

Low Carbon Asia Research Network

Sustainable Low Carbon Emission Development in Asia

Synthesis Report

Sixth Annual Meeting of
Low Carbon Asia Research Network

1-3 November 2017
Bangkok, Thailand

Organisers

Universiti Teknologi Malaysia (UTM)
Joint Graduate School of Energy and Environment (JGSEE), Thailand
Institute for Global Environmental Strategies (IGES)
National Institute for Environmental Studies (NIES)
Ministry of the Environment, Japan (MOEJ)



LoCARNet 6th Annual Meeting Synthesis Report

Preface	2
LoCARNet Bangkok Declaration	4
Keynote report 1	5
Keynote report 2	6
Keynote report 3	8
Keynote report 4	10
Keynote report 5	12
Keynote report 6	15
Session report 1	17
Session report 2	21
Session report 3	24
Session report 4	26
Session report 5	29
Session report 6	34
Keynote report - City Mayors' Summit	37
Acknowledgements	41

Amidst the growing and urgent need to realise low-carbon, sustainable society, the Low Carbon Asia Research Network (LoCARNet) was launched in 2012. The network acts as a knowledge-sharing platform linking research communities and other stakeholders together with the aim of assisting in drafting science-based policy aimed at low-carbon development in the Asian region. The Institute for Global Environmental Strategies (IGES) has acted as its secretariat since it was launched, and in cooperation with the National Institute for Environmental Studies (NIES; Japan's Focal Point), promotes dialogue among researchers and policymakers in Indonesia, Thailand, Cambodia, Malaysia, Viet Nam and other Asian countries, and has held workshops to support collaboration among researchers. These activities have brought to light the need to prioritise knowledge-sharing on low-carbon issues within Asia.

LoCARNet's Sixth Annual Meeting was held on 1-3 November 2017, in Bangkok, Thailand, and was co-organised by the Ministry of the Environment, Japan (MOEJ), the Joint Graduate School of Energy and Environment (JGSEE), Thailand, the Universiti Teknologi Malaysia (UTM), the National Institute for Environmental Studies (NIES), and the Institute for Global Environmental Strategies (IGES).

At this meeting, under the theme of "Sustainable Low Carbon Emission Development in Asia", the network held lively discussions on urgent issues in Asia – such as low-carbon cities, the growing importance of forestry and land-use management, integration of local actions into national development towards achieving SDGs, the role of science and technology, national adaptation plans and their implementation, low-carbon development and Joint Crediting Mechanism (JCM), linkage between NDC and SDGs – synergies and trade-offs, together with researchers, policymakers, businesses, international organisations and others.

LoCARNet has held five annual meetings to date. The first, in Bangkok, scoped out topics for the network to address, while the second, in Yokohama, focused on how to advance its activities. At the third meeting, in Bogor in 2014, the LoCARNet Bogor Declaration was released, proclaiming "Asia is ready to stabilise the climate", and emphasised to the world Asia's high potential in attaining the 2-degrees target. The fourth meeting, held in 2015 in Malaysia and with a view towards COP21 in Paris and beyond, declared "Asia must be included in any global climate change mitigation and adaptation actions to be meaningful towards the year 2020 and beyond" and "Asia is ready to contribute". The fifth annual meeting in Bandung, Indonesia, stressed the growing importance of incorporating science-based knowledge into policymaking, in view of the high likelihood of adoption of the Paris Agreement, and calls for its steady implementation and increased transparency.

The most recent, sixth annual meeting in Bangkok, Thailand, portrayed Asia as having already

taken actual action led by non-state actors – for example, by making efforts in some cities and devising individual projects that make use of the Joint Crediting Mechanisms (JCM).

Taking this opportunity, we would like to express our profound gratitude to all speakers and participants from academia, government, civil society, and international organisations for their contributions to the meeting. We would like to add our sincere appreciation to the chairs and rapporteurs of the meeting, the steering group of LoCARNet, and the organising committee comprising JGSEE, UTM, and the LoCARNet Secretariat for their support in bringing this dialogue to fruition. We are also grateful to the Ministry of the Environment, Japan, for providing us with favourable opportunities to meet. Thank you very much indeed!

Co-Chair of the Meeting, representing the steering group of the Sixes Annual Meeting of LoCARNet

Prof. Ho Chin Siong, Universiti Teknologi Malaysia (UTM), Malaysia

Assoc. Prof. Dr. Sirintornthep Towprayoon, Director of the Joint Graduate School of Energy and Environment (JGSEE), Thailand

LoCARNet Bangkok Declaration

Sustainable Low Carbon Emission Development in Asia

A new era for global climate and sustainability policies dawned in 2015 and 2016. The adoption of the Sustainable Development Goals (SDGs) 2030 (September 2015) and the New Urban Agenda (NUA) (October 2016), and the coming into force of the Paris Agreement (November 2016) set the world on a new course towards effective realisation of sustainable, low-carbon societies (LCS). Global sustainability and climate policies will now not only be formulated and implemented at the national level but, importantly, also at the regional and city levels. Non-state stakeholders such as cities, local governments, businesses, financial organisations and civil societies will be game changers in worldwide transitions towards sustainable LCS – actual actions on the ground at all levels will take centre stage.

Being home to over half the world's population and, soon, commanding over half the world's economy, Asia is forever more key to the global transition into a sustainable and climate-change-mitigated future in 2030 and beyond.

Recognising the above, WE, participants of the *3rd International Conference of Low Carbon Asia* and *6th LoCARNet Annual Meeting* in Bangkok, Thailand, have thus agreed to produce the *LoCARNet Bangkok Declaration* as stated below:

1. In order to reduce GHG emissions required for climate stabilisation, across-the-board transition in our social system as a whole is pivotal. In this regard, LoCARNet remains steadfast in fostering domestic and within-region research communities in Asia, promoting evidence-based policymaking by bridging the gap between policymakers and research communities, and stimulating region-wide knowledge-sharing via regional cooperation
2. 'Science to Action' (S2A) shall remain an indispensable dimension of effective sustainable development and climate policies towards ensuring that sustainability and climate policies are not only formulated based on good scientific evidence, but are also implementable. Asia will continue to focus efforts on strengthening well established pro-active research networks and communities of researchers, sub-national as well as national policymakers and implementation agencies to spearhead actual transitions into a sustainable LCS.
3. People are at the centre of any consequential transition into a sustainable LCS and economy. Asia is committed to continuous engagement of the widest possible range of stakeholders in an inclusive manner, in order to empower the people to determine and take positive sustainability and LCS actions in accordance with their different economic, socio-cultural and technological capacities.
4. SDG 2030, NUA and the Paris Agreement need to be consolidated into an integrated framework for sustainability and LCS research, policymaking and implementation; sustainability and LCS actions need to be constructively aligned with these global agendas, considering all potential synergies and possible trade-offs. LoCARNet undertakes to enhance and support research on, and dissemination and operationalisation of SDG 2030, NUA and the Paris Agreement at all national, regional and city levels.
5. Identification and quantification of social and economic co-benefits of sustainability and LCS actions are highly essential in order to increase their attractiveness to, and buy-in among, businesses, industries, policymakers and the society at large. Asia looks positively to various leveraging opportunities offered by emerging 4th Industrial Revolution technologies and "co-innovation" – cooperation among Asian countries by utilising leading countries' technology and knowhow – to help close the varied gaps of resource availability, socioeconomic inequalities and sustainable infrastructure provision across the Asian Continent.

The world can no longer afford any delay in taking real, positive actions to mitigate and adapt to global climate change, and create real, sustainable low carbon societies around the world. Asia is more than ever willing to contribute to this global transition into a sustainable LCS future; LoCARNet is committed to providing the supporting and enabling platform to expedite the realisation of this transition, especially in promoting actions by private companies and local governments through appropriate institutional arrangements and capacity building.

3rd November 2017

Low Carbon Asia Research Network (LoCARNet)¹

¹http://lcs-rnet.org/about_locarnet/

Keynote report 1

Expectations of Research Communities in Supporting Science-based Climate Policy

[Speaker]:

Dr. Wijarn Simachaya, Permanent Secretary, Ministry of Natural Resources and Environment, Thailand

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

Inevitably, the consequences of climate change affect everyone everywhere on Earth, especially those who live in poverty, children, and minorities. While science plays a key role in finding solutions to global, regional and local scale problems, and scientific communities are critical actors in policy design and informing the public, it is the task of translating and interpreting the technical and scientific research findings into simpler messages to reach wider audiences that represents a key challenge.

The Royal Thai Government serves as the Focal Point to cooperate with various stakeholders and develop an intergraded master plan for tackling climate change problems. The three main strategies of the master plan are (1) Adaptation in order to

respond to the impacts of climate change; (2) Mitigation through greenhouse gas reduction and increase of sinks and reservoirs; and (3) Improving Thailand's capacity in managing the risks associated with climate change to pursue the Sustainable Development Goals (SDGs).

The Intended Nationally Determined Contribution (INDC) of Thailand pledged a 20–25% GHG reduction within 2030 with energy, transport, waste, and industry as the key driver sectors. According to SDGs-Goal 13, Climate Action, transferring scientific knowledge and findings to wider audiences will greatly contribute to successful implementation of national environmental measures.

Key Findings of the Session

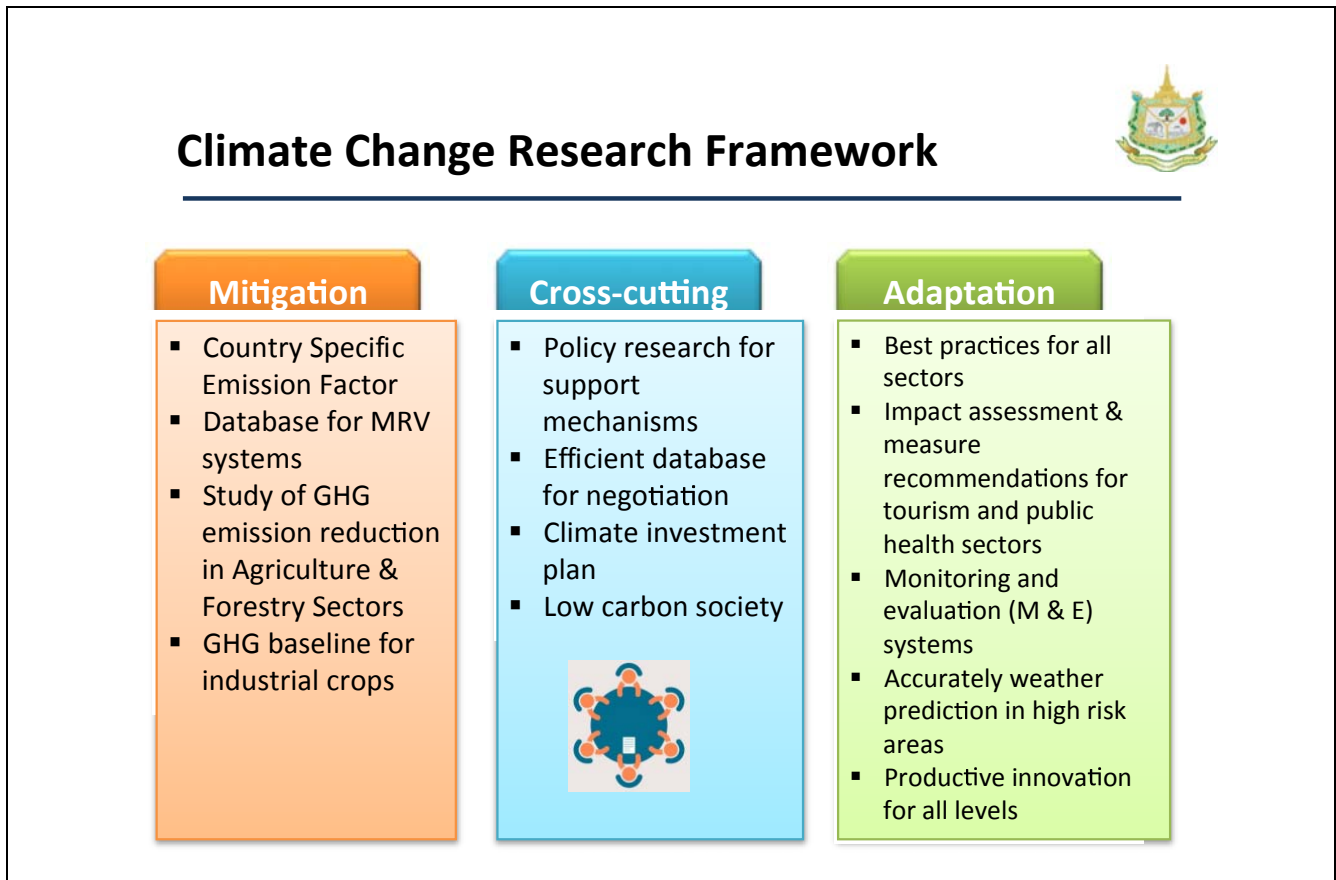
- Public awareness and understanding of environmental issues and climate change are the keys to successful national policy implementation.
- 'Think globally, act locally' still remains the key mantra in driving national policy implementation.
- SDGs will help drive and strengthen science-based climate policy in Thailand.

