PROCEEDINGS

APN, LoCARNet and AIT/RRC.AP Capacity Building Workshop and Science-Policy Dialogue on Climate Change:

LOW CARBON AND ADAPTATION INITIATIVES IN ASIA

6-8 February 2017, AIT, Thailand

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Science-Policy Dialogue on Climate Change: Low Carbon and Adaptation Initiatives in Asia

Summary

The Asia-Pacific Network for Global Change Research (APN), the Low Carbon Asia Research Network (LoCARNet), the Regional Resource Centre for Asia and the Pacific, Asian Institute of Technology (AIT/RRC.AP) and the Climate Change Asia (CCA) Initiative co-organized a Capacity Building Workshop and Science-Policy Dialogue at the AIT campus in Pathum Thani, Thailand from 6-8 February, 2017. The activities were driven by the common aim to strengthen the global response to climate change set forth in Article 2 of the Paris Agreement and in line with celebrating four years of support for low carbon development by both APN and LoCARNet. The three-day activities shared and discussed results from APN's funded projects under its Low Carbon Initiatives (LCI) Framework and Climate Adaptation Framework (CAF), as well as the latest outcomes from partner organisations that support the implementation of the Paris Agreement with the aim of sustaining a planet under the 2^{o}C scenario. The activities included a capacity building workshop (1 day), and a science-policy dialogue (SPD, 2 days) for exchange of ideas and best practices on knowledge management, communication & networking, and science-policy interactions. The activities engaged countries in South and Southeast Asia. The SPD included talks on the role of green investment in cities, low carbon and energy-efficient technology, a better water-energy-carbon nexus, among others. In addition, the 42 participants joined "café kiosks" to discuss effective strategies for engaging science and policy and narrowing existing gaps, sharing best practices on knowledge management, and undertaking communication and networking activities at local, national and sub-regional levels to realize a low-carbon and resilient Asia. Decision-making games also formed part of the activities and engaged participants in making decisions that are, or could possibly be, high-risk decisions in a changing climate. These games created an informal and friendly atmosphere conducive to relaxed discussions among participants and was a key ice-breaker for the events. A policy brief outlining the key take home messages has been prepared in conjunction with the present proceedings.

Table of Contents

Opening of the Science-Policy Dialogue

Dr. Linda Anne Stevenson (APN Secretariat) explained that the main objective of the dialogue is to have informal discussions and to build relationships that last. She stressed that everyone has a role to play. To make a dialogue successful it is, from experience, more effective to have a champion from the science community who can effectively talk to different audiences on the same scientific topic. For discussions to flow smoothly, Dr. Stevenson mentioned that participants should not feel that they have to represent their own organizations. Creating opportunities for informal dialogues with stakeholders at sub-regional levels addresses common issues, builds trust and sense of ownership, and is less intimidating than larger regional or international meetings. For successful communication, the most important factor is the human factor allowing the sharing of information, data, and transfer of knowledge, experiences and best practices. The key to a successful dialogue will be open, face-to-face communication among all participants, with an outcome that boosts the importance of low carbon society, adaptation and preparedness in South and Southeast Asia. She ended by saying that the outputs of the dialogue would be a science-policy brief, the results of which would be fed into a synthesis of three former dialogues that had taken place in Southeast Asia (mid 2012), South Asia (early 2015) and Temperate East Asia (late 2015). The opening session concluded with a round of introductions and a group photo.

Session One: Case studies from APN Low Carbon Development Initiatives Framework (LCI)

Co-Chairs for the session were Dr. Juan Pulhin and Dr. Sangam Shrestha

1.1. Keynote Speech: Toward a better Water-Energy Carbon Nexus in Asian Cities - Dr. Shobhakar Dhakal, Asian Institute of Technology, Thailand

Dr. Shobhakar Dhakal gave the keynote speech on the "Energy-Carbon-Water" nexus in Asia. He expressed the importance of the Sustainable Development Goals (SDGs) and how they can be met with some synergy. In the scientific community, discussions are ongoing as to whether all energy goals can be accomplished. If so, then we can meet climate goals and if we meet all water goals, then can we meet any other goals. There is a need for harmonization between the SDGs to realize these goals. This is similar with the energy-carbon-water nexus as there are multiple objectives in planning and implementation mechanisms and systems. In the past, there has been strong connections between energy and carbon because of the climate agenda. Now, there is a need to link this with water. Water and energy are integrally linked and global water withdrawal is about 15% of the total for energy production. Water, energy and carbon interactions are also complex but important to understand. While energy use in the water sector is growing, the energy sector itself is growing producing the need for more water, and the cycle continues. There is also a need for water even in solar-concentrated or geothermal-concentrated energy production. Dr. Dhakal observed that energy for water is more significant than water in the city context. He highlighted that cities are the major consumers of water and energy, along with other materials and resources. Per capita carbon footprints of cities, especially in developing countries, are much higher compared to peri-urban and rural areas with large contributions to national emissions. For this reason, low carbon cities need to optimize many low carbon opportunities in urban systems across all sectors. According to the Food and Agriculture Organization of the United Nations (UNFAO 2012), freshwater is distributed by

sector of agriculture (70%), industry (19%) and municipalities (11%). On the outputs of his APN project[1], Dr. Dhakal highlighted that the project encompassed cases from three mega-cities of Bangkok, Delhi and Tokyo. Few studies have been undertaken at the city-scale in this area (some in Australia, Norway and USA), he said. In the studies of the present project, focus was mainly on water-energy linkages, meaning essentially, that carbon is factored in through energy consumption and production. The stages looked at in the study included abstraction, conveyance, distribution, end use, collection, treatment, and recycle/disposal of water. Having gone through the particulars of each case study[2], Dr. Dhakal concluded that:

- From a policy perspective, cities' water-energy-carbon nexus is a key area to look at both from direct and indirect perspectives. There is an opportunity to link these together at the municipal level.
- There is a growing need for cities' transition into a cleaner, healthier, sustainable and economically secured future.
- There are number of approaches that cities must adopt in water-energy systems, including investments in renewable technologies, improving efficiency of water and energy systems, reforming the necessary regulations and policies.
- Cities play a significant role in determining the future of water and energy resources as well as combating climate change.

1.2. Rapid Talk: Scaling up low carbon technology on construction and infrastructure sector - Ms. Pratihba Ruth Caleb, Development Alternatives, India

On urbanization in South Asia, Ms. Caleb explained that, in India, the total urban housing shortage was estimate to be 18.78 million in 2012. In Pakistan, this shortage was estimate to be 7.57 million in 2009 and in Nepal an additional one million urban houses will be required by 2021. Worldwide, buildings account for up to 30% of raw materials. In 2011, gross built up areas in India grew by 10%. A major share, almost 80% of the GHG burden of the building sector, is borne by building materials alone. Cement, steel, lime and bricks are the largest bulk consumption items in the Indian construction industry and the most energy consuming. Emphasizing the growth trends in construction materials in India, Ms. Caleb went on to explain what is considered as green materials and trends for greening in the construction sector. Green production in the construction industry are low in embodied energy, low in resource materials, have cleaner production processes, low or nil conflicts with other users of greater ecological and economic value, and are recyclable/reusable with low life cycle costs. She described three examples of the use of energy efficient green materials in the construction sector: fly ash brick production in India, vertical shaft brick kilns in Pakistan, and hollow concrete blocks in Nepal; and explained the positive and negative aspects for incorporating these materials. Overall, the imperatives for upscaling low carbon technologies in the building sector is research and new knowledge in the materials and models developed, capacity development on

[1] "Understanding and Quantifying the Water-Energy-Carbon Nexus for Low Carbon Development in Asian Cities," http://www.apn-gcr.org/resources/items/show/1916.

