the import of fossil-fuel machineries) is already sought by the government.

Feed-in-tariffs can be used to promote geo-thermal, biomass, and PV for solar power. Feed-in-tariffs have the rationale to be used since they provide a strong signal from the government to the nation about its commitment towards low-carbon societies, and its feasibility has already been tested in overseas. In Indonesia, bio-diesel already receives subsidies.

Funds from the CDM, carbon trade, and eco-tourism are expected to provide additional resources.

Best utilisation of all available financial resources should be ensured.

Indonesia is expecting further economic growth, which means that it also has risks of increase debts. The Indonesian economy is still vulnerable to economic ups-and-downs due to e.g. foreign investments, and is also easily affected by various factors such as natural disasters and political instabilities. Risk management for funding schemes is very important for sustainable low-carbon development. Available sources of funding need to be diversified to finance sufficient money to tackle climate change. Likewise, policies to allocate money to each individual scheme must be diversified for the risk-management, as well as the optimisation of the available resources.

Efficient, rational and transparent allocation of money to the most appropriate measures and sectors is one of the most challenging issues to realise the green growth. This reminds us of what we confirmed in the technology section where the strategic approach and the identification of the proper technologies for short-, mid- and long term are discussed.

New institutional arrangement to ensure the efficient use of resource across sectors must be realised.

The best use of all available financial resources, national budget, finances from ODA, international donors, private sectors, and NGO, should be ensured through better coordination both vertically (national and local) and horizontally (across-sector). A formal climate change policy centre may soon be created by the Ministry of Finance to support funding of climate change related programmes, replacing the current climate change work group. A new trust fund is expected to provide financing green growth and ensures appropriate and timely financing to the most suitable policies, sectors and projects. A decision is being sought on details of the management, including how it will function.

Costs in the short-term can be benefits in the long-term.

With good skills, costs in the short-term can turn out to be an investment in the longer-term. In this respect, the role of government is important, as shown by the example of government support for the exploration of geo-thermal sites. A balance and best mixture of top-down and bottom-up approaches should be explored.

Strong pricing signal is necessary.

As discussed in the energy section, oil subsidies prevent the shift to low-carbon or renewable energy sources. Such subsidies must be eliminated. The government of Indonesia has already started to take various measures such as subsidies on biofuels, which is a strong signal of the government's commitment to power utilities and consumers.

6. Life-style innovation for the sustainable low-carbon development

Life-style and behavioural change is considered as one of the key areas of research to promote sustainable low-carbon development. How to integrate traditional values and practices into sustainable low-carbon development policies is an important question.

Traditional values and practices are rich in tips for designing an innovative lifestyle to enable low-carbon development, while applicability to the modern context and different localities should be also carefully examined.

Values and practices embedded in traditional lifestyles

in certain localities are often found to go along with resource efficiency and energy efficiency, which are the key principles of a sustainable low-carbon society. However, such traditional values and practices are quickly being replaced by non-in-situ values associated with foreign lifestyles. For example, many countries in Asia, including Indonesia, face changing trends in food preference, consuming more flour-based food than rice these days, as well as in energy and material use. This trend seems to be contributing to an increase in GHG emissions and is likely to contribute further in due course.

Principles of traditional society, such as ‘sufficiency,’ ‘co-existence with nature,’ and ‘cooperation’ should be re-vitalised in the current development context.

A study conducted in a rural area of Thailand sets eight indicators for the notion of “sufficient economy²” that support actions for low-carbon. Some of the indicators incorporate traditional values such as application of local wisdom, integrated practices in natural resource and environmental management, recognition of carrying capacity and ecological balance, and most importantly the adjustment of lifestyle in coexistence with nature. In such a society, the three drivers to reach sufficient carbon economy where CO₂ emission is low while happiness is high are ‘leadership,’ ‘good governance,’ and ‘unity.’ A community with good political leaders, governance, and unity helps the community to lead a sufficient carbon economy and society.

The mindset of consumption through eco-thinking and routine activities in rural population is different from urban communities. When CO₂ emissions were linked to happiness index, there were communities with low CO₂ emissions and high happiness index, and high CO₂ and low happiness. What is needed to move to a low CO₂ emission and high happiness index is an important question to be asked.

To this end, the research community can show not just information, but visualisation/images of the

consequence of BAU, such as damages caused by extreme weather, together with the visualised image of sustainable low-carbon development.

Local and indigenous technologies, methods, and wisdom should be fully utilised in promoting Green Growth especially in sectors such as agriculture, fishery and forestry.

As projection indicates an increase in GDP and population growth, part of CO₂ emissions reduction in Indonesia should be achieved by maintaining and/or re-introducing low-carbon lifestyles, in addition to technological efforts to reduce energy intensity. Policy measures have an important role to play for encouraging people to choose a low-carbon life-style. For example, energy pricing could help people to reconsider the high-carbon dependency of a life-style at present widely adopted by a large number of people, and may provide an opportunity to revisit the less carbon-dependent lifestyle in traditional/local cultures.

² Sufficiency Economy can be defined as an approach to life and conduct which is applicable at every level from the individual through the family and community to the management and development of the nation. It stresses a middle path, especially in developing the economy to keep up with the world in the era of globalization. [Wibulswasdi, C., P. Piboolsravut and K. Pootrakool (2010) Sufficiency Economy Philosophy and Development, Sufficiency Economy Research Project, Bureau of The Crown Property, Bangkok, Thailand]

The research on sufficiency economy that was conducted in rural areas of Thailand was introduced during the Dialogue. It was explained that drivers to implementation of low carbon policies and action in city level and metropolitan area are different, and also that sufficiency economy is a good foundation to move towards low carbon society and to become “Sufficiency Carbon Economics Society”.

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