Concrete/practical steps for low carbon transformation

- It is crucial to create academic outreach programs to convey scientific research findings to

the public in a simpler and more understandable manner.

- Continuous research plays a key role in finding solutions to climate change and pursuing the SDGs.



Source: Presentation by Dr. Wijarn Simachaya, Permanent Secretary, Ministry of Natural Resources and Environment, Thailand

Keynote report 2

The Paris Agreement and Global Low Carbon Transition Towards 1.5°C Target: A Perspective and Update

[Speaker]:

Prof. Dr. Preyadarshi R. Shukla, IPCC, Working Group III Co-chair

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

The brief history of the 1.5°C target has taught us that overall progress towards achieving the long-term global goal and the

adequacy of this long-term global goal (LTGG) have to be reviewed periodically to ensure target achievement, as well as set

new goals. The key pathway toward achieving this goal is to enable stable financial flows in order to reduce GHG and environmental stress.

Stabilising atmospheric concentrations of GHGs requires a substantial shift from the baseline set by the mitigation goals in the IPCC Assessment Report 5 (AR5), which include energy efficiency, greater use of low-carbon and no-carbon energy, improved carbon sinks, and changes in lifestyle and behaviour.

The co-benefits of climate change mitigation on health and income disparity is another critical point encouraging the promotion of mitigation measures and policies.

However, the window in which appropriate actions can be executed is closing rapidly, as a large portion (65%) of the carbon budget has already been used up. And unfortunately, the actually achieved carbon emission reduction is still far below our ambition, and so much more needs to be done.

It is now essential for us to look for new solutions. In this regard, biomass energy which is carbon neutral, is sure play a crucial role in achieving the 2°C goal. But, many challenging questions remain unanswered, such as 'What are the additional costs of mitigation in accordance with the 2°C goal?', 'What are the potential impacts of missing the targets on sustainable development, including poverty eradication and food security?', and 'What technologies are needed to achieve the 2°C target in the context of non-Annex I countries?'

The proposed outline of Working Group III (WGIII) of the 6th assessment report (AR6) is therefore focused on accelerating the transition in the context of sustainable development.

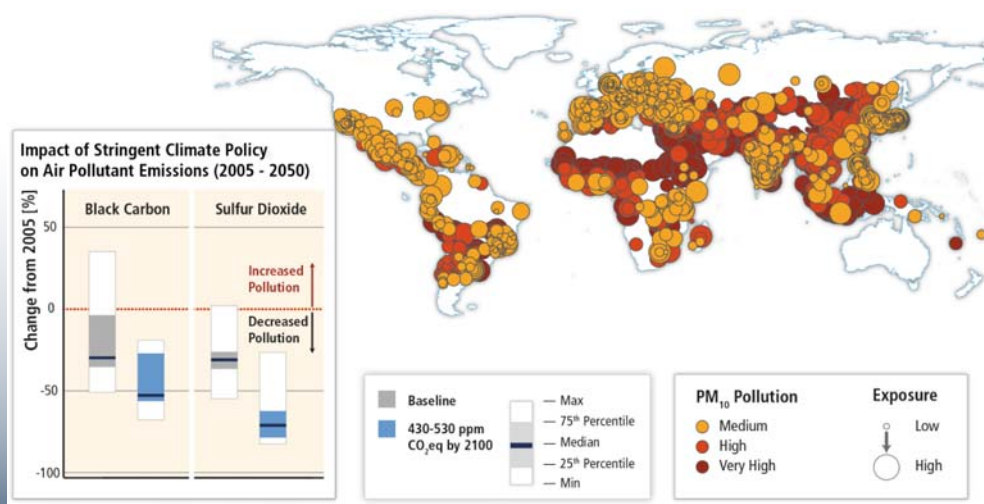
Key Findings of the Session

- Achieving the 2°C target remains highly challenging, and more actions are necessary to accelerate the transition towards this target and a global low carbon society.
- The window for action is rapidly closing, and much more efforts are needed.

Concrete/practical steps for low carbon transformation

- Appropriate financial flows are the key to creating continuous actions.
- Low carbon options release co-benefits for health, energy security and other societal goals towards sustainable development.

Climate change mitigation can bring co-benefits – health, energy security and other societal goals (IPCC AR5).



Source: Presentation by Prof. Dr. Preyadarshi R. Shukla, IPCC Working Group III Co-chair

Keynote report 3

Low Carbon Cities: Knowledge, Action Gaps and Opportunities for Asia

[Speaker]:

Dr. Shobhakar Dhakal, Asian Institute of Technology (AIT), Thailand

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

The global emissions from fossil fuels and industry are starting to stabilise due to the extensive efforts in climate change mitigation, especially in China. Although much deeper efforts are needed in order to achieve the global goal of reduced emissions, global emissions overall have actually started to significantly decrease for the first time in history since the Industrial Revolution.

Land-use and energy sectors have largely contributed to this improvement. Sustainable urban development will play a crucial role in the near future. Despite the many challenges ahead, many opportunities can also be found and implemented.

Currently, a large and ever-increasing portion of the population lives in cities, especially in Asia and Africa; consequently, greater efforts are needed here, particularly in infrastructure investment, which in turn will result in large emission releases.

There are several drivers of emissions in large cities, including income, population dynamic, and urban form, but the most challenging point is the lack of bottom-up emissions inventory and basic driving-factor database. Research challenges in solving this issue include the disparity in methods in tackling the problem, ambiguity over definitions (what

constitutes 'city emissions'), and how to integrate various disciplines into the singular goal of emissions reduction.

In an attempt to solve this problem, the World Bank recently developed a data collection and benchmarking exercise. In this regard, many efforts have taken place in China, mostly focused on city energy consumption. These innovative approaches should be asserted as the upcoming standard in data collection and knowledgebase development.

To date, top-down emission estimation has been the mainstream in research fields, but this is limitative as it cannot be used in local contexts. While much research looks at future emissions and mitigation, little has covered the needs of local initiatives and practical problem solving.

What cities lack is a bottom-up approach and research methodology aimed at practical solutions. There is a huge potential for land use, infrastructure development, and spatial planning in urban areas in the coming decades, which means big opportunities for Asia's cities, which although are relative latecomers in terms of development, look set to grow quickly. There are still many easily implemented mitigation measures, which is where efforts should be focused.

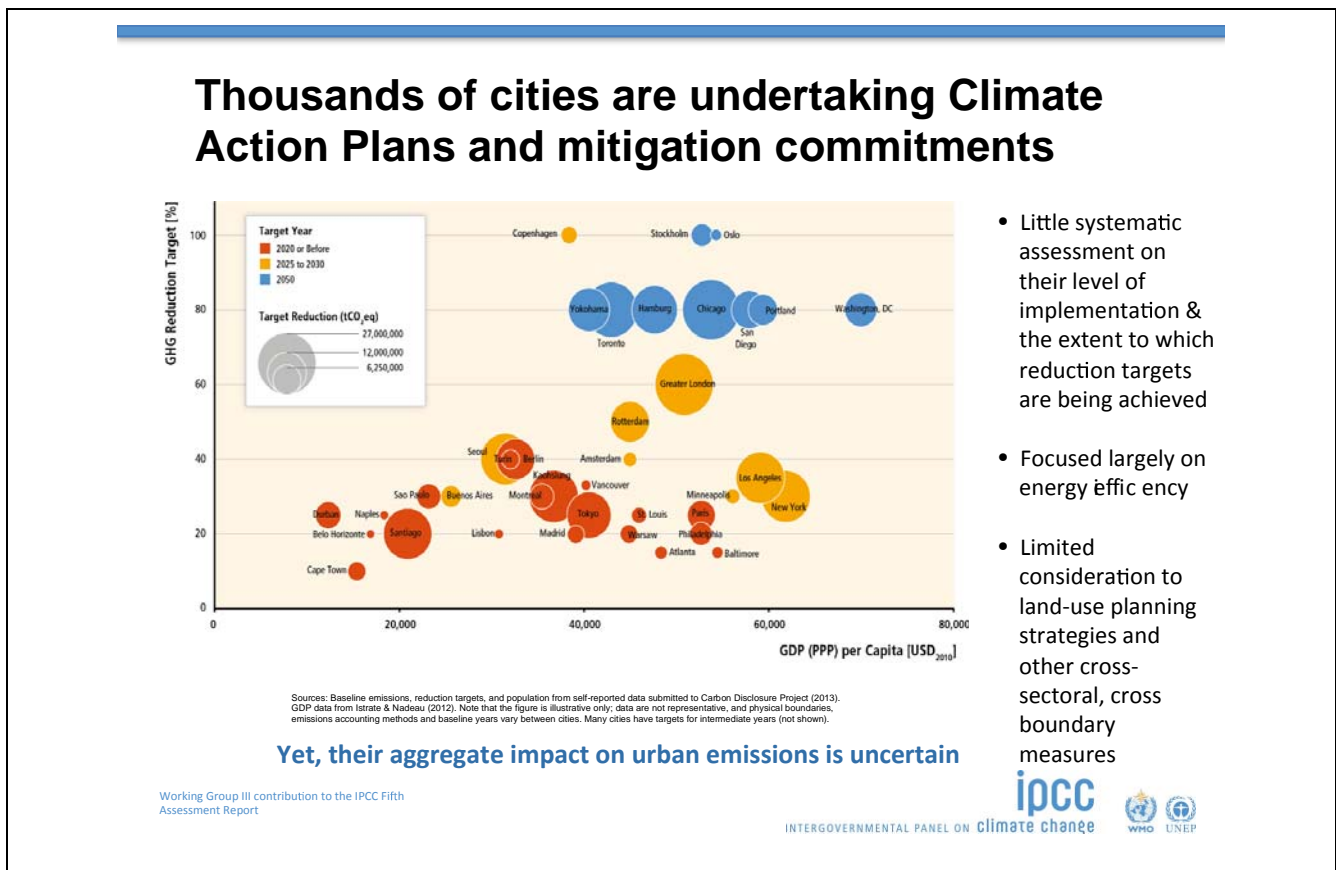
Key Findings of the Session

- Urban areas and cities should be the main focus of low carbon development due to large untapped opportunities.
- Asia and Africa are growing in urban population, economic and social development, as well

as greenhouse gas emissions and air pollution. Research and proactive actions could turn this critical threat into opportunities.

Concrete/practical steps for low carbon transformation

- Bottom-up data inventory and analysis are the current main gaps, which local actions could greatly help to fill to align cities with the low carbon development path.
- Infrastructure development as well as sources of air emissions remain crucial, thus should be the focus of future research and actions.



- Little systematic assessment on their level of implementation & the extent to which reduction targets are being achieved
- Focused largely on energy efficiency
- Limited consideration to land-use planning strategies and other cross-sectoral, cross boundary measures

Source: Presentation by Dr. Shobhakar Dhakal, Asian Institute of Technology (AIT), Thailand

Keynote report 4

Green Economy for Sustainable Development in the Context of Thailand

[Speaker]:

Mr. Pravit Prakitsri, Chief Operating Officer – energy Business, Mitr Phol Sugar Corp., Ltd, Thailand

The sugar industry is linked with our lives in many ways, but it is set to undergo big changes in the future due to the upcoming Sugar Tax. While the core business and production will remain in farming, its impacts will extend to other sectors, including energy production.

Currently, the global challenge lays in the increasing demand for food derived from finite resources and lands. In this regard, Thailand is seen as a successful case study for bioethanol, where convergence between governmental policies and the private sector has made a real difference, as evidenced by the country's daily use of ethanol.

Agriculture is the basis of Thailand's economy. However, it uses almost half of the total labor but creates low added value and contributes little to GDP, hence the current system needs a more integrated policy and holistic problem solving.

In this sense, Thailand's 'Bioeconomy' can serve as the basis for high value-added production, which in turn can solve the aforementioned problem of agriculture. Its energy policy helps develop bioenergy, in which biochemicals and biomaterials form the backbone, followed by R&D on food and animal feed, nutrition and medicine, to complete the whole bioeconomy roadmap for

the country.