[2] Ghosh, R., Kansal, A., & Aghi, S. (2016). Implications of end-user behaviour in response to deficiencies in water supply for electricity consumption – A case study of Delhi. Journal of Hydrology, 536, 400–408. https://doi.org/10.1016/j.jhydrol.2016.03.012

Singh, P., Kansal, A., & Carliell-Marquet, C. (2016). Energy and carbon footprints of sewage treatment methods. Journal of Environmental Management, 165, 22–30. https://doi.org/10.1016/j.jenvman.2015.09.017

Dhakal, S., Shrestha, S., Shrestha, A., & Kaneko, S. (2015). Towards a better water-energy-carbon nexus in cities (APN Global Change Perspectives Policy Brief No. LCD-01). Kobe: Asia Pacific Network for Global Change Research (APN). Retrieved from: http://www.apn-gcr.org/2015/10/26/policy-brief-towards-a-better-water-energy-carbon-nexus-in-cities-lcd-01/

Dhakal, S. and Shrestha, A. (2017). Optimizing Water-Energy- Carbon Nexus in Cities for Low Carbon Development, In Creating Low Carbon Cities (Ed. Shobhakar Dhakal and Matthias Ruth), Springer International Publishing. DOI: 10.1007/978-3-319-49730-3

existing knowledge and sharing of such knowledge with more information relayed to ensure consumer engagement, and capacity development in vocational skills. Importantly, technical specifications (standards and codes), behavioral change, and sustainable procurement through financial incentives for low carbon performance such as easy credit and grants and tax reform.

1.3. Rapid Talk: Low carbon infrastructure investment – Indonesia case – Professor Rizaldi Boer, Bogor Agricultural University, Indonesia

The Paris agreement would like to lower the global temperature by 2^{o}C and this has to be incorporated into all countries Intended Nationally Determined Contributions (INDCS). This is very difficult to undertake and even if all countries were to submit their INDCs, the level of temperature increase would be greater than 2ºC. Accordingly, there is a need to not only reduce emissions but also to re-evaluate the commitment, see available technology and the support that the international community can provide. Indonesia has submitted its INDCs, which focused on land-use change and forestry. For energy, due to the investment needed on a larger scale, this will likely be done after 2030. For a deep decarbonization sector, there is a possibility to cut the emissions into 1.3% per capita. If we were to exploit renewable energy sources, we need to transfer renewable energy, which will require cables that need greater investment. Government makes use of clean coal if this is not financially feasible. Biofuels in the transport sector is also a possibility. The forestry sector needs local government, and renewables need central government and the private sector. Achieving the Paris Agreement means that each country needs to submit its INDCs every five years. Change of governments adds a potential problem in terms of the mandates of new governments. Involvement of all stakeholders, particularly local governments and the private sector are crucial to meet the national target. As long-term commitment will be beyond the election cycle, how can we ensure that the commitment will be carried over from government to government? What legal instruments will there be? What fiscal policies will be in place? In addition, how will science help local government to integrate climate change into long-term development plans? Dr. Boer went on to explain five stages for mainstreaming climate change into a local development plan: identifying programmes (tagging), analyzing historical and future emission by mapping emission risks and priority locations, undertaking gap analyses for programme enhancement, establishing synchronization and synergy of programmes within and across sectors, and setting mechanisms for coordination on programme synergies, synchronization and integration.

1.4. Policy Talk: Integrating scientific knowledge into policy in Asian Cities – A case of Bangkok – Dr. Monthip Sriratana Tabucanon, NRCT, Thailand

Dr. Sriratana began by highlighting the fifth assessment of the International Panel on Climate Chane (IPCC), which states that changes in climate are unequivocal since the 1950s and many of the observed changes are unprecedented over decades to millennium. As a hub of economic activities, cities are responsible for the bulk of greenhouse gas emissions and are important for mitigation strategies. Climate change is one of the current challenges in the development of current and future human society. Greenhouse gas emissions are increasing and this presents a big challenge for Bangkok. For example, in 2011, the city was hit by unprecedented large-scale flooding causing historic social and economic damage. For Bangkok, there are a number of strategies being implemented to realize a low carbon and climate-resilient city in the near future. The Bangkok

Metropolitan Administration (BMA), in partnership with national government ministries and agencies, has taken on the major responsibility to mitigate and adapt to climate change. BMA endeavours to establish action to harness economic and social development in regards to climate change, and is taking a comprehensive approach to low carbon and climate-resilient urban development by implementing the Bangkok Climate Change Master Plan 2013-2023[3], which is the main vehicle in achieving this. As a leading city in Southeast Asia, BMA is taking proactive measures to mitigate and adapt to climate change including promoting action taken by citizens, the private sector and academia as key players, and looking at innovative promotional schemes, including low carbon technology. Dr. Sriratana went on to explain the main elements of the Master Plan, highlighting five key areas of environmentally sustainable transport, energy efficiency and alternative energy, efficient solid waste management and wastewater treatment, green urban planning and adaptation planning. The Master Plan includes measures to assess current and future situations, prioritize possible interventions as well as propose feasible and concrete implementation plans. The plan also provides and compares scenarios of business as usual with target settings, actual mitigation and adaptation measures, as well as monitoring and evaluation; and measurement, reporting and verification (MRV) mechanisms. Implementing measures for the target settings in the five areas would result in approximately 13% emissions reduction compared with business as usual by 2020. She finished by stressing the importance of capacity building outreach at three levels: society level (citizens and the private sector) in cooperation with other ASEAN nations; nationally at the institutional level (holistic approach across ministries and departments) and at the individual level by BMA officials.

1.5. Policy Talk: Low carbon development in cities for a sustainable and resilient South Asia – Mr. Keshav Kumar Jha, ICLEI South Asia, India

Mr. Jha began by explaining ICLEI South Asia's initiatives for low carbon development in cities. These included energy, sustainability, water, solid waste and urbanization. He explained that ICLEI South Asia has 66 member cities who are conducting 436 actions related to creating sustainable communities. Through the various programmes, ICLEI South Asia has been producing robust technical and resource documents and toolkits, which cities and its stakeholders can use for their own planning purposes. He went on to talk about the 68 cities that had recently completed baseline GHG emission inventories in South and Southeast Asia. He went on to explain the Urban LEDS project, which focused on three cities in India that, through the project, aimed to reduce emissions by as much as 31% by 2020 through utilizing the various action plans and tools developed. Another project on Solar Cities planned cumulative targets over ten cities with energy savings of up to 1780 Million KWh. ICLEI offers a complete comprehensive package for low carbon and climate-resilient cities. ICELI's Global Protocol for Community Scale GHG Emissions package (GPC)[4] helps cities develop a comprehensive and robust GHG inventory to support climate action planning. GPC ensures consistent and transparent measurement and reporting of GHG emissions between cities, and aims to empower cities' endeavours in reporting mitigation performance in national or international frameworks. GPC also demonstrates the important role that cities play in tackling climate change, facilitates insights through benchmarking and aggregation of comparable data, and allows cities to contribute effectively to INDC targets. Mr. Jha went on to explain a web-based user-

[3] BMA Master Plan for Climate Change 2013-2023
[4] www.ghgprotocol.org/city-accounting

interface tool "HEAT + Functionalities" for quantifying and reporting GHG emissions through a five step process leading to an action plan to meet set targets according to sector and base year. He reported other projects including Asian Cities Climate Change Resilience Network (ACCCRN)[5] and related pilot projects, Urban-LEDS pilot projects, Compact of Mayors project, and the Carbon Climate Registry that is the world's leading reporting platform to enhance transparency for GHG emissions. This registry comprises 67 countries with 726 reporting entities. Finally, Mr. Jha noted a low carbon solution for urban development challenges - Solutions Gateway[6] that provides information on solutions, solution packages and case studies that are underway.

1.6. Panel Discussion on Low Carbon Development in Asian Cities

Noting the overarching goal to discuss low carbon development in the many energy-consuming sectors in South and Southeast Asia, Dr. Pulhin opened the floor for questions and comments.

Mr. Tai Keo expressed his concern on the adverse impacts of hydropower energy production and dams in the Mekong countries, such as the displacement of communities and weakened ecosystems, food insecurity, etc. While introducing low-carbon intensive hydropower as a good mitigation strategy under the CDM, he stressed whether this is a good long-term solution for the Mekong countries. Particularly, due to transboundary impacts, he noted whether the Mekong River Commission could address this, as there are currently no clear regional policies in relation to hydropower dams, particularly concerning impact assessments.