Four projects are currently underway under Mitr Phol, which are aimed at supporting development of this bioeconomy, in addition to the **Bioeconomy R&D Centre** and related **Whole Package Supports**. Two are highlighted below.

(1) **Modern farm and smart farm** where high technology and advanced management are combined to produce sugarcane, cassava, soybeans, and peanuts. The key to modern farming is the integration of land at large scales, collective management, and resource sharing.

(2) **Biorefinery industrial estate**, which aims to produce a wide range of products such as first- and second-generation feedstock from sugar cane, bagasse, and cassava pulps, bioenergy, biochemical, food & feed ingredients, and biopharmaceuticals.

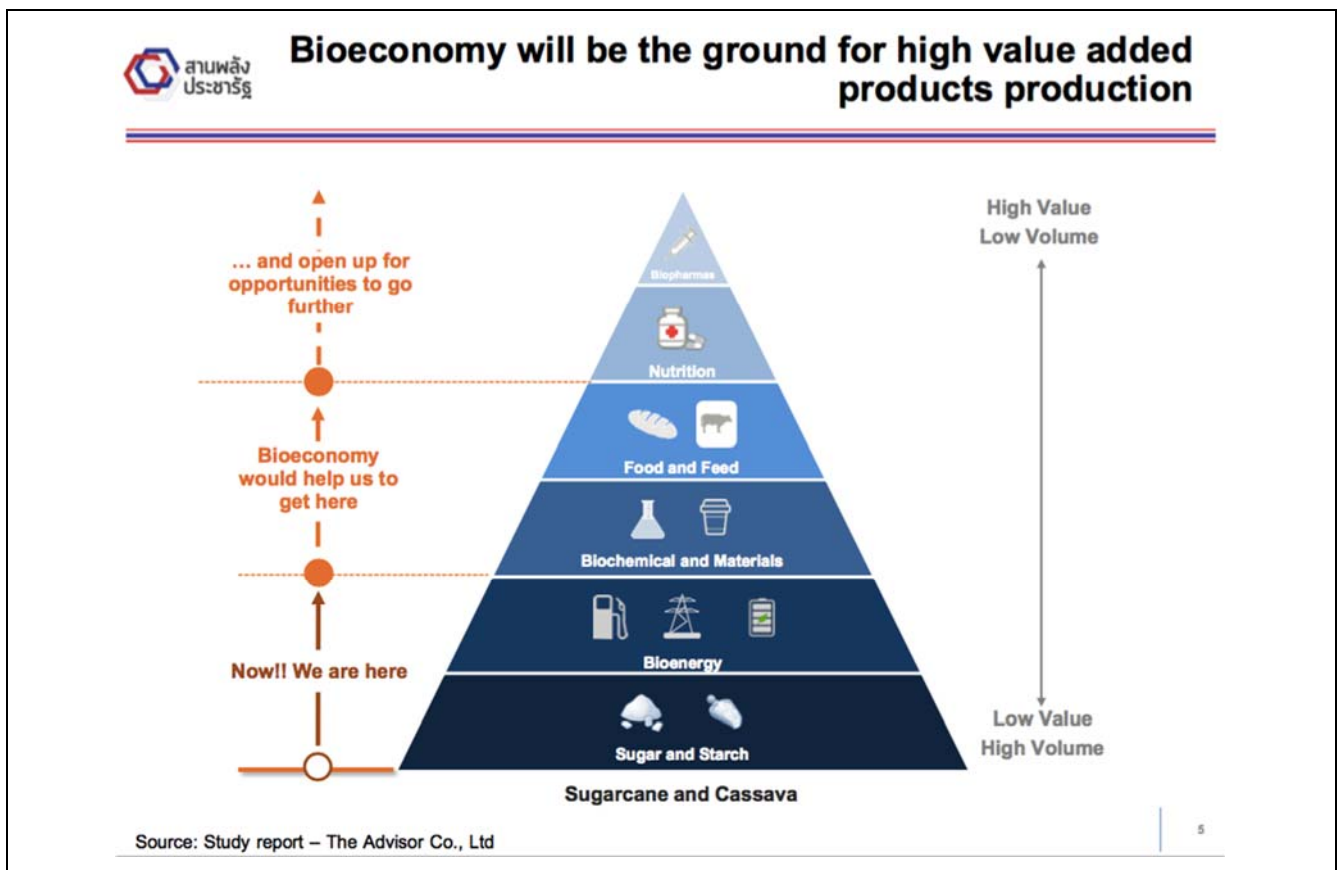
In summary, 'Bioeconomy' is not just another business idea to add value to agricultural products, but will in fact help solve the problems in farming related to low income, and has required much effort from the public sector as well as the local farmers themselves. The key actor in this system is the holistic integration of upstream production, development of which is centred on the quality of life of farmers.

Key Findings of the Session

- Agriculture is the basis of Thailand’s economy, and to develop a modern farming system requires a holistic perspective involving all stakeholders.
- ‘Bioeconomy’ can offer new perspectives to Thai farmers, to improve income levels and therefore quality of life, and also benefit sustainable development.

Concrete/practical steps for low carbon transformation

- Use ‘Bioeconomy’ as the foundation for high value-added production with low carbon footprint.
- Use ‘Bioeconomy’ to help Thailand expand opportunities for increased energy efficiency and carbon intensity in agriculture through high value-added production.



Source: Presentation by Mr. Pravit Prakitsri, Chief Operating Officer – Energy Business, Mitr Phol Sugar Corp., Ltd, Thailand

Keynote report 5

New Views on De-carbonisation: Good and Bad Carbon

[Speaker]:

Prof. Dr. Jiri Jaromir Klemes, Sustainable Process Integration Laboratory (SPIL), Brno University of Technology, Czech Republic

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

The rising world population has placed more pressure on the demands, especially on industrial and agriculture production. Higher demand and consumption result in greater carbon emissions, but not all carbon is bad.

Actually, carbon can be divided into carbon negative, neutral, and positive, each of which needs to be managed differently.

Whilst methane is also a GHG gas, it receives little attention from research and media communities. Methane is emitted from various sources, such as eutrophication, rice cultivation, enteric fermentation from livestock, and coastal sediment.

On the other hand, the best solutions and strategies to solving the bad carbon issue are energy saving and efficiency through electricity and the heat sector, as well as transportation and waste management.

Currently, two-thirds of the fuel used to generate power in USA is lost as heat. Consequently, research communities should focus on the reduction of loss from energy production to solve the issue of bad carbon, especially in transportation and industrial sectors.

In addition, research communities should focus efforts in renewable energy, which is recognised as one of the major contributors to high energy loss, since the actual efficiency is still very low, whether for solar or wind energy. Also, wind energy incurs huge losses due to its fluctuating, unpredictable nature, leading to high management costs, including costs related to production risk prevention.

Regarding the transport sector, battery and energy storage represent the most critical issues in terms of energy loss. More detailed research studies are required in the very near future.

Inland waterways and maritime transport have contributed to large bad carbon emissions, which is often overlooked. Many physical products are transported by cargo ships, a trend that is accelerating as more and more connections are developed worldwide.

Particulate matter (PM), including dust particles and mist, and emissions from the transport sector have many adverse health impacts. However, research in assessing these impacts is still currently very limited.

On the other hand, waste has become a large business along with growing markets, but technological advances in waste to energy

technology alone are insufficient; waste management, waste collection, and public awareness should also move forward to meet the challenge of accelerating urbanisation.

Finally, new footprints should be developed, especially related to smog and haze, which are caused by CO, SO₂, NO_x, VOCs, O₃ and particles emissions. Haze and smog are major

threats to human health.

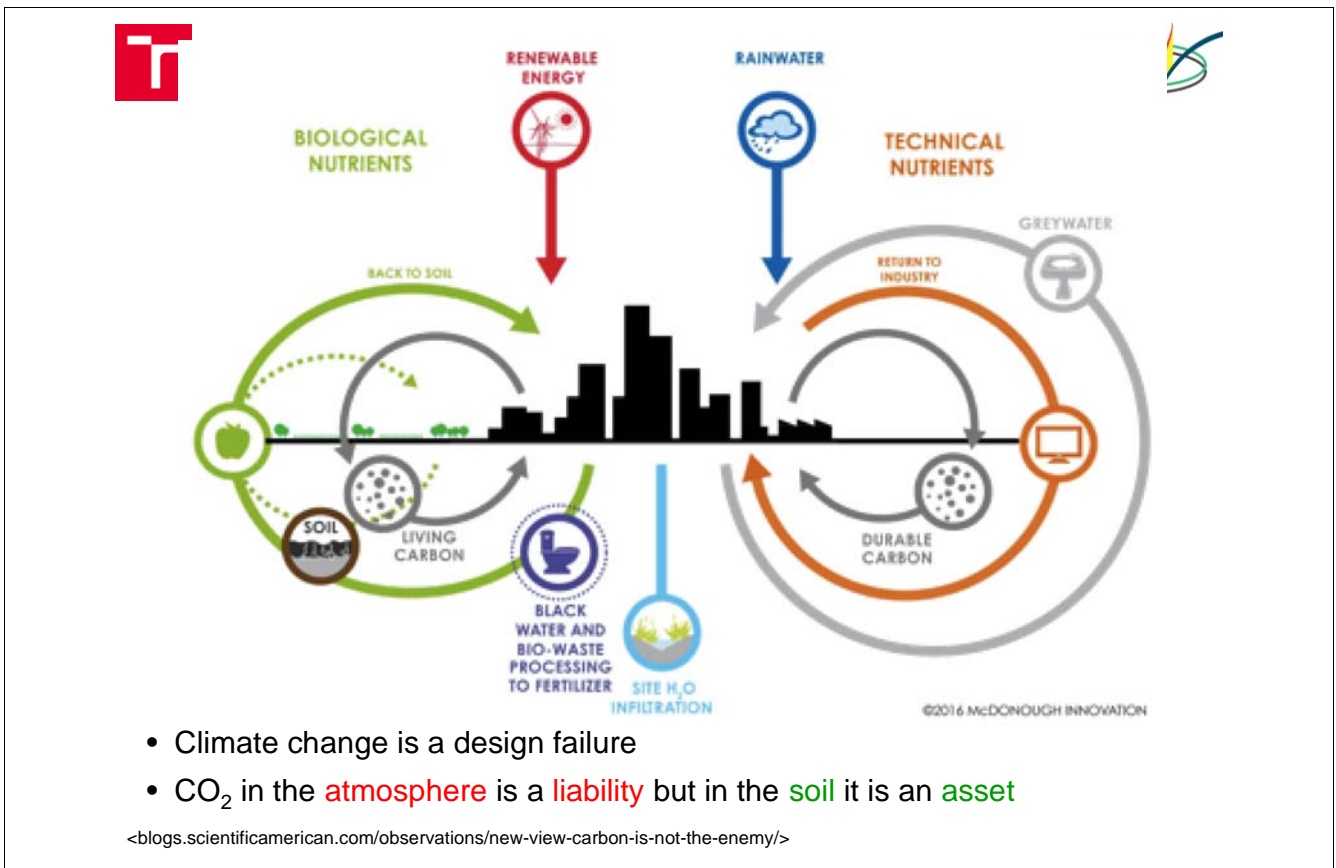
In conclusion, multi-dimensional research that posits carbon as a resource is the key to transition to a global low carbon society. The goal is not just to reduce carbon, but also to better manage and contain bad carbon and utilise it in a positive way.

Key Findings of the Session

- The major component of bad carbon results from mismanagement, and we urgently need a paradigm shift in how we manage it.
- Energy efficiency and conservation are the priority areas to reduce carbon emissions.

Concrete/practical steps for low carbon transformation

- Multi-dimensional research that recognises carbon as resource is the key.
- The goal is not just to reduce carbon, but also to better manage and contain it and utilise it in positive ways.



Source: Presentation by Prof. Dr. Jiri Jaromir Klemes, Sustainable Process Integration Laboratory (SPIL), Brno University of Technology, Czech Republic

Keynote report 6

Mobilising Low Carbon Emissions in Malaysia

[Speaker]:

Prof. Dr. Tan Sri Zakri Abdul Hamid, Science Advisor to the Prime Minister of Malaysia, Malaysia

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

Climate action as well as inaction concerns not only Asia or a particular place, but the whole world. Malaysia is committed to contributing to a low carbon society, with the overall goal of a carbon neutral society.

Under the Paris agreement, the world has for

the first time come to a united goal of finding common but differentiated solutions to climate change problems. The agreement seeks to strengthen developing countries to adopt new technologies and build capacity. Cities and urban development are the key actors in achieving these goals.

In the context of Malaysia, the major challenges include sustainable development, air and GHG emission reductions, and sustainable urban planning. Whilst we have identified key national environmental issues over recent decades, we have yet to find appropriate solutions to them.

Politics and policy can contribute to problem solving, but they have to incorporate holistic, societal and economic aspects, e.g., health and income disparity, in the analysis. Engaging and empowering people are both as important as technological advancements.

'How?' is a crucial question arising from these challenging and complex global climate problems. To develop an action plan is only the first step, but to implement such plan and achieve the goals is certainly the priority.

Major actions in Malaysia include (1) institutionalising the problem of land use and land reserves to maintain green and resilient areas; (2) committing to solve the climate change problem through research-based policy design at the city level focusing on research that is realistic and applicable to actual situations. Using the lessons learned from these actions and linking up research communities and policymakers play the key roles.

In Southeast Asia, haze due to biomass burning has been a persistent and enduring problem for over 20 years. Scientific communities across Malaysia and Indonesia

have been working together to find answers to the problems. But actions have been implementing very slowly, since the most limiting factor is still the lack of political will. Therefore, it is the responsibility of the scientific community to convince and to stay connected with politics.

Asia-Pacific is the focal problem region in the context of the global climate change. Failure here will greatly affect the rest of the world.

Key Findings of the Session

- Translation from the national plan into local actions is the real challenge.
- Sustainable development, air and GHG emission reduction, and sustainable urban planning are the three keys for local action development and implementation.

Concrete/practical steps for low carbon transformation

- Cities in Southeast Asia are accelerating in development and population density, which hence requires a holistic approach towards low carbon society development.
- Sustainable urban planning in this region requires resources and efforts from both research and political spheres.
- Of overarching importance is to link up research communities with policymakers.

Session report 1

Progress and Future: The National Adaptation Process and its Implementation among ASEAN countries

[Chair]: Dr. Jakkani Kananurak, Director, CITC, TGO, Thailand

[Rapporteur]: Ms. Panida Payomthip, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Dr. Kollawat Sakhakara, Environment official, Senior professional level, Office of Natural Resources and Environmental Policy and Planning (ONEP), Thailand

Dr. Julie Teng, Technical Specialist, NAP-GSP, UNDP

Dr. Akarapon Houbcharaun,

Office of Agricultural Economics (OAE), Ministry of Agriculture and Cooperatives

Ms. Chayathorn Thanawattanadamrong, CITC Technical expert, TGO, Thailand

Thailand is ranked 10th globally in terms of countries impacted by climate change (Germanwatch and Munich RE NatCatSERVICE), and 22nd globally for greenhouse gas emissions (GHGs). To support climate change preparedness initiatives, Thailand's climate change master plan (CCMP) (2015–2050) was formulated with a vision to move the country towards climate-change resilient and low-carbon development society following a sustainable development pathway. The three key approaches to achieve this CCMP vision are Climate Change Adaption (CCA), GHG mitigation and low carbon development, and capacity building/enabling environment.

Regarding CCA, Thailand's National Adaption Planning Process (NAP) was created with the cooperation of local mainstreaming of four pilot areas – Chiang Rai province, Central Chao-praya river basin, Udonthani province, and Andaman Cluster, together with the Ministerial Policy Integration unit, in accordance with the Nationally Determined Contributions (NDC) Roadmap. NAP's objective is to provide government and other related entities at national and local levels with an implementation framework, good practices, approaches, and guidelines for developing their own strategies, management plans, and action plans appropriate for individual sectors and areas. To achieve the NAP objective, six strategies were prioritised for future action: (1) water management, (2) agriculture and food security, (3) tourism management, (4) public health management, (5) natural resources management, and (6) human settlement and human security.

To implement NAP, the climate change international technical and training centre (CITC), Thailand's Greenhouse Gas Management Organisation (TGO) in collaboration with the Office of Natural Resources and Environment Policy and Planning (ONEP), has been assigned to develop training curriculums and conduct trainings for local, regional and national officers, as well as to catalyse private sector involvement in public awareness and investment.

Finally, agriculture constitutes the major pillar to Thailand's economy. However, most agricultural land is located in high risk areas subject to flooding in the central part of the country, and subject to drought due to irregular rainfall patterns in the eastern and northeastern parts. In addition, a strong correlation was found between climate change and crop yields for all economic crops, especially rice, sugarcane, and maize. Orchards, including orange, pineapple and longan, were identified as the most vulnerable to climate change. It is estimated that the economic impact of reduced crop yield due to climate change for rice, sugarcane and maize will equate to around 9.8 to 13.9 billion baht by 2050.

Despite the importance of economic crop production, Thailand's CCA is incorporated in the agricultural development plan in three main sectors: livestock, crops, and fisheries. However, more significant progress, adaptation projects at farmer and institutional levels, monitoring tools for climate change mainstreaming into agriculture policies, and climate change adaption indicators all need to be better

promoted.

The national adaptation plan (NAP) process was established under the Cancun Adaptation Framework (2010), a mechanism that enables countries to formulate and implement their own national adaptation plans (NAPs) as a means of identifying medium- and long-term adaptation needs, and to develop and implement strategies and programmes to address such needs. It is a continuous, progressive and iterative process and follows a country-driven, gender-sensitive, participatory and fully-transparent approach. The UNFCCC has approved the following objectives: (1) to reduce vulnerability to the impacts of climate change, and (2) to facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, and in particular into development planning processes and strategies, within all relevant sectors and at different levels, as appropriate.

The National Adaptation Plan Global Support Programme (NAP-GSP) is a joint UNDP-UN Environment programme to assist developing countries in advancing National Adaptation Plans (NAPs), and to help them better focus on medium and long-term climate change adaptation planning as well as budgeting. The aim of this programme is to strengthen institutional and technical capacities for iterative development of comprehensive NAPs, which can be achieved by supporting existing efforts in relation to climate change adaptation planning, funding frameworks and prioritisation of options by encouraging exchange of experiences and

good practices or data analysis between different countries, and so on.

In addition, the NAP process supports access to NAP financing; to conduct regional trainings by using three tools on targeted topics currently under development, which are mainstreaming adaptation in the water sector, leveraging climate finance, and appraisal and prioritisation of adaptation options; and to share knowledge by providing a website with enhanced integration and country-specific information, which is scheduled to be up and running in November 2017.

By integrating agriculture into NAP, four NAP-Agriculture programme outcomes have resulted, and supports are attributed to 11 countries including Thailand. Furthermore, UNDP also provides support to climate budgeting and financing frameworks via UNDP tools and approaches for mainstreaming climate finance into budgeting and financing strategies.

The Climate Change International Technical and Training Centre (CITC) is a flagship project of the Ministry of Natural Resource and Environment (MONRE), and was implemented by the Thailand Greenhouse Gas Management Organisation (TGO). Launched in 2014 under the technical support provided by the Government of Japan through the Japan International Cooperation Agency (JICA), CITC is a one-stop technical training centre and networking platform for mitigation and adaptation for Southeast Asian countries. The four target groups of CICT are central government, cities and municipalities, academic and education institutes, and the

private sector. CICT provides three services – training, networking and collaboration, and knowledge dissemination, based on a bottom-up approach and four knowledge clusters.

Since its launch in 2014, it has trained around 1,077 trainees through domestic trainings on six courses – including GHG inventory, climate change management for sustainable development (CCSD), mitigation mechanism (MM), climate change economics (CCE), climate finance (CF), and trainer training (TT) – and around 234 trainees through international trainings on three courses (CCSD, MM and CF).

CITC has also conducted workshops with municipalities, meetings with stakeholders, joining networking and regional

collaboration on bilateral cooperation and dissemination of knowledge; e.g., (1) workshop on an ongoing curriculum of “Train the Trainers” under low carbon and resilience society development over 22–23 November 2014 at Ibis Bangkok Riverside; (2) workshop on impact management in climate change in the context of cities and communities over 6–7 September 2017 in Bangkok; (3) meeting on development of guidelines for low carbon society on “Eco-Health” on 21 September 2017 in Phayao province; (4) attending the ASEAN working group on climate change meeting over five years from 2012 to 2016; and (5) organising exhibitions and a climate change channel as a knowledge sharing platform for the general public.

Key Findings of the Session

- The target of CCMP could be achieved through the developments of CCA, GHG mitigation and low carbon society, and capacity and enabling environment building.
- NAP implementation needs to be supported by comprehensive preparatory approaches, including stakeholder capacity building, a database system, research and development, multi-sectoral/agency collaboration, institutional arrangements, a budgeting/financial system, supporting mechanism, and local-international collaboration.
- Adaptation projects at farm and institute levels, monitoring tools for climate change mainstreaming into agriculture policies, and climate change adaption indicators are urgently required to achieve the ASPP targets.
- The new theory agriculture (NTA) programme should be promoted as a CCA programme for shifting agricultural practice to NTA by supporting agricultural input and in-farm landscape adjustment in line with the policy impact evaluation method.
- Due to the uncertainty of climate change, the implementation of long-term adaptation plan should accommodate research within the framework of climate change mitigation by establishing a flexible adaptation programme.
- To accomplish CCMP in the agriculture sector, policymakers should be strongly involved in implementation at the local level in order to integrate understanding and knowledge from the community, and to analyse and implement strategies and tools for problem-solving for communities.

Concrete/practical steps for low carbon transformation

- Strengthening collaboration among private, government and academia sectors to increase the capacity of city and district levels.
- Adaptation and integration of climate change issues should be developed and implemented today for future prevention.
- Promoting trainings and workshops to help local people and communities to better understand the climate change situation, and so be more fully engaged in mitigation action implementation.

Session report 2

Mitigation in Asia – Lessons learnt and challenges identified from implementation on low-carbon development and Joint Crediting Mechanism (JCM) for further promoting mitigation actions of the private sector and other stakeholders

[Chair]: Dr. Jun Ichihara, Chief Advisor/Expert, Climate Change Project, JICA Indonesia Office, Indonesia

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Mr. Ryuzo Sugimoto, Ministry of the Environment Japan (MOEJ), Japan

Dr. Arthit Vechakij, Excellent Energy International Company Ltd, Thailand

Dr. Paweena Panichayapichet, Thailand Greenhouse Gas Management Organisation (TGO), Thailand

Mr. Yoshihisa Nakagawa, Toyota Daihatsu Engineering & Manufacturing Co., Ltd, Japan

Mr. Joseph Hwang, PT Gikoko Kogyo, Indonesia

Under the goals set by the Paris Agreement, many countries in Asia have prepared to implement mitigation actions, but their experiences have revealed many barriers exist to carrying this out.

This session aims to understand the progress of mitigation actions and discuss ways to more efficiently promote them. The key questions of the session are to identify the barriers, how to overcome them, and what research is necessary to efficiently

implement mitigation actions.

Examples of types of barriers include financial, carbon market, institutional and regulatory, as well as knowledge and capacity. Different stakeholders face various specific barriers that interact with each other in complex ways. For example, local governments may encounter a mismatch between budgeting from funders for projects that can be practically implemented in the local context. On the other hand, the private

sector may find governmental regulations impede operations, while financial institutes may overlook mitigation objectives and focus only on financial gain.

Based on the overall experiences of countries in Asia, many barriers, such as financing, have emerged in a wide range of countries, which means there is an opportunity for better understanding and more efficient mutual learning. In terms of policy design, these common experiences can lead to city-to-city collaboration programmes and co-created policy design, which is the key to the Joint Crediting Mechanism (JCM). In this regard, two schemes have been developed to support JCM, as follows.

First is the Asia-Pacific Integrated Model (AIM), which has been developed as a scheme contributing to climate change mitigation action. This has led to creation of a research network to contribute to JCM, which includes Thailand, Indonesia, Malaysia, Cambodia, and Vietnam, as targeted countries. Another scheme is 'Japanese Cities', in which knowledge and experience is transferred with private sector support, for which both stakeholders support foreign cities to create low carbon projects, design local systems, and build capacity. The government of Japan has already formed collaborations and developed such schemes in 17 countries (including Thailand) with over a hundred mitigation and infrastructure projects implemented in both the private and public sector.

Financial support is recognised as the key mechanism in technology transfer. The criteria for selecting JCM projects are cost effectiveness, payback period (less than

three years), and partnership. One of the key steps to developing a JCM project is to build a trustworthy and acceptable methodology to monitor and verify (M&V) the project results, in order to accredit the financial support. These methods truly represent lesson learnt from the mitigation actions in Asia and the true legacy born from such financial mechanisms. Knowledge management of these experiences is the key to generating more mitigation actions and to accelerating mitigation results.