Dr. Dhakal agreed that there were adverse implications in the use of hydropower systems, particularly the storage-type hydropower systems, where a lot of concern lies regarding community settlements and on the environment. This, he noted, is an issue that the international community is aware of. There is a lot of research being conducted to produce low-carbon energy on a more sustainable basis and in South Asia, hydropower will remain a very important source of energy because it is inexpensive, low carbon-intensive and inputs to transboundary-related benefit sharing. The issue is not about discounting hydropower dams, he said, but rather about how to manage hydropower dams in a way that ensures that communities and the surrounding environment do not suffer. He stressed the importance of clean energy development in the region and that it cannot be discounted. Taking a regional approach on how to handle local issues more carefully is important.

Dr. Ajay Raghava noted that many issues have arisen related to hydropower development. Of concern in India, for example, is the need for re-habitation because of displacement problems. Further, in a number of river-related projects, adverse impacts on eco-aquatic systems and impacts on various species have been found. The cumulative impacts are immense and, in fact, more than 100km of river has disappeared because of the development of new hydropower plants. Therefore, although, in terms of carbon footprint, hydropower seems to be a favourable option, there are multiple adverse impacts that we should not ignore. Dr. Raghava stated that, recently, city design incorporates water conveyance systems, but that these seem to be very energy-intensive and costly. He asked which would be the better option for treatment: centralized or decentralized systems.

Dr. Dhakal stated that, in general, decentralized systems would appear to be better than centralized systems although more analysis is needed especially where urban city design is considered. Asking about emissions-intensity for wastewater treatment in Tokyo compared with Delhi, Dr. Dhakal responded that the kind of technology employed makes a significant difference. For example, if the

[5] Asian Cities Climate Change Resilience Network
[6] www.solutions-gateway.org

treatment system itself can recover energy, then it would be less energy intensive overall. Further, if the energy input were from a cleaner energy-production plant rather than from a coal-fired thermal power plant, carbon emissions for wastewater treatment would be lower. This may be the reason why carbon emissions are lower in the Tokyo case compared with the Delhi case in the LCI project.

Dr. Acosta-Michlik talked on low carbon infrastructure investment and the tagging system for programme identification in Indonesia, noting that there is a similar system in the Philippines. She noted that local governments units (LGUs) are now required to identify and implement plans and projects, which poses challenges of capacity development of LGU officials. She asked whether the same challenges are being experienced in Indonesia.

Professor Boer responded that the biggest challenge is maintaining capacity at the local level. Indonesia struggles because trained government officials are transferred from one position to another, making it difficult to maintain a working group. To address this problem, Indonesia has developed a "cadre group" of local officials and university members to ensure systems are in place for continuous capacity development to conduct assessments at the local level. The implementation of a similar scheme is also being discussed at the national level to ensure that knowledge is transferred at the national level when governments change.

Her second question was about developing capacity to move towards technology required for low carbon development in Asia. Noting that not all technologies from developed countries can fit the socioeconomic conditions of developing countries in Asia, how can Asia respond and adapt to low carbon development in order to comply with the Paris Agreement?

Mr. Jha responded noting that local governments across sectors are very proactive and eager to implement pilot innovative low carbon technology systems. He cited an example of a UNEP-funded ICLEI project on a centralized cooling technology that transports water for air-conditioning using renewable energy sources.

Ms. Caleb stressed that we need to look beyond implementing new technologies, but also look at developing capacity to implement existing technologies developed in the region.

Ms. Islam asked the speakers about the engagement of policymakers in design and implementation of projects.

When engaging cities for climate resilient planning, Mr. Jha stated that ICLEI establishes a core climate team at the outset, which includes administrators, policymakers and city planners. In parallel, a stakeholder group is formed and all project activities and deliverables at the city level happen through these groups, who take ownership of the activities.

From the research side, Dr. Dhakal said that engaging with decision makers at an early stage is very important. Are we asking the right questions? Will the results be useful for policymakers? In addition, engaging decision makers at different stages of a research activity can be useful. For example, gathering them together in a dialogue at intermediate stages, listening to their perspectives and subsequent needs can really help a research activity provide policy-relevant outputs.

Dr. Sriratana noted that in Thailand when the BMA master plan was adopted by the government, Thammasat University was engaged to develop a roadmap to help achieve the targets laid out in the plan. The government was then able to identify partners to help achieve targets for each sector and, at the same time, fund research to identify hotspots where GHG needs to be reduced. She also stressed the need to engage other donors and stakeholders and she cited a project funded by

JICA/JST where Japanese and Thai universities, in 17 projects, are undertaking research for Thailand to develop its National Adaptation Plans.

Dr. Lohani raised the concept of climate screening and its incorporation into environmental impact assessments. He further stressed that when it comes to transboundary issues such as hydropower, multilateral agreements need to be entered to ensure the best outcomes.

Dr. Lokupitiya asked Dr. Dhakal about his calculations on carbon footprint. Was the water volume calculated at extraction, conveyance and treatment?

Dr. Dhakal responded that for extraction and conveyance water volume, it was measured for both surface and groundwater at each stage. For treatment, the volume of treated water was measured.

Dr. Boonjawat asked about carbon emissions in aviation transport sector. She asked the panelists about their opinion on a regional-based project in this area in order to complete the emissions cycle in the transportation sector.

Dr. Sriratana said that the International Civil Aviation Organization of the United Nations is taking proactive measures to calculate and reduce emissions in the aviation sector and that systems are in place to measure the carbon footprint of passengers and flights. With the increasing number of flights, including low-cost airline flights, this area needs more research.

Mr. Jha noted that it is very difficult to collect data in the aviation sector. ICLEI undertook a GHG inventory of take-off and landing emissions data for domestic and international flights in Melaka Province in Malaysia over one financial year (baseline year 2012-13). He noted that he could share the report with interested participants.

Co-Chair, Dr. Pulhin summarized the session: There is a big challenge in moving towards low carbon development in the region. Some of the key outputs of the session included the nexus across sectors, the trade-offs involved, and how these can be managed. Dr. Pulhin highlighted the need for interdisciplinary procedures moving from quantification to implementation and undertaking cost-benefit analyses to inform decision-making. Also, maintaining the gains that we have made is another challenge. For example, in the transition of governments, maintaining capacity at local levels, developing appropriate technology that draws on local knowledge and expertise so that we will tread a path for a more sustainable future rather than depending on external support. Engaging stakeholders is another important area as our plans can only be implemented if there are resources available. We have to bear all of these in mind to continue to move forward towards low-carbon and climate resilience in South and Southeast Asia.

Participatory Games

In the afternoon participants took part in an energizing game on climate resilience, a game in which teams competed against each other. This session created a relaxed and friendly atmosphere that forged collaborations and friendships among participants, while stressing the importance of a cadre of groups (planners, aid workers, decision-makers, etc.) to work together to adapt to the risks of extreme events.

The game was adopted from the Red Cross/Red Crescent Climate Centre compilation of games linking climate change with disasters. The game's main aim is to support learning and generate dialogue on the concept of decision-making in disaster risk reduction, in this case, extreme flooding events.

More information on climate change games by the Red Cross/Red Crescent Climate Centre can be found at http://www.climatecentre.org/resources-games.

Café Kiosks Session One

Kiosk I: Science-Policy

The group looked at the second question on building synergies between research and implementation. Specifically, the group discussed how science can shape policy development at the local level, and what issues and gaps exist in implementation. Science can provide evidence- and objective-based results as inputs for informed policymaking. Future scenario-based scientific research works such as simulation models can help policymakers better understand the consequences of alternative approaches and interventions, and thus help make the optimal choice. In addition, science can help develop and apply bottom-up participatory approaches and techniques to ensure that local context is reflected in policy formulation. The group discussed some examples of how science can reinforce implementation. These included:

- Uncertainty assessments
- Threats and opportunities
- Loss and damage assessments
- Assessment tools, techniques and methods
- Impact assessments
- Bottom-up approaches
- Bench-marking best practices

In terms of gaps for implementation, a number of gaps were noted mainly in information sharing and communication as key areas for science-policy based interactions. In addition, the ability to share knowledge (i.e. talk in a common language), lack of data or gaps in data requirements, and the presence of uncertainty factors prevents science-based evidence from being utilized in the decision-making process.

The group talked about other adverse issues that generate gaps. These include lack of funding and technology, differing priorities (not placing low carbon development as a priority issue), social-cultural gaps across sub-national and national boundaries, lack of common communication strategies or a common platform for communication, and the inability to understand how media/press can play a role – fear/caution that correct information is being reported.

Capacity development is understood to be a key element to address knowledge gaps, enhance understanding and set priorities. The group also discussed, *inter alia*, the need for more dialogue among the science and policy communities, need to understand the the impact, role and usage of social media and web-based platforms, the need for international collaboration and sharing of best practices, and ensuring data availability at local and international levels.

Kiosk II: Knowledge Management

Dr. Keith Bettinger provided a report on behalf of the knowledge management group. He began by saying that his group talked about how to structure an information-based knowledge and data service for a secondary city, a topic that is discussed extensively in the agenda. Rather than focusing

on what information and data can do for you, the group focused on how a data, management and information system could be structured for a secondary city and what that blueprint would look like. While hearing some comments earlier from ICLEI, for example, to back up cities' abilities to collect data that is needed for cities to build resilience plans and projects, there is a need to recognize that institutions such as ICLEI, USAID, and all other donors have limited capabilities. The group used their collective wisdom towards developing a blueprint or a toolbox kit, a guide essentially, to help secondary cities set up their own data and information system. To do this, the following series of stages were considered crucial:

- *Stage 1 - consultation process*: To encourage executive and stakeholder buy-in to make this process work.
- *Stage 2 - determine data requirements*: Figure out what knowledge you need, which is a process of looking at the problems your city faces or will potentially face in the future under different climate change scenarios and figuring out the kind of data you will need to address these problems.
- *Stage 3 - procurement process*: Once you figure out what your data needs are there is a process of procurement. This means that financial resources need to be allocated to procure the things that you need.
- *Stage 4 - set up data and monitoring network*: Need to address some of the obstacles that you might encounter in each of these steps. Setting up a monitoring network will allow you to do this. As an example, if you want to look at urban heat island effects in your city, then you need a network that will give you temperature data. In order to do that, you need to set up physical stations and determine the area you want to cover, you need to procure equipment, and you have to deal with issues such as "right-of-way" issues, procurement/rental of land, etc., in order to establish a good and rigorous coverage.
- *Stage 5 - maintenance schedule and funding*: One of the common issues faced in many countries, including Laos, Cambodia, Bangladesh, etc., are complaints from government officials that they do not have the long-term data records needed to establish projects under GCF, or the adaptation fund, etc., which is a big issue. Another practicality of this is that after we set up our data and monitoring network stations and we have coverage fully established, we need to ensure that someone has the job of maintaining the system. For this to happen, there needs to be an ongoing and sustained budget to pay that person.
- *Stage 6 - data extraction and smoothing*: Again, this is a very practical issue. We are not simply saying that you need to gather data to support a resilience plan, or that you have to get data to build evidence-base for your adaptation project, or you have to get data to support a case to get the private sector involved in your resilience-building plan efforts. This is not enough. How do you operationalize such a system? Data itself is not a finished project – gap-filling needs to be undertaken, data needs to be in a form that it can be analyzed. Therefore, for the pre-analysis stage, you need to fulfill steps and this may require some capacity building processes as well.
- *Stage 7 - data analysis and synthesis*: Significant capacity building efforts may be needed to develop the competencies required not just for stage 7 but also for all stages in the blueprint.
- *Stage 8 - data to information products*: This is where breakdown happens in many cases. Simply put, data does not make policy or decisions. Information is needed. We need to have the capability to identify what our needs are, and turn the raw data into a format by way of an information product that is decision-relevant.

- *Stage 9 - dissemination and use*: The institutional and technical needs for these stages is crucial. Further, we need to be able to create information products than can be replicated and used in other cities as well. This means creating a guide or a toolkit for cities that wish to take the initiative to do this but who have no prior knowledge.

Kiosk III: Communication and Networking

Mr. Keshav Jha, the rapporteur for the communication and networking kiosk, provided a report on behalf of his group that comprised participants from South and Southeast Asia. He started by saying that the topic of communication and networking is very crosscutting in nature. It is a very important area across all topics and sectors, and the group built their discussion around two basic questions:

The first was how could we effectively communicate scientific uncertainty to policy- and decision makers, planners, among others? What kind of networking instruments can we implement across different levels of the environment? The second was how could we enhance regional cooperation on adaptation, mitigation and related topics?

On the first question, the group discussed approaches to effective communication among stakeholders.

- Undertaking planning using a variety of available scenarios, especially when talking to decision makers and planners about strategic findings. This may give an advantage whereby a decision can be taken instantly. Providing business as usual scenarios as well as scenarios based on scientific findings would be particularly important, and scenarios-based planning and assessment is crucial in this aspect.
- Providing standardized protocols to develop scenarios. This will require indicators to be developed and reported.
- Ensuring transparency of methodology and models. Capabilities and constraints or limitations of models should be communicated to all stakeholders. This would lead to building trust and confidence among all stakeholders.
- Creating trusting atmospheres through openness of scientists on data limitations. Scientists should clearly cite limitations of their research (disclaimers, exemptions, etc.) to decision makers.

The group looked, too, at developing scenarios with the uncertainties aspect in mind.

- Evidence-based scenarios are very important. When talking to different entities – decision-makers and policy planners, etc., it becomes crucial for us to have some sort of real-time example of life-case studies that are evidence-based.
- We discussed participatory scenarios development. For example, participatory budgeting is an important part of the planning process in India. All cities have to prepare annual budgets. The cities start this process by asking city councilors and other stakeholders to determine their own priorities and what resources they currently have available. Based on the responses, annual budgets and action plans are formulated.
- More robust, no-regret scenarios need to be considered in planning processes.
- Co-benefits need to be considered because all plans and subsequent actions have co-benefits attached to them. If we can successfully communicate co-benefits to communities and stakeholders there will be responses that are more positive at the planning stage.
- There is a need to realize the rising costs of in-action. This needs to be communicated and included in developing scenarios and plans. It has been argued by many that the cost of in-action is simply something that cities cannot afford. This needs to be understood by

decision-makers – there is a need for instant action on adaptation or mitigation, and this is something that we can no longer afford to avoid.

On the second question of how to enhance regional cooperation on adaptation, mitigation and related topics, the group highlighted the following:

- On best practices, EUROSTAT, which is hosted by the European Union, has a central repository of best practices that acts as a regional database/knowledge management system
- ICLEI hosts a city Climate Registry (http://carbonn.org/), which is an online, web-based platform. The registry is a mechanism through which cities register and report their climate commitments, actions and performance to the global public.
- Information from databases can be replicated across sectors and themes, allowing for greater exchange of knowledge and ideas.
- On regional cooperation for low carbon development, Mr. Jha cited the ASIA LEDS Partnership (http://www.asialeds.org/), which is a non-profit organization with more than 120 prominent stakeholders at the international level. ASIA LEDS works with any individual or organization interested in low emissions development strategies in Asia and fosters coordination, collaboration and partnerships. ASIA LEDS undertakes a number of other important activities, including identifying specific needs and tools for developing plans on adaptation and mitigation, fostering training and capacity building, and facilitating inter/intra consultation processes.
- Encouragement is needed to start reporting involuntarily, and sharing results and knowledge on various platforms in a timely manner.
- ICLEI, for example, provides incentives via such initiatives as the “Earth Hour Competition” and city challenges – inviting all cities to report their outputs and performance - GHG emissions, carbon footprint information, commitments for the future, and building resilience capacity to reduce climate risks, etc. Incentives for participating include access to other partnering organizations that may also include donor agencies. This ICLEI incentive designates “winning cities”, providing them with opportunities to attend international events and/or receive grants for pilot programmes etc.