The second keystone to JCM is Public-private partnership. In order to improve the success of projects based on any form of partnership, not only international, it is crucial for local implementers to seek out local partnerships. Whilst including various stakeholders may add complexity to the whole operation, projects with more collaboration, i.e. between local authorities, private sector, and financial stakeholders, have proven to be more successful and sustainable in the long run.

Local government and policy are also needed to implement projects, as without appropriate support, projects on energy and energy efficiency that are not fully developed in the market in particular are prone to fail. Private companies perceive this as an implementation risk and may avoid engaging in project development from the outset. In many implementing countries where coal is still the most economically preferable option, such as Indonesia and Thailand, local government and policy can act as huge barriers.

From the perspective of local governments, it is also challenging to choose the right technologies and projects given that these

agencies often lack expertise on climate change mitigation. Projects may also face conflicting goals between local priorities and international support.

However, city-to-city cooperation can contribute to convincing local governments to take on projects, since local administrations can learn about the benefits of project implementation and practical solutions from each other and from foreign experiences. Deepening and widening international connections and knowledge exchange can lead to more opportunities, including changes in attitude and behaviour. This institutional barrier is hard to overcome

by local stakeholders alone.

Permits, regulations, and legislations are the main institutional barriers at local government levels. In countries like India where the local governments have gained more understanding and realised the importance of mitigation actions, the implementation process becomes easier and smoother, lessening the burden on the private sector and local implementers. With appropriate levels of international support and collaboration local governments can become facilitators as opposed to opponents of mitigation action implementation.

Key Findings of the Session

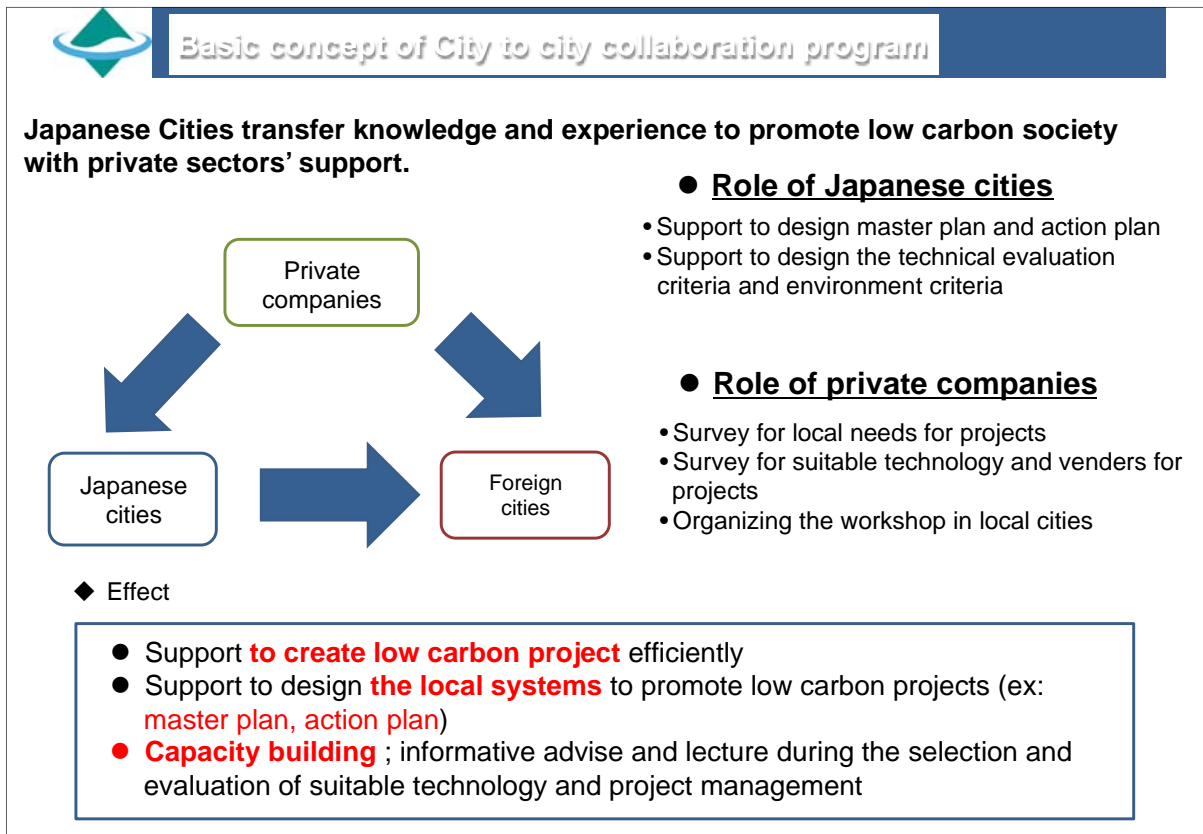
- Public-private partnership is crucial to mitigation action, both at local and international levels.
- Development of monitoring and verification (M&V) methodology is the essence of JCM projects. This requires knowledge management (KM) and can lead to knowledge transfer.
- Including various local partners in mitigation actions can lead to more complexity, but the result can be rewarding for project implementation and sustainability in the long run.
- Without appropriate support and understanding from local government and policy, the heavy burden lies on private sectors and local project implementers, which may become an institutional barrier in itself.
- Permits, regulations, certification accreditations, and legislations constitute a heavy burden on local implementers. Without the understanding and support of local governments and administration, even large organisations such as auto manufacturers will struggle to implement mitigation projects.

Concrete/practical steps for low carbon transformation

- Knowledge transfer and capacity building programmes can enable stronger and more successful international collaboration. Both the private and public sector can contribute to this collaboration.
- It is crucial to amass M&V methods to ensure the results from mitigation actions, since such methods are also the key to knowledge transfer and can be used to replicate similar projects across countries.
- Local financial institutes may not share the same climate change goals or visions and may be

challenging to persuade, but support from local financiers greatly contributes to project implementation and sustainability.

- More international G-to-G cooperation including knowledge and experience exchange is necessary to topple the current paradigm of local government and policy toward increased sustainability.



Source: Presentation by Mr. Ryuzo Sugimoto, Ministry of the Environment Japan (MOEJ), Japan

Session report 3

Climate Actions and Interactions with SDGs

[Chair]: Dr. Mikiko Kainuma, IGES, Japan

[Rapporteur]: Dr. Thapat Silalertruksa, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Prof. Dr. Priyadarshi R. Shukla, IPCC WGIII Co-chair, India

Prof. Chen Sha, Beijing University of Technology, China

Prof. Rizaldi Boer, Bogor Agricultural University, Indonesia

Dr. Nguen Tung Lam, ISPONRE, Vietnam

Dr. Hak Mao, Ministry of Environment, Cambodia

Dr. Toshihiko Masui, NIES, Japan

Both of the COP21 target to limit the average global temperature rise to well below 2°C above pre-industrial levels and the 2030 Agenda for 17 Sustainable Development Goals (SDGs) of the United Nations have been agreed by the global community.

In practice, there are many interactions between climate actions and SDGs that should be linked to enhance the synergy and so aid in implementation of climate mitigation actions, in order to move the world towards a low carbon and sustainable development society. This session aims to discuss (1) main issues of Nationally Determined Contributions (NDCs) of each country, (2) long-term goals of GHG mitigation of the parties, (3) climate mitigation measures, (4) barriers to implementations, and (5) how mitigation measures are linked with a country's SDGs. Many actions dedicated to tackling climate

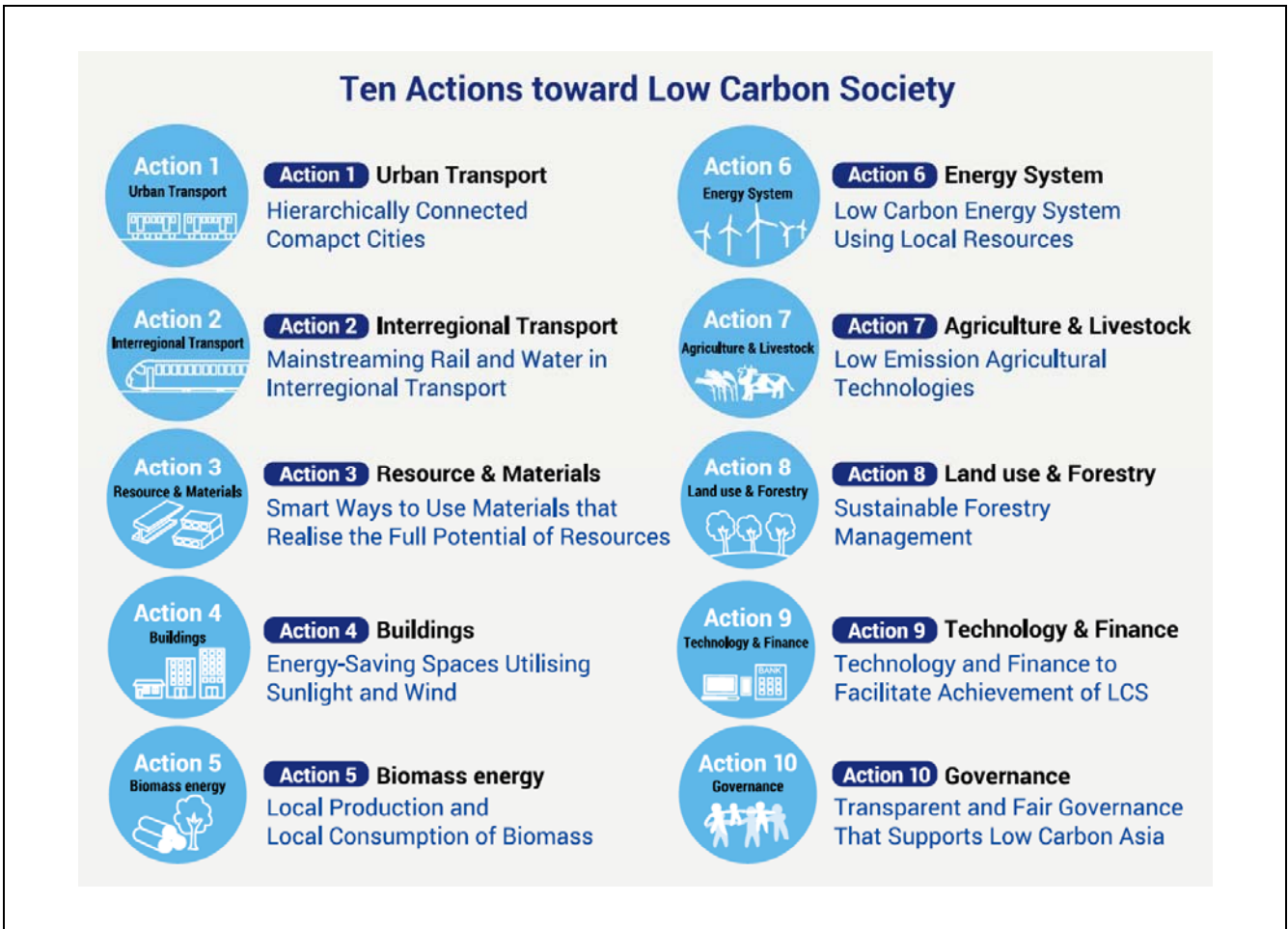
change can also help achieve other SDGs, such as ensuring access to affordable clean energy, climate action, building resilient infrastructure and sustainable cities and communities. Experiences from the representatives of various countries including India, China, Indonesia, Vietnam, Cambodia and Japan have been shared. The presentations and discussion have focused on various important issues, including (1) targets and achievements in mitigating climate change, (2) climate mitigation measures, especially energy systems, (3) long-term GHG reduction strategies, and (4) how to develop synergy between climate actions and SDGs. The results from the session are expected to further support policymakers as well as relevant stakeholders in developing and adopting the climate action plan and measures for achieving a country's NDC and SDG targets.

Key Findings of the Session

- The 17 SDG goals and climate change will interact with each other in multiple ways, as seen by linkage between 10 actions toward low carbon society and the relevant SDGs.
- A range of climate mitigation options have been proposed, such as carbon pricing, climate focused technology pushes, technology cooperation fields (energy efficiency, renewable energy, and resources use efficiency), behaviour change, urban planning as well as infrastructure development.
- Energy policy and energy structure for transition to more intensive renewable energy utilisation are the key climate actions to achieve the NDC targets in many countries.
- SDGs and climate policies are now synergised and in place for several countries.
- Each country has its own socio-economic circumstances (e.g., demographic, economic, technology readiness level, renewable energy potential), and thus long-term GHG reduction plans and targets must be designed specifically and incorporate them.