Session Two: Case Studies from APN Related to LCD and Climate Change

Co-Chairs for the session were Dr. Erna Sri Adiningsih and Dr. Muhammad Helmi Bin Abdullah

2.1. Rapid Talk: Role of bioenergy in enhancing energy, food and ecosystem sustainability – Dr. Lilibeth Acosta-Michlik, UPLB, Philippines

In her presentation, Dr. Acosta-Michlik talked about her LCI project on integrated sustainability assessment of bioenergy potentials in Asia: An application of a hybrid approach on trade-offs and pathways (PIC-STRAP). Defining bioenergy as energy from biomass, she noted that two categories exist: (1) raw biomass - use for heating and cooking (e.g., wood), and (2) processed biomass - used to generate energy for transport, industry and household purposes (e.g., bioethanol, biodiesel). The policy objectives of the study relates to energy security, clean and renewable energy, source of foreign revenue and rural income, rural development, economic growth, etc. Conjoint preferences revealed significant trade-offs among energy security, food security and ecosystem capacity in the Philippines, India and China. In particular, she noted the preferred role of bioenergy for sustainable development reflects the social and economic concerns in respective Asian countries: Philippines - ecosystem degradation; India - food security; and China - energy security and environmental conditions. Policy needs to weigh the impacts of bioenergy development on sustainability, which are closely interlinked in an energy-food-ecosystem nexus, carefully. Concluding, she stipulated three recommendations on future regional actions/initiatives that may help to overcome existing issues/gaps in the region. These are replicating conjoint survey in other major biofuel-producing countries like Malaysia, Indonesia and Thailand; identifying technologies that are appropriate for production of biofuels at the farm level or for farmers' cooperatives; and scientific investigations on the impacts of bioenergy on biodiversity and ecosystem services, and how these impacts translate into the decline in economic growth.

2.2. Rapid Talk: Strengthening community responses in REDD+ policy – Mr. Tai Keo, Non-Timber Forest Products Exchange Programme, Cambodia

Mr. Keo began his presentation by providing a background and an overview of the REDD+ programme, highlighting that forestry sector shares between 14-19% of global GHG emissions. He also stated that whether carbon rights in REDD+ is compatible with the forest tenure rights (bundles of rights, i.e. rights to access, managing forests, etc.) is still questionable. He went on to explain the REDD+ Community Carbon Pool Programme (CCPP) implemented at sites in Cambodia, Indonesia, the Philippines and Viet Nam by Fauna & Flora International (FFI), Non-Timber Forest Products Exchange Programme (NTFP-EP)[7] and Pan Nature, with the main beneficiary groups being communities and local government institutions. With the main objective of strengthening community voices, the programme was targeted at developing the capacity of local communities and local government in the formation of REDD+ policies; stimulating policy dialogue and reform through a bottom-up process; and increasing knowledge on critical community forestry and REDD+ themes. Some lessons learned in conducting the project were 3-fold in that the timing, content and understanding of localized context is important in the establishment of REDD+ benefit sharing frameworks; securing community and local government participation in REDD+ cannot be assumed or automatically guaranteed; and community livelihoods as co-benefits to REDD+ is critical.
As a way forward, Mr. Keo underscored that REDD+ information dissemination should be implemented nationwide, especially to forest communities for appropriate decision-making on REDD+ implementation. Further, carbon rights and forest tenure rights should be compatible.

[7] http://ntfp.org/

2.3. Rapid Talk: Identification of best agricultural practices with better GHG benefits in salinity-affected areas in South Asia – Dr. Erandathie Lokupitiya, University of Colombo, Sri Lanka

South Asia agriculture makes up approximately 60% of the workforce, 20% of the total GDP and 32% of global rice production. Rice is also the staple food source in the region. One of the problems facing rice production in the region is salt-water intrusion in paddy areas due to sea level rise and irrigation. With climate change, the number of people affected annually by coastal flooding will significantly increase along the coasts from Pakistan through India, Sri Lanka and Bangladesh (Church et al., 2013[8]). South Asia is at the second lowest level of the regional food security ladder, and salinity intrusion could significantly affect food security further. Soil salinity is a major challenge for rice production in all four countries collaborating in the APN project. She explained the methodology of the activities in brief and noted that the study would vary depending on the country and the type of soil. Some remedial measures would include soil reclamation - land leveling and efficient irrigation management (flood water level); soil amendments (e.g. organic manure); and salt-tolerant varieties. In addition to socioeconomic benefits, the potential impact on emissions would be beneficial due to reduced methane, increased nitrous oxide and increased soil carbon stocks. She ended her talk stating the importance of the Paris Agreement and Sri Lanka's Nationally Determined Contributions (NDCs), particularly for salt-water intrusion and related tangible outputs, and their contribution to effective policy- and decision-making.

2.4. Policy Talk: Designing, developing and managing climate change information and knowledge management systems in Cambodia – Ms. Vichet Ratha Khlok, Department of Climate Change, Cambodia

Given Cambodia's high vulnerability to the impacts of climate variability and change manifesting in severe floods, droughts, storms, increasing temperatures, sea level rise, and changing rainfall regimes, climate change could undermine/derail the country's economic growth and poverty reduction if no adequate measures are timely put in place. It is with this background that Cambodia's National Strategic Development Plan 2009-2013[9] prioritized the development of a strategic response to the challenges posed by changing climate conditions by way of its climate change strategic plan and action plan. The Cambodia Climate Change Alliance (CCCA)[10] includes a mix of technical and policy advisory support, and financial support based on lessons learned from the first phase of implementation. CCCA will engage a broad range of stakeholders in line with their respective roles in responses to climate change, and promote innovative partnerships between government, civil society, academia and the private sector. The CCCA programme phase II is focusing on three main results of a clear governance and accountability framework that is functional for climate change responses at national and sub-national levels, domestic and external finance effectively oriented in support of climate resilient and low carbon development, and to strengthen human and technological capacities to support climate change. The planned outcome is improved access to updated climate change information, knowledge and learning opportunities at all levels with expectations to enhance information, knowledge and learning, create platforms for exchange at national and subnational levels, a clearing house for climate change data, information resources and

[8] Church, J.A., Clark, P.U. , Cazenave, A., Gregory, J.M., Jevrejeva, S., Levermann, A., Merrifield, M.A. , Milne, G.A., Nerem, R.S. Nunn, P.D. Payne, A.J. Pfeffer, W.T., Stammer, D. and Unnikrishnan A.S. (2013). Sea Level Change. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, USA.

[9] Cambodia National Strategic Development Plan 2009-2013

[10] http://www.camclimate.org.kh/

learning services, and a comprehensive outreach and learning campaign. Ms. Khlok shared some of the challenges experienced in implementing the strategic plan, *inter alia*, limit of human capacity, technical and financial support, knowledge sharing and lack of collaboration. She expressed optimism through the Climate Change Policy and Knowledge Management programme[11] that will consider actions to improve institutional and human capacity (for DCC officers, national GHG Inventory team, etc.) to support awareness raising and capacity development activities. The programme will establish a mechanism to compile and disseminate information on the technical, financial and social feasibility of livelihood adaptation and mitigation measures, and engage more public-private partnerships in research and innovation through strengthened collaboration with various climate change institutions and programmes at national and regional levels.

2.5. Policy Talk: Importance of gender equity in low carbon development for a sustainable Asia – Mr. Marvin Lagonera, ICLEI Southeast Asia, Philippines

Local Governments for Sustainability (ICLEI) Southeast Asia approaches gender equity at the local, sub-national and national levels by using a three-pronged approach to capacity building, knowledge products and national policy. ICLEI sees gender equity as a crosscutting issue with low carbon development in a variety of relevant sectors. In this aspect, a multi-dimensional, integrated approach to low carbon development is taken, which takes into account environmental, social and economic benefits, including gender responsiveness. Considering SDG 5, which is to achieve gender equality and empower women and girls, low carbon development must consider the interplay between techno-economic and social-political aspect, societal change, such as institutional settings (i.e. care, economy), gender-biased power relations, cultural values, employment, and interdisciplinary and multilevel approaches. Developing a low carbon society must encompass vertical (national-local) and horizontal (academia, private sector, women's groups) levels of governance and decision-making. The United Nations Economic and Social Council (UN ECOSOC) 1997[12], describes gender mainstreaming as "the process of assessing the implications for women and men of any planned action, including legislation, policies, or programmes, in all areas at all levels. It is a strategy for making women's, as well as men's, concerns and experiences an integral dimension of the design, implementation, monitoring and evaluation of policies and programmes in all political, economic, and societal spheres so that women and men benefit equally and inequality is not perpetuated". Reflecting on the roles of gender in low carbon development in cities, there is a need to disaggregate the contribution made to climate change based on gender, as well as the differentiated impacts from climate change based on gender. At the city level, the gender lens can inform local policy through sectors such as energy, transport and waste. In moving forward, recommendations include gender mainstreaming in planning and policy-making, knowledge generation and capacity development. In this context, capacity and knowledge development needs to enhance the roles and status of women as participants and agents of change, build on their strengths and experiences, knowledge and coping capacity, and ensure women's access to information. This includes developing and integrating gender accessible capacity building programmes[13].

[11] http://www.camclimate.org.kh/en/activities/cambodian-climate-change-alliance/45-climate-change-policy-development-and-knowledge-management.html
[12] http://www.un.org/womenwatch/osagi/pdf/ECOSOCAC1997.2.PDF
[13] ICLEI Local Governments for Sustainability. Women and Climate Change Manual.
http://seas.iclei.org/fileadmin/user_upload/SEAS/Documents/Women_and_Climate_Change_Manual.pdf
ICLEI Local Governments for Sustainability & UNDP. Climate Change and Vulnerability of People in Cities of Asia Asia-Pacific Human Development Report Background Papers Series 2012/06.
GIZ, UNDP and Gender CC. Gender and Urban Climate Policy: Gender-Sensitive Policies Make a Difference.
http://www.genderportal.eu/sites/default/files/resource_pool/Guidebook_Gender_and_Urban_Climate_Policy.pdf

2.6. Panel Session

The first comment came from one of the co-chairs on bio-energy use in Southeast Asia and that reluctance to use bio-energy as fuel or diesel is quite high.

Dr. Acosta-Michlik responded by saying that, for bio-fuel, there are different issues in different countries. For example, she noted that using bio-diesel in Philippines is not that problematic. There is some hesitation for people to use bio-ethanol, as they are not sure of the impacts. Therefore, in her view, it is a matter of raising awareness on the issue.

Dr. Kim Chi Ngo asked a question on policies and technologies for bio-fuels and their use in the region, especially in India and China.

Dr. Acosta-Michlik responded that policies are available on blending regular fuels with biofuels. In terms of success, some countries are able to implement co-production, for example in China. In the case of the Philippines, there is not much problem with bio-diesel but we have problems related to sugarcane and bioethanol production because of competition in the sugar industry and the bio-fuel industry. For this reason, bioethanol production in Philippines is not that successful. While some technologies exist, their environmental impacts need to be considered due to chemical-use in the production process. In addition to the problems faced in the countries studied, some common problems exist in Indonesia as well.

Dr. Ina Islam asked about gender responsiveness and considerations and that they should be taken at the decision and policy-making levels. In all the initiatives that have been cited in these discussions have considered gender. Specifically, she asked how women have been engaged at the community level, and integrated into and involved in discussions. Secondly, she asked whether there is a ministry responsible for the advancement of women in respective governments and how they have been involved in processes and the degree of their support. In regards to power and access, where do women stand?

Dr. Lagonera responded that it is very important to have women engaged across various sectors, bioenergy, waste sectors, etc. In the case of the Philippines, there is national level Philippines Commission on Women (CWR)[14]. As an oversight agency, CWR's mission is to make government work for the promotion, protection, and fulfillment of women's rights to enable women and men to contribute to and benefit equally from development. It is especially pertinent now to explore the synergies among women and men across different crosscutting issues. When you talk about capacity building and technology, women's capacity needs to be developed in implementing technology. As far as the climate change strategy in the Philippines is concerned, Philippines is exploring the role of women in climate disaster situations and, importantly, exploring the role of women as agents of change.

Dr. Bin Abdullah asked how the issue of gender equality in REDD+ in Cambodia is addressed. Mr. Keo responded that REDD+ is embedded in the existing mechanism of forest governance and all people, including women, are given a voice. This is seen in the institutional arrangements, which also advises on women's power. When projects are implemented, existing mechanisms that ensure gender equity, and the voices and rights of women, are used.

UNDP and GGCA. Gender and Energy. http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB4-AP-Gender-and-Energy.pdf

[14] http://www.pcw.gov.ph/

Mr. Keshav Jha asked a question about Colombo, Sri Lanka, on the climate change mitigation and planning options available in the agriculture sector. Dr. Lokupitiya said that Sri Lanka is moving towards climate smart agriculture to ensure climate change mitigation, while at the same time maintaining ancestral adaptation practices.

On gender equity, Dr. Sriratana noted that she had attended the committee for gender at the last COP22 and since previous years, gender equality has had a visible improvement where it was not seen before, and conclusion has almost been reached that all development projects and planning should include women and ensure gender equality. Ensuring gender equity in policy formulation in developing countries is a great step forward.

One participant asked on how to assess accountability in terms of carbon and timber rights. Mr. Keo responded that forestry committees are established in forestry communities. REDD+ policies are discussed, developed and implemented with the committees. This has allowed communities to establish sustainable use of timber, including harvesting, through inventory mechanism and the age of the harvest. When developing national strategies, we think about how communities and national bodies can work together to ensure accountability and solve any related issues on carbon and timber rights of the forestry communities. This is to ensure that REDD+ and forestry community rights can be aligned fairly and effectively.

Dr. Sri Erna Adiningsih asked Ms. Khlok on Cambodia's information system on climate change, and whether gaps exist at the local level on knowledge transfer. Ms. Khlok responded that functions have been introduced at the local government level on waste management, management of community-protected areas, and education on climate change. This ensures that climate change is incorporated into development planning at the local level in community and municipal plans. This has also led to more activities and practices in terms of sharing knowledge and integrating climate mitigation practices at the local level.

Mr. Wangchuk directed his question to Dr. Acosta-Michlik and asked for advice on using biogas in the transport sector. He noted that Bhutan is currently working towards implementing electric vehicles in the transport sector. Dr. Acosta-Michlik responded that the issue of using bioenergy is the resources required to produce feedstock and having to compete with the land for food. If the land being used for food is affected then you have problems of food security. It is not impossible to achieve, but because most developing countries use land for food, there may need to be some trade-offs. As for electric vehicles, the question can still arise on where the energy is coming from. If it is from clean and renewable energy, then this is a good practice. In the Philippines, for example, energy to run electric cars is produced from imported gasoline.

The co-chair, Dr. Bin Abdullah, summarized the session:

- Using bioenergy as an alternative fuel is being implemented but there are issues related to food security and sustainability. The food-energy-ecosystems nexus in countries in Asia have different policies according to their respective conditions.
- Ensuring community awareness and engagement in REDD+ and formulating policies.
- Ensuring gender equity in climate change and policy programmes.
- Best practices in ensuring low carbon footprints in Indonesia.
- Information systems on climate change in Cambodia and how the plans are trickling down and being implemented at the local level.

Café Kiosks Session Two

Kiosk I: Science and Policy

The second group discussed science-policy interactions in the context of the presentations delivered in Session Two. Mr. Wangchuk explained that the group discussed science-policy issues related to water, food and energy security, land-use change and forestry, gender equity, poverty reduction and rural development, and sustainable development. The group discussed how science could help streamline national/local policies with development policies and how different countries implement different strategies in this area.