Concrete/practical steps for low carbon transformation

- Climate mitigation action plans must be clearly developed with science based action planning (such as gap analysis, risk assessment) along with stakeholder engagement and prioritisation.
- Synergies between SDGs and climate actions must be considered.
- Each country has its own circumstances; thus GHG reduction plans and targets must be designed specifically according to each country’s circumstances.
- Indicators and baseline data are required for monitoring and measuring the achievement of the action plan.
- Mobilisation of resources is needed to ensure proposed activities are implemented as indicated in the NDCs.



Source: Presentation by Dr. Mikiko Kainuma, IGES, Japan

Session report 4

Low Carbon Cities

[Chair]: Dr. Junichi Fujino, Programme Director, City Taskforce, IGES/Senior Researcher, NIES, Japan

[Rapporteur]: Dr. Piyanon Kaenchan, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Prof. Dr. Chin Siong Ho, Universiti Teknologi Malaysia (UTM)

Ms. Vu Thi Thu Huong, Haiphong Department of Natural Resources and Environment

Assoc. Prof. Dr. Maryono, Diponegoro University

Ms. Kim Thoa, Can Tho City

Dr. Nguyen Thai Hoa, Ritsumeikan University

Mr. Curt Garrigan, UN ESCAP

Dr. Shom Teoh, Programme Manager, Sustainable Cities (IGES)

Mr. Boun Eua Khamphilavanh, Department of Climate Change of MONRE, Lao PDR

Awareness of environmental problems such as atmospheric emissions, water pollution, and natural resource depletion has been increasing over recent decades. Not only do environmental problems directly affect ecological cycles and the services provided by ecosystems, but they also indirectly impact on humans. For instance, greenhouse gas (GHG) emissions can lead to climate change that potentially results in lack of water availability for agriculture and human consumption. According to The United Nations Framework Convention on Climate Change (UNFCCC), climate change has affected counties all over the world. Recently, under the UNFCCC, the Paris Agreement was adopted by 170 countries with the aim of strengthening the response to these climate change threats (UNFCCC, 2017).

Also, many nations have individual plans to mitigate climate change effects at the city level. Research and initiatives on achieving low carbon cities (low carbon society, LCS) are ongoing in Asian developing countries, such as Indonesia, Lao PDR, Philippines, Thailand, and Vietnam. LCS was recently

mentioned in the context of Sustainable Development Goals (SDGs) because one of the key components is the environment. Therefore, many cities not only aim at reducing carbon but also focus on the quality of life of city dwellers.

Other than local government agencies, LCS working teams, i.e., Semarang in Indonesia, and Can Tho and Haiphong in Vietnam, have collaborated with the Asia-Pacific Integrated Model (AIM) team and Institute for Global Environmental Strategies (IGES) from Japan. The AIM team supports developing and accelerating climate change action planning using quantitative analysis. LCS working teams have contributed to developing different LCS scenarios by varying carbon reduction targets (percent reduction), and results from such analysis helps identify impacts of the targets, including amounts of carbon emissions and economic impacts over pre-determined periods of action. Then, considering all impacts, the best scenario is decided upon as an action plan for a certain city. The LCS working team of Kuala Lumpur city, Malaysia, suggested that after deriving the best action plan (from the analysis),

such plan should initially be tested at the city hall level first, before being offered to the government.

LCS of some cities, such as Semarang in Indonesia, and Can Tho in Vietnam, are partners of the '100 Resilient Cities' (100RC) programme, initiated by the Rockefeller Foundation. Being members of 100RC, such cities are provided with assistance and advisory support towards urban resilience in the phase of shocks and stresses in various fields, including climate change. Other benefits of membership are knowledge sharing and collaboration amongst

countries.

UN ESCAP supports LCS through its SDG promotion, and supports cities to implement SDGs through various activities, e.g., in requesting grants, pilot projects and advisory services. UN ESCAP currently proposes that other than focusing on low carbon, we should also pay attention to resource consumption as it rises in line with population growth. Whilst we are all aware of the term 'carbon footprint', we may be unfamiliar with 'resource footprint', which is still very difficult to estimate and requires large datasets.

Key Findings of the Session

- Data collection is necessary for quantitative analysis. However, we should not be too focused on the problems of data accuracy; instead we should carry out analysis based on good methods or models. More accurate data will only become useful in the event use of a model is maintained into the future.
- Connections with related organisations (both local and international) will provide more opportunities to learn about the methods for low carbon scenario analysis.
- Resource footprints should also be taken into account for SDGs.

Concrete/practical steps for low carbon transformation

- Networking with organisations to realise opportunities to obtain advisory supports, funding, partnership/collaborative working, etc.
- Selecting/identifying low carbon action plans by using LCS scenario quantitative analysis.
- Testing selected action plans with local government agencies or organisations before implementing such plans at the city or country level.



Source: Presentation by Dr. Shom Teoh, Sustainable Cities (IGES) and the United Nations (UN, 2017)

References

UN (2017) Sustainable Development Goals: 17 goals to transform our world [Online], Available at: <http://www.un.org/sustainabledevelopment/sustainable-development-goals/> [Accessed on 17 November 2017]

UNFCCC (2017) The Paris Agreement, Available at: http://unfccc.int/paris_agreement/items/9485.php [Accessed on 17 November 2017]

Session report 5

Towards long-term carbon-neutrality in Asia – Growing importance of forestry and land use management

[Chair]: Dr. Kentaro Tamura, Research Leader, Climate and Energy Area, IGES, Japan

[Rapporteur]: Dr. Nittaya Cha-un, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Dr. Shuzo Nishioka, Counsellor, IGES, Japan

Dr. Norbu Wangdi, Head, Centre for Water, Climate, and Environmental Policy, Ugyen Wangchuck Institute for Conservation and Environmental Research, Bhutan

Prof. Dr. Ram Shrestha, Asian Institute of Technology and Management (AITM), Nepal

Prof. Rizaldi Boer, Executive Director, Centre for Climate Risk and Opportunity Management, Bogor Agricultural University, Indonesia

Mr. Bea Pheaxay, Acting Vice Dean, Faculty of Environmental Science, National University of Laos, Lao PDR

The aim of this session was to discuss ways and means towards long-term carbon neutral Asia, and on the growing importance of forestry and land use management.

The session started with a background to the carbon cycle, global surface temperature, GHG emissions and climate change impacts, and also a recap of the UNFCCC Parties' endorsement of the Paris Agreement to limit the temperature increase to less than 2°C, to prevent critical climate change impacts and challenges, especially in Asia.

The concept of leapfrogging Asia was developed based on the fact that the region has sufficient potential to move forward with low-carbon development, which impetus is bolstered by a number of ongoing favorable conditions. Therefore, by introducing innovative technologies and managing to "leapfrog" in terms of development, Asia will be able to make progress towards low-carbon development, and lead the way to low-carbon society at the global level. It is noted that Asia is currently standing at the crossroads.

The case study of Bhutan showed that it is not just carbon neutral, but also carbon negative

since forest covers more than 70% of the country. However, net GHG emissions are expected to be slightly positive in 2050 under the Business As Usual (BAU) scenario, thus low-carbon measures are needed in order to maintain its status as a negative emissions country.

Currently, emissions are about one third of the total sequestration capacity of its forests, resulting in negative emissions. Due to the higher share of hydropower-based electricity in the energy mix, Bhutan currently has a low carbon intensity of 0.15 kg CO_{2e}/USD of GDP purchasing power-parity compared to an average of 0.46 kg CO_{2e}/USD among other developing countries. Strategies, plans and actions for low GHG emission development for Bhutan should include sustainable forest management and conservation of biodiversity to ensure sustained environmental services; promotion of a low carbon transport system; minimising GHG emission through application of the zero waste concept and sustainable waste management practices; promotion of a green, self-reliant economy towards carbon neutral and sustainable development; promotion of clean renewable energy generation; promotion of climate smart

livestock farming practices to contribute to poverty alleviation and self-sufficiency; promotion of climate smart agriculture to contribute towards achieving food and nutrition security; energy demand side management; and integration of low emission strategies in urban and rural settlements.

A commitment to carbon neutral is not only aligned with the green growth principle of the Bhutan Economic Development Policy, but also with the global goal of preventing dangerous anthropogenic interference with the climate system. Such a commitment is however a challenging pathway, and will require relevant supports from the international community in terms of technology, finance and capacity building.

The presentation on Nepal's experience with NDC and low carbon policy development provided first a background profile of the country, indicating that mountains and rugged hills cover almost 75% of its land area, and that major natural resources include water resources and hydropower, forests, and other diverse biological resources (biodiversity). Nepal's land area is 40.36% covered by forests and 44.74% by other wooded land, which in total directly engages over 25,000 community-based forest management groups across the country in managing about 30% of the country's total forest area. The total carbon stock of Nepal's forest is estimated at around 1,054.97 million tonnes (i.e., 176.95 t/ha).

Hydropower is a key low carbon development strategy of Nepal, since it has a technical potential of 83,000 MW and economic

potential of 45,000 MW, with 107 projects at different stages of construction. Nepal is to add 2,587 MW of generation capacity in the next 10 years.

Of its low carbon plans and policies, Nepal is planning for clean energy through the use of hydroelectricity, solar energy, bio-energy, small and micro hydropower plants, biogas and smokeless improved cooking stoves (ICS). In addition, the Forestry Sector Strategy (2016 – 2025) aims to enhance the forest carbon stock by at least 5% by 2025 as compared to 2015, and to reduce the mean annual deforestation rate by 0.05% in Terai (southern plain) and Chure. The Environment Friendly Local Governance Framework (EFLGF) was set up to promote renewable and clean energy and energy-efficient options; to increase greenery through tree plantation and management of gardens and parks; to plant trees on at least 10% of the current open/barren land; to promote rainwater harvesting and pond construction; and to enhance waste management through environment-friendly technology.

The NDC reported that by 2050, Nepal will achieve 80% electrification through renewable energy sources, reduce its overall dependency on fossil fuels by 50%, and decrease its dependency on fossil fuels in the transport sector by 50%. To this end, the country will develop an electrical (hydro-powered) rail network by 2040 and increase its share of renewables by 20% to increase the share of electric vehicles up to 20% from the 2010 level by 2020. It will also maintain its level of forest cover at 40% of the total area.

The role of forests in mitigating climate change and challenge to measure progress in limiting land use change emissions was then highlighted. Land use change and forests are often considered highly complex secondary mitigation options – forests play a significant role in regulating climate with sensitive changes of types and density of vegetation at the regional level, and from climate modeling results, loss of forests in tropical regions significantly affects precipitation at mid and high latitudes through hydro-meteorological teleconnections. Large-scale loss of forest cover directly affects the reflectance of the earth's surface, induces local warming or cooling, and alters air pressure patterns, which in turn affect typical global circulation patterns and rainfall distribution.

The Paris Agreement explicitly calls for all countries to make use of a full range of land-based mitigation options and to take action on REDD+. AFOLU accounts for about 10% of global CO₂ emissions, and nearly a quarter if CH₄ and N₂O are included. In most tropical countries, emissions from deforestation still dominate; in temperate and boreal regions, forests are a net sink. However, different perspectives still exist among countries in defining emission reduction targets, which include different accounting rules and different uncertainties. Therefore, which direct and indirect effects should be included in the 'balance' needs to be actually clarified. Currently, most countries include indirect effects on managed land (e.g., Indonesia with peat fire emission natural disturbance in managed lands). Therefore,

there is a need to reconcile conceptual nuances of what constitutes anthropogenic as well as clarify 'managed land' concepts.

In actual fact, the "Global Stocktake (GST)" requires comparability, and without this, progress towards the Paris Agreement target cannot be properly assessed. Turning the forest mitigation promise into reality requires higher transparency, commitment, and confidence.

The issue of natural resources and land use was then illustrated with a case study of Lao PDR, which provided information on different steps taken by the central government in forest management.

It was found that the forest area of Lao PDR gradually decreased from 1990–2010 and its cover was only 41% in 2007, while the government has pledged for a cover of 70% of the total national area by 2020.