On water security towards food security, Mr. Wangchuk highlighted the importance of water balance management, water footprints (in industry) as related to the second SDG as well as disaster forecasting and floods linked to the sixth SDG. Water catchment protection was also mentioned in terms of the designation of catchment area, and the need for rainwater harvesting systems to be mandatory in urban planning. Issues such as water balance management and measurement of water footprints are highly technical, and policy making on these issues require in-depth knowledge that can be delivered by researchers and scientists who specialize in relevant subject matters. For energy security, the group discussed a number of issues that included demand and supply forecasts, renewable energy policies, assessment of renewable energy potential, and cost assessment and RESCO[15] projects. In addition to this, the group saw the importance of having mixed energy policies and smart grid policies, as well as energy efficient standards. Science plays an important role in energy-related policy formulation. For instance, governmental decisions and policies on renewable energy depend on a number of scientific inputs including the assessment of a country's renewables potential, availability of renewables technology, and impacts on other sectors (such as biofuels and food security).

On the issue of introducing policies on land-use change, forestry and agriculture, the group stressed the importance of GIS and remote sensing systems and the need to monitor and assess land-use change, and the importance of reforestation to act as carbon sinks. Many of these technologies are capable to do things that were not possible in the past. GIS/remote sensing, for instance, can help detect changes and help in infrastructure site selection etc. Policymakers can thus make more science-based planning by involving researchers in the process.

The group also discussed the importance of gender equality noting that, for example, women can be strong advocates for clean energy to support and improve human health. Further, multi-stakeholder consultations are suggested to discuss and ensure an equitable role for women in the climate arena, noting that the role of women in combating climate change is one that is now recognized as being crucial. This is also observed as being very important in decision-making processes and was concluded that gender balance in this area needs strengthening.

On poverty reduction and rural development, the group highlighted a number of important areas that included more policy-relevant science on resilient cropping systems for food security, implementing renewable energy schemes that could create jobs and increase rural income, and providing incentives to rural communities to implement mitigation strategies. In this context, the idea of country carbon offset trading schemes to help alleviate poverty was also raised. On the side of adaptation, the group emphasized the importance of strategic placement in early warning

[15] A Renewable Energy Service Company (RESCO) is an ESCO Energy service company that provides energy to the consumers from renewable energy sources, usually solar photovoltaics, wind power or micro hydro.

systems, and increased preparedness in the face of disasters to ensure climate resilient communities.

For sustainable development, the importance of green growth and green economy as well as resource efficiency was considered key. The group also stressed that greening the economy and better management of natural resources will have positive impact on economic growth, job creation, resilience, poverty reduction and human well-being in general. Scientists can help policymakers by providing evidence that transitioning to a green economy can actually benefit the economy, society and the environment. Empirical studies such as the ones from UNEP's Green Economy-related works, for instance, demonstrate the positive impact of green investments on job creation.

The group discussed and acknowledged the important role of interdisciplinary science to be able to inform policies in the sectors discussed and that it would allow for increased economic growth, and ensure sustainable food, water and energy security.

Kiosk II: Knowledge Management

Dr. Ina Islam presented on behalf of the knowledge management group. She explained first that the group's strategy was to attempt to discuss effective knowledge management systems for each of the projects discussed in the session. Three out of the five presentations were discussed.

Before discussing the projects, the group agreed that knowledge management is about creation and dissemination of knowledge into processes in order to build efficiency and make things cost-effective.

The group focused its first round of discussions on the first case study – **role of bioenergy in enhancing energy, food, and ecosystem sustainability**. The group discussed on what it means, and whom it may affect and so forth, and came up with a number of considerations or goals to be achieved in order to attain best practices for establishing a knowledge management system. The first thing to understand is the situation and who is involved, the stakeholders. The second is to understand the potential demand for bioenergy in the countries concerned. The group discussed the need to identify capacity gaps, and opportunities for private sector engagement and how they can be engaged. How can we create enabling environments that are conducive to putting a bioenergy system into place? The identification of market-entry barriers – unless we identify them, we will face subsequent problems, therefore early identification is crucial. Understanding market potential was considered important. Do we study bioenergy for the sake of it? Does a market exist already for using bioenergy? These questions need to be taken into account. These are the steps that we considered necessary to ensure an effective knowledge and management system for bioenergy production and use. A set of replicable guidelines or a toolkit could be developed to allow the information to be transferred to other countries as well.

The second case study was on **strengthening community responses in REDD+**. Here the group tried to find out what needs to be in place for an effective REDD+ system to work. Some considerations here were land tenure and access, institutions engaged and diplomacy issues in light of conflicts. There were many facets to the discussion and it is not that easy, particularly as there is no one-size-fits-all approach and policies are different from one country to the next. Considered important are the needs for a free prior informed consent (FPIC) mechanism and a sufficient grievance mechanism, noting that FPIC is a big problem and threatens to undermine many REDD+ projects. If FPIC does not exist, then community support is lacking and could sabotage a project. Knowledge management in a REDD+ project is extremely important for appropriate FPIC, and grievance/settlement mechanisms

and procedures to be registered. If this kind of management system is missing, the key ingredients to make a good REDD+ project would be inadequate and will lack transparency. For example, Mr. Keo's project identified a number of weaknesses and the project was able to identify ways for knowledge management to address those weaknesses. These lessons learnt can be transferred to other projects in other countries as well.

The third case study addressed identification of best agricultural practices with better GHG benefits in salinity-affected areas in South Asia. The group discussed the scope of the problem, the areas where the problem exists and the drivers to the problem in order to establish a knowledge management system for this kind of project. At the outset, the group agreed that for this kind of project, knowledge management is a way of coordinating and collecting all information produced from pilot projects and experiments, and sharing this with communities (ensuring that the language is appropriate). In essence, gathering information on best practices and disseminating the information to raise awareness among communities affected by the problem of salinity inundation. In this effort, agriculture extension services can make the link between the projects and raising awareness to those affected. There was also a consideration of the need to think more holistically from a watershed perspective, which needs socioeconomic and scientific interdisciplinary methods. Other issues considered important included sustainability, agriculture crop insurance and risk management practices to support knowledge management system. Finally, distilling knowledge management was considered key by the group to improve situations. For example, a central repository/knowledge base that can be accessed by researchers, extension officers and other stakeholders dealing with the issue and searching for information is needed. The basic message is that in order to address any of these issues, knowledge management needs to be addressed. Systems need to be understood and communications need to be in place. Involvement needs to be clear and understood by all parties engaged, and we must retain what we create.

Kiosk III: Communication and Networking

Dr. Mara Mendes presented on behalf of the communication and networking group. She began her presentation by highlighting some key communication strategies. Communication needs to take place from an early stage in any research or other programme that will provide information to end-users. Involving stakeholder from the beginning provides them with a clear sense of ownership of the results. The level of stakeholders and kinds of approaches will depend on the objectives of the programme. In general, target audiences will vary widely from layman/end-users/communities to policymakers, the media (social and press), and the private sector. For each of these stakeholders, a different set of communication tools would be required:

Policymakers:	policy briefs, infographs, policy dialogues and workshop, site visits for best practices, demonstrate cost-benefit analyses, etc.
Community/layman/end-user:	info graphs, community meetings, social media (blogs)
Journalists/press:	glossaries, blogs, press releases, press workshops
Private sector:	workshops, best-case site visits, life-cycle costs, mitigation and adaptation projects, etc.

The group also discussed different methods of communication depending on whether approaches are taken from bottom-up or top-down. She also stressed that for adaptation, strategies tend to be bottom-up, and for mitigation top-down. Local language dissemination of information is crucial. The

group agreed that information should be free of bias and in a language that is appropriate to the target audience. A good communication channel is also considered very important to ensure transparency on mitigation and adaptation as outlined in the Paris Agreement. At the community level, proper communication and advocacy can help overcome any resistance in a community, particularly if it is communicated in a language that is readily understandable. The issue of hierarchical levels of communication was considered important and needed and the kinds of communication is different depending on the audience.