The session noted that the carbon stock in living forest biomass was 1,186 MtCO₂ in 1990, which had reduced to 1,074 MtCO₂ in 2010. In addition, Lao PDR classifies its forest into three types; national conservation areas (3.8 Mha), national protected areas (7.5 Mha), and national production forest areas (3 Mha). During 1991–2002, agriculture and natural resources, which contributed to key industries and services (mainly hydropower, mining, and tourism), were the key drivers of GDP in Lao PDR. However, threats to natural resources and forest are growing quickly due to poverty and population expansion issues. These threats include shifting cultivation & plantation concession, significant population growth (2.3%), infrastructure development,

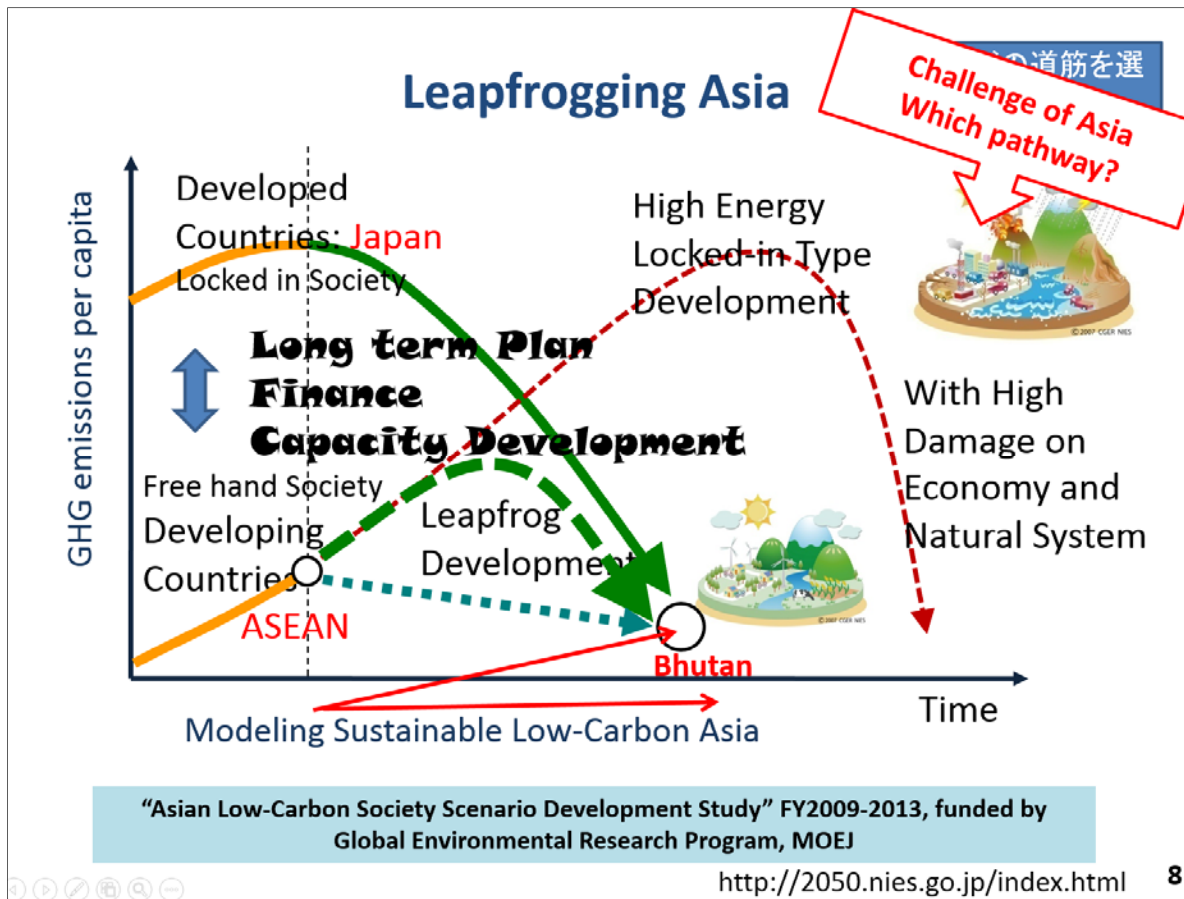
large livestock production, over harvesting of natural resources, and illegal timber harvesting.

Key Findings of the Session

- Development of quantitative analysis methodologies to support the NDCs in (LDCs) in Asia, such as Bhutan, Nepal, Lao PDR and Myanmar, should involve formulating emission and absorption plans consistent with national development policies.
- Quantitative methodologies should be science-based and able to forecast long-term low emission strategies towards attaining carbon neutral societies by the end of 2100.
- Each country must learn to develop integrated assessment models (IAM) under its national and local circumstances by using quantitative methods, in order to focus all pathways towards carbon neutral society; to choose appropriate key policies; and to evaluate policy effects based on long-term insight.
- As LDCs in Asia have yet to industrialise, it is acknowledged that they will not be able to follow the same energy-dependent type pathways as taken by industrialised countries to date.
- In a carbon-neutral world, as natural resources such as carbon sinks and biomass, as well as forests and soils for fresh water use and hydropower will globally gain more significance, we will need to seek out new development patterns that capitalise on the plentiful supply of natural resources within LDCs.

Concrete/practical steps for low carbon transformation

- In the case of forest, it is recommended to preserve traditional and culture activities for forest protection. Mechanisms and systems should be established for forest C tax, C market, and other C products.
- For cropland, it is recommended to increase crop productivity by good agricultural practices (GAP), to protect against landslides, to sustainably plan landscape, to establish an agriculture community standard, to access technology, and to provide knowledge to the community.



Source: Presentation by Dr. Shuzo Nishioka, Counsellor, IGES, Japan

Session report 6

Integration of Local Actions into National Development towards Achieving SDGs in Asia and the Role of Science and Technology: Development and Application of Models and Monitoring Technologies to Evaluate Transition to the SDGs

[Chair]: Prof. Tsuyoshi Fujita, NIES and Dr. Shuichi Ashina, NIES, Japan

[Rapporteur]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Dr. Mikiko Kainuma, Senior Research Advisor, IGES, Japan

Dr. Chatchai Intatha, Environmental Official – Senior Professional Level, ONEP, Thailand

Prof. Toshihiko Nakata, Tohoku University, Japan

Prof. Retno Gumilang Dewi, Bandung Institute of Technology, Indonesia

Dr. Shuichi Ashina, National Institute for Environment Studies (NIES), Japan

Prof. Tsuyoshi Fujita, National Institute for Environment Studies (NIES), Japan

Dr. Yukio Terao, National Institute for Environment Studies (NIES), Japan

Local, national and international actions are needed toward achieving the sustainable development goals (SDGs). National actions are often considered as a fundamental milestone for achieving SDGs, but harmonising such actions with local and international levels is also necessary, and this is where the real challenges are.

Many of the goals under SDGs are interrelated and overlapping – the majority are related to resources and materials (Action 3 under SDGs) used in daily living and production processes. Each stakeholder has different roles in this action; for example, the government's role is to design low carbon cities and national land that use less material. On the other hand, the private sector's role is to develop and deploy technologies that improve material and resource use efficiency. However, such initiatives may fail to be adopted by local citizens due to high investment costs and other barriers. It is also the role of national actions to integrate these goals and translate them into actions at the local level and to seek appropriate international supports, as needed.

For example, in the case of Thailand, the National Committee on SDGs has created three subcommittees as working groups to integrate SDGs for implementation, to compile national SDGs reports, and to develop socio-economic/legal mechanisms to support SDGs. As a result of this framework, ONEP has created an official map of Vulnerable and Risk Areas of Natural Disaster to support local actions toward SDGs. This helps local communities to develop resilience to natural disasters with

the assistances from international experts. Designing a sustainable society with appropriate links between local and international levels is a challenging task for national actions to accomplish, and requires extensive planning, stakeholder engagement and multi-level integration – for example, clean energy (Goal 7) and sustainable cities (Goal 11). Actions under these goals involve both supply-side and demand-side integration, as well as various stakeholders in residential, industrial, commercial, and transportation sectors. To better manage this complexity requires careful planning and an open mind to new technology, such as big data analysis and artificial intelligence (AI) for better decision-making and improved urban monitoring systems.

Good mitigation action plans identify the potential for project implementation on the local level with clear targeted sectors as well as for stakeholders. Physical goals are not the only aspects to consider – spatial information of the implementing areas, including the timeframe of the plan, is also necessary.

In the energy sector, well-planned action requires extensive data, scenario modeling, and projection. The difficulties to realising these analytical models are a lack of data and rapid rate of change in society and economy, which requires researchers to recalibrate models and retest them to ensure they remain current and valid.

Sustainable transportation remains a significant challenge. Fuel efficiency and technology advancement are as important as city transformation, land use, and

sustainable urban planning. Analytical flows of development models have to be holistic and include well-rounded aspects to successfully reach the goals. A holistic design system includes the macro design of cities, spatial design including land use and transportation network, and local projects to facilitate personal mobility and to reduce the need to be mobile in a first place.

A smart urban and industrial energy management system is the future path toward local and national actions, and the key to this is developments in monitoring, data management, and simulation. Japan

has already started using these technologies to develop and restore the city of Fukushima, which is an interesting case from which other countries can learn from.

Atmospheric characteristics and air quality monitoring in cities yields valuable information on sources of emissions and pollution. Such information can be very useful for planning and finding suitable solutions. Comparative case studies involving different cities can yield much for our understanding of the dynamic of atmospheric pollution in urban areas.

Key Findings of the Session

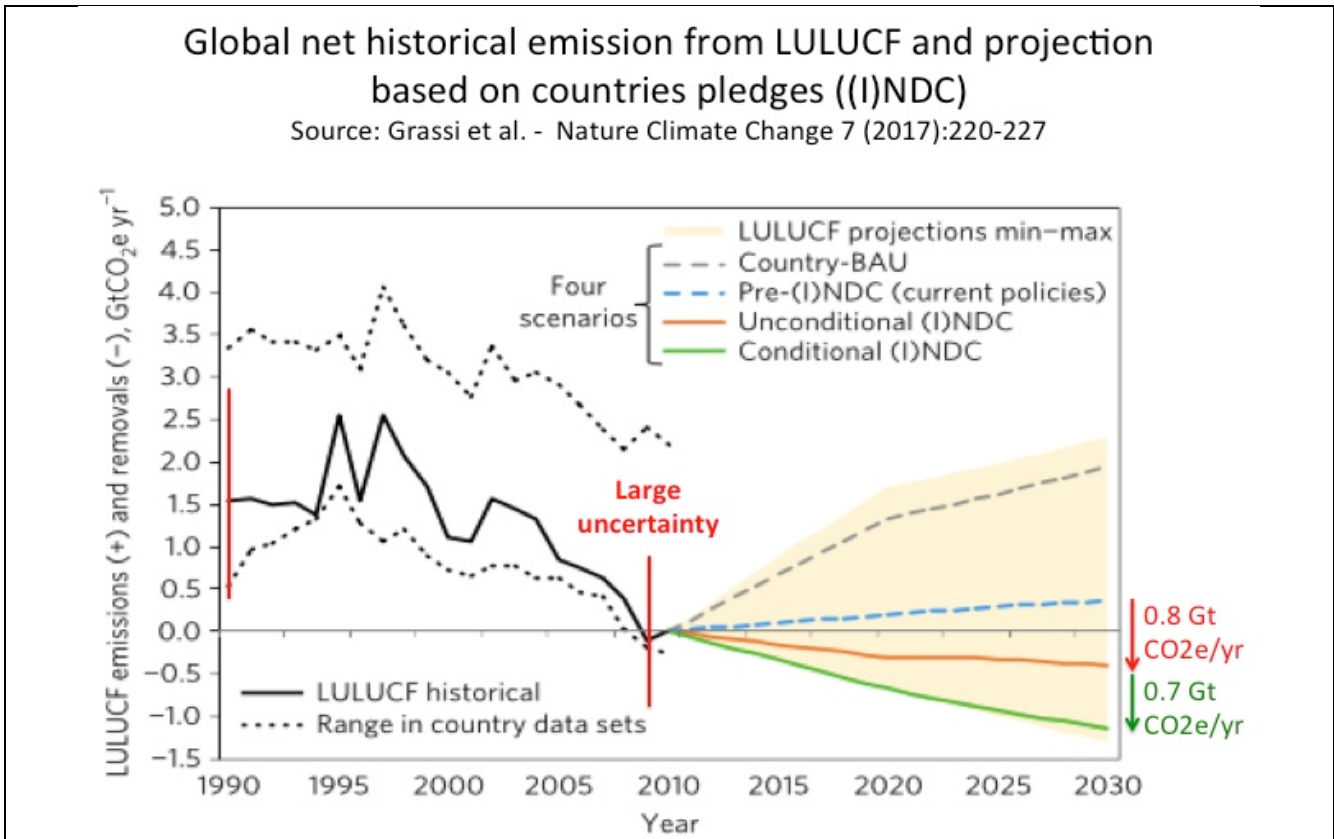
- One of the key roles of national actions toward SDGs is to link up local and international actions. Such national roles range from developing national plans and facilitating local projects to finding appropriate international donors and capacity building.
- The main burden may lie with the national actions, but knowledge and experience exchange can greatly contribute to integrated action plans.
- Scenario analysis and emission modelling are useful and practical tools in planning processes, which require extensive data and modelling experts but are valuable in terms of decision-making.
- There is no single silver bullet. To reach one goal usually involves various aspects to analyse the obstacles and many solutions to run in parallel.
- Atmospheric characteristics and air quality monitoring data are highly valuable and informative for developing local actions and emissions management, since it is impossible to manage what we cannot monitor.

Concrete/practical steps for low carbon transformation

- It is one of the key roles of national actions to create sub-level organisations or institutions to initiate actions and implementations at the local level and also to link with international supports.
- A clear framework to create an integrated action plan is the first stepping stone to project implementation. To develop an appropriate framework means multi-stakeholder involvement, and the framework should be revised and revisited often.
- Mitigation action plans should consist of a clear objective, physical target, timeframe, spatial information, and relevant stakeholders. It should be detailed enough to be useful and be

easily converted into local actions.

- Data collection and management have to be improved in developing countries in order to conduct more holistic planning and scenario analysis.
- Atmospheric and air quality monitoring stations are necessary in all large cities to comprehend the sources of air pollution and to initiate proper solutions.



Source: Presentation by Dr. Mikiko Kainuma, Senior Research Advisor, IGES, Japan

Keynote report - City Mayors' Summit

City Mayors' Summit

[Chair]: Prof. Dr. Chin Siong Ho, UTM, Malaysia and Dr. Junichi Fujino, IGES/NIES, Japan

[Rapporteurs]: Mr. Pan Piyasil, JGSEE-CEE, KMUTT, Thailand

Dr. Pham Thi Bich Thao, JGSEE-CEE, KMUTT, Thailand

[Speakers]:

Mr. Vijai Amaralikit, Mayor, Phanatnikhom Town Municipality, Thailand.

Mr. Nor Rahman bin Mustaffa, Director of Town Planning, Pengerang Local Authority, Malaysia.

Dr. Dao Anh Dung, Vice Chairman of Can Thos People Committee, Vietnam.

Dr. Do Quang Hung, Head of Division, Member of Haiphong City Sustainable Development Council, The Office of Haiphong People Committee, Vietnam.

This section provides opportunities for representatives from different municipalities; (1) Phanatnikhom Municipality from Thailand, (2) Pengerang Municipality from Malaysia, (3) Can Tho city from Vietnam, and (4) Hai Phong city from Vietnam, to share their approaches, experience, and lessons learned, on “Low Carbon Transformation: Past, Present, and Future”.

All these participating municipalities have been facing the same problem of fast growth in terms of population as well as economy, leading to high potential of Greenhouse Gas (GHGs) emissions expansion. In addition, due to their locations, such municipalities are vulnerable to climate change and need to develop actions for climate mitigation and adaptation, following the concept of Low Carbon Society (LCS).

Phanatnikhom municipality, Thailand, has developed a strategic plan including the following strategies:

- 1st strategy: **City of Trees** aims to preserve local trees, collect data on the tree stock, and to encourage participation of local communities where more than 4,000 trees are protected and registered to meet the goal of 10 m² green area/person.
- 2nd strategy: **Waste Minimisation** aims to reduce as much waste as possible and to encourage waste management and separation following the 3R method, e.g., use of fabric instead of plastic bags, no

foam, garbage banks at schools, organic products from organic waste, eco-friendly products.

- 3rd strategy: **Energy Efficiency and Alternative Energy** aims to reduce fossil-fuel consumption as well as encourage renewable energy. This campaign also encourages the use of bicycles instead of motorcycles and cars, and promotes adoption of appliances with higher energy efficiency.
- 4th strategy: **Sustainable Consumption** encourages people to consume local products, create local careers in organic farming and food production, and provide public spaces as well as organic fertilisers and seeds for communities to jointly grow vegetables.

Pengerang, located on the southern east coast peninsular of Malaysia, is under development as the ‘Integrated Petroleum Complex’. The city serves as a regional oil and gas storage and trading hub under the ‘Tourism Industries and Eastern Johor Economic Corridor’.

It has committed to a “Clear Policy Framework” with implementation programme towards a vision of “Clean, Green, Safe and Smart Pengerang 2030”. The Economic Transformation Programme and Pengerang Low Carbon Society Blueprint (PLCSBP) 2030 are the main plans for this development, the scope of which includes: (1) Decarbonising Pengerang Integrated Petroleum Complex (PIPC) industries; (2) Green port management &

logistics; (3) Smart agriculture; (4) Green mobility; (5) Sustainable energy system; (6) Low carbon green urban settlements; (7) Green network; (8) Sustainable waste management; (9) Low carbon smart community; and (10) Green urban governance.

In the case of **Can Tho** city, due to its location in the Mekong Delta Region, it has been increasingly affected by the results of climate change, such as temperature rise, rainfall reduction, unusual floods, landslides, and riverbank erosion, which also have impacts on socio-economic development. Facing these challenges, the city took the opportunity to implement actions by involving collaborations and networks initiated by the Institute for Global Environmental Strategies (IGES). Can Tho joined the 100RA network in 2016, which was pioneered by the Rockefeller Foundation and was granted the 4th ASEAN Environmentally Sustainable City Award. The discussion following the presentation of Can Tho's experiences and approach was mainly focused on how to conduct data collection to support the low carbon development model.

Key Findings of the Session

- Many municipalities in Asia are facing ecological pressures due to rising populations and economic growth, leading to high potential of greenhouse gas emissions expansion.
- Approaches should be holistic and collaborative, linking scientific information to policy with achievable actions towards LCS to meet the Sustainable Development Goals.
- Challenges still exist, and supports from different parties (local government, national and international experts) are essential.

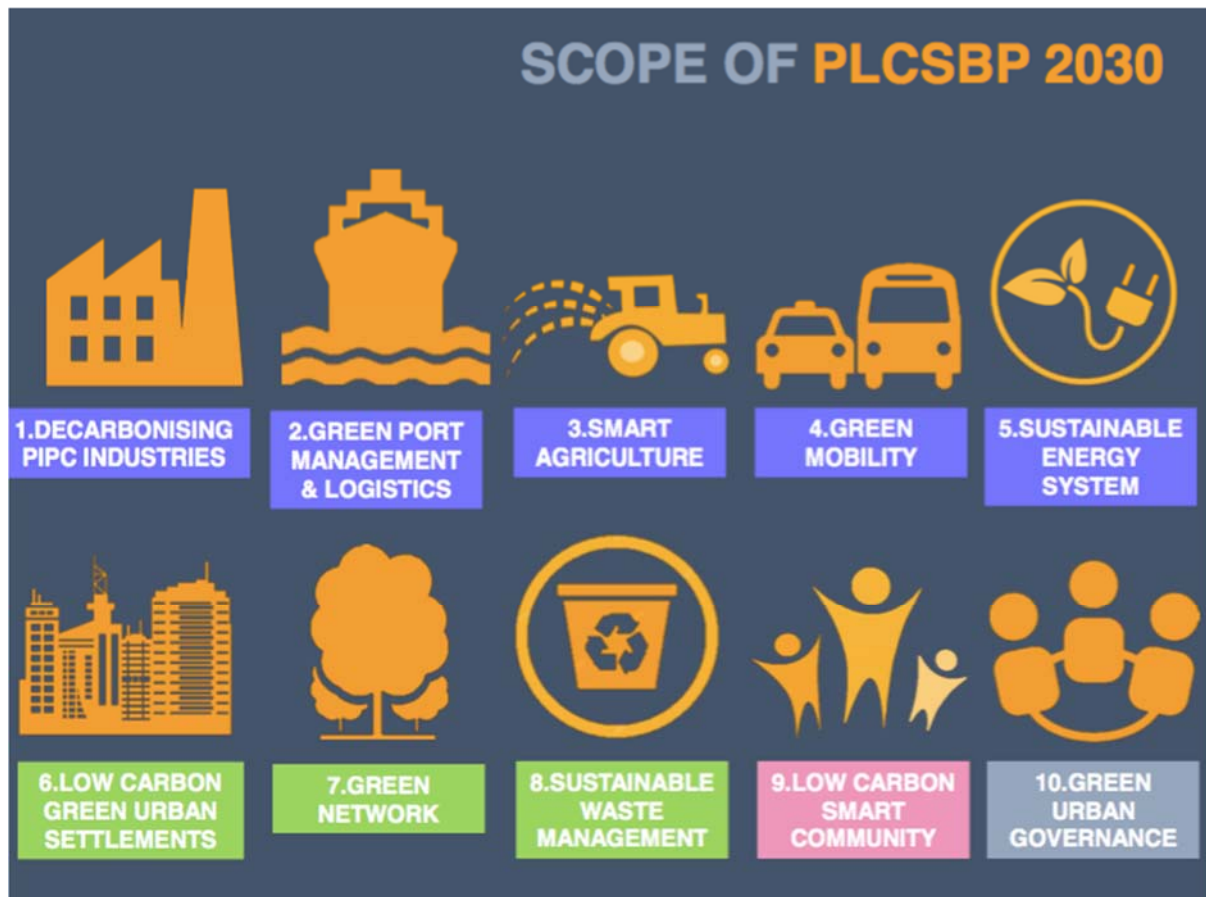
Finally, **Hai Phong**, which is situated in a strategic location between Vietnam and China, and is referred to as "two economic corridors – one economic rim" as well as the "East-west Economic corridor" (EWEC). With the largest seaport in the country, the city has experienced fast growth in recent years. Strong environmental stresses due to rising population and economy alongside expansion of cargo activity are expected over the coming years.

Hai Phong city, in collaboration with IGES has developed a Low Carbon Technical Framework using the AIM model for energy-related sectors. The city successfully achieved the goal of reducing its electricity consumption per capita when compared with other cities in the region.

Along the path to LCS, many challenges have arisen – for example, the difficult interlinks between different parties and lack of clarity over standard indicators to measure LSC progress. To overcome these challenges, we need to join hands together for improved collaboration, technical support, and capacity building to make Science to Action (S2A) a success.

Concrete/practical steps for low carbon transformation

- Pilot projects with collaboration between local stakeholders, international experts, and national or local government.
- Campaigns should be organised, especially to raise awareness on climate change and LCS concepts for municipalities and communities.
- Development of standard indicators to monitor and measure progress in low carbon transformation, other than sole use of CO₂ emissions, is urgently needed.



Source: Presentation by Mr. Nor Rahman bin Mustaffa, Director of Town Planning, Pengerang Local Authority, Malaysia

Acknowledgements

This synthesis report was developed with the aim of highlighting cross-cutting conclusions emerging through the discussions held during the Sixth Annual Meeting of LoCARNet in Bangkok, Thailand, 1-3 November 2017.

A breakthrough in global climate policy was realised at COP21. As a result all nations throughout the world need to address greenhouse gas reduction with the aim of stabilising climate with a temperature rise of less than 2°C. In order to achieve this target over the next half century, knowledge and wisdom from around the world must be collated. Further, having entered the stage of action, sharing of scientific knowledge with civil society, private industry, the financial sector, cities and local administrative bodies (non-party stakeholders), it is necessary for the actors involved to implement mitigation measures and take action.

Asia has an important role to play in the global low-carbon transition, both due to its significant present and future emissions as well as its high vulnerability to climate change. Looking back over the recent three days of discussions, we believe our annual meeting was heading in a positive direction, and also that it provided a number of takeaways for its participants in terms of knowledge on climate policies in Asia and emerging research. It also provided opportunities for Asia to accumulate knowledge, to discuss subsequent challenges for future research and how we can best overcome them – challenges such as adaptation, land-use, and low-carbon cities. In other words, we hope we have managed to clarify the path that research needs to take in Asia in terms of climate policy research, and that a virtuous cycle of research support for science-based policymaking can result.

I would like to express my special appreciation to JGSEE and UTM for their generous support for the LoCARNet Sixth Annual Meeting. I would also like to express my appreciation to Assoc. Prof. Dr. Sirintornthep Towprayoon and Assoc. Prof. Dr. Savitri Garivait, JGSEE for the hospitality graciously received in Bangkok. In addition, I would like to thank the Focal Points of LoCARNet who attended the meeting – Prof. Rizaldi Boer (Indonesia), Dr. Hak Mao (Cambodia), Prof. Ho Chin Siong (Malaysia), Dr. Toshihiko Masui (Japan), and Dr. Nguyen Tung Lam (Viet Nam), – for their strong support before, during, and after the meeting.

And, last but not least, I would like to express my appreciation to the Ministry of the Environment, Japan, for their ongoing support of this network.

Tomoko Ishikawa

Secretary General, Low Carbon Asia Research Network (LoCARNet)