Developing a communication strategy to ensure the most appropriate engagement of stakeholders and to address any existing gaps between scientists and policymakers are considered fundamental to its success. The strategy also needs to ensure that communication channels are open from science to science, science to policy, science to community and may be a multi-layered communication strategy that addresses all stakeholders using the most appropriate communication tool.

The group also questioned the purpose of a communication strategy (rather than developing one just for the sake of having it). For example, is the purpose only dissemination or do we want to impact policies? If it is the latter, then a number of steps are suggested:

- Need to continue working with decision makers beyond the outputs of research and advise when necessary.
- Networking organizations have an essential role to facilitate implementation.
- Engaging different actors and stakeholders that can translate science outputs into real impacts (engage NGOs, etc.). As an example, ICLEI activities have helped bridge science and policy gaps.
- Networking is an effective tool that will also develop capacity.

Involving the target audience early in the design process was considered as important. The whole design framework should be based on the realities and needs of the recipient community and keeping them involved over the period of the research is key to ensure their trust and interest. Other issues considered important were co-generating the recommendations (higher likelihood of implementation), and knowing that communication and networking should go hand in hand to be more effective.

Other important issues discussed were:

- Trust in scientists
- Communication methods should be context specific
- The flow of communication/orders through different governmental hierarchies
- Developing a glossary of easy to understand phrases (avoiding jargon)
- Paying attention to local languages/not everybody can understand English
- Cost-benefit analysis in layman language
- Clarification on the life cycle costs
- Role of the education system for facilitating communication
- Reporting with clarity is important for achieving mitigation goals (monitoring, reporting and verification)

Group Discussion on Café Kiosk Outputs

Dr. Erna Sri Adiningsih asked a question on communications in South and Southeast countries where there are regional groups such as ASEAN and SAARC. Taking the REDD+ project as an example, how can the results be effectively communicated, particularly to communities?

Dr. Saleemul Huq responded that the group talked about the difference between designing research projects in mitigation and adaptation, and noted that for mitigation, researchers design a project in a top down manner. It is more difficult for adaptation since it is very specific and the communities need to be engaged along the way. Adaptation research needs to be based on the existing knowledge base of the community and so in designing the research of adaptation, it is an essential pre-requisite design step to consult with vulnerable communities and ensure that their views and inputs are considered in the research design. These communities should be kept engaged during the research activity itself and when the research is completed, the results should be shared with the communities, since they are the ultimate beneficiary to allow them to implement more effective adaptation strategies.

Dr. Adiningsih stressed the importance of policy-to-policy communications between ministries within governments, especially on issues related to climate change and sustainability. Communication across ministries is especially important to avoid conflicting policies.

Dr. Mendes noted that in the countries she has worked with, there are conflicting decisions in government ministries and lack of communication plays a large role in this situation.

Dr. Bin Abdullah noted that in developing countries there is a problem of knowledge generation and sharing in general. In governments, for example, there are small groups of people who have high levels of knowledge but these same people tend to rotate or be promoted and take the knowledge with them. This leaves of a void, a gap in knowledge. He asked the knowledge management group about how this problem can be overcome.

Dr. Bettinger responded on this isolation of knowledge issue and how it can be overcome, noting that in governments there is no one answer that could solve the barriers of transferring knowledge in all countries. On the other hand, universities have a more robust communication strategy in terms of transferring knowledge across relevant faculties.

Dr. Ina Islam talked about universities as capacity building institutions and given that the discussion is centred on the right vehicle for knowledge management it is important to go back to that discussion on universities as they can bring in different kinds of stakeholders such as governments, private sector, IGOs and NGOs, etc. in a very benign manner. They can do this across political boundaries and across strata of local, regional and national levels. Universities are powerhouses that have not yet been tapped into as much as they should be. Visiting them, supporting their initiatives, and enabling them to engage with other institutions internally, regionally and internationally. Support in south-south interactions and south-north interactions is needed, too. Open access to resources can enable institutions that have the knowledge to disseminate that through various channels. Knowledge management is a process by which we can save on costs.

Dr. Adiningsih provided a brief summary of the discussions:

- The Café kiosks discussed APN's low carbon development projects and projects on climate change and related issues.
- Important to manage the knowledge coming from scientific projects effectively and ensure access to that knowledge as widely as possible.
- Communication of results is considered crucial for providing best positive impacts on communities.
- It is important to engage all stakeholders before, during and after a project is completed to ensure effective stakeholder buy-in and sustainability.

Session Three: Adaptation and Mitigation under the Paris Agreement

Co-Chairs for the session were Dr. Saleemul Huq and Prof. Mukand Babel

3.1. Rapid talk: Integrated, resilience-based planning for mitigation and adaptation in Asia – Dr. Ayyoob Sharifi, NIES, Japan

On interconnected risk landscapes, Dr. Sharifi explained that the biggest risk comes from climate change. For resilience and adaptation to climate change, he noted that both incremental adaptation and transformational adaptation are needed. Incremental adaptation is the dominant type, which is in response to small-scale disruptions. For transformational adaptation, we are dealing with highly vulnerable systems, severe/more frequent stresses and the crossing of thresholds. In terms of a framework for analysis, he stressed the importance of comprehensiveness (including environmental, economic, institutional, social, and built environment factor dimensions), cross-scale relationships, temporal dynamism, uncertainties, participatory approaches and action plans. On shortcomings, challenges and gaps in knowledge related to resilience assessment, Dr. Sharifi stressed that there are insufficient general and flexible systems; spatial and temporal dynamics are not well addressed; and modelling, simulation techniques and scenario making are not well integrated into the systems. There is a dominance of vulnerability (not resilience) measures, and lack of interlinkages and complex interactions. He questioned whether resilience assessments can shed more light on the uncertain future, and stressed concern on data availability and costs for conducting assessments. A major challenge would be reducing information to an understandable and manageable level (optimization), and developing integrated tools for assessing both sustainability and resilience. For solutions in the energy system, IT networks and equipment for system monitoring could be put in place. Further, a shift from centralized grid to decentralized systems (e.g. microgrids) could solve a number of issues, such as optimizing response time to reduce potential loss of system function, less exposure to extreme events, energy efficiency enhancement, among others. In closing, Dr. Shairifi highlighted future challenges and opportunities, and emphasized the importance of paying attention to adaptive mitigation, life cycle costs (massive urbanization provides opportunities for co-design), nexus issues (e.g. water-energy nexus), tradeoffs, and consideration of context (climate, technical feasibility, site suitability, etc.).

3.2. Rapid talk: Climate smart agriculture: Using best practices for mitigation and adaptation in Asia – Ms. Nuzba Shaheen GCISC, Pakistan

The agriculture sector represents about 10-12% of GHG emissions. For agriculture-driven economies, it came as a surprise that agriculture was not specifically mentioned in the text of the Paris Agreement. This has put the fate of agriculture and greening economies into question in terms of reduction and incentivization. For the majority of INDCs, 80% of countries will adopt mitigation targets in the agriculture sector and 90% will adopt adaptation. Adaptation, mitigation and sustainable food security are key considerations for climate smart agriculture, which is a relatively new concept, first presented by the Food and Agriculture Organization (FAO). Urgent action towards food security is crucial. Each day, one out of nine people go hungry in Asia and the Pacific, accounting for 62% of the global hunger. With increasing population and increased risks due to climate change, a transition to agriculture production systems is needed to address food security issues. These systems are more productive and sustainable. They use energy more efficiently, have less variability and greater stability in their outputs, and are resilient to risks, shocks and long-term climate variability. Ms. Shaheen went on to describe adaptation, which she noted is adjustment of

agriculture systems and behaviours. For best practice situations, adaptation in agriculture should be country driven, forward looking and flexible, with bottom-up approaches taken by engaging farmer stakeholders. The new technologies would ensure water efficiency as well, since water is one of the most limiting factors in agriculture production. Ms. Shaheen went on to explain why climate smart agriculture is important for mitigation. According to CGIAR, it will be impossible to stay within either a 1.5^{o}C or 2^{o}C target if agriculture does not contribute to emissions reduction. She explained the breakdown of GHG emissions from different sectors in Asia and agricultural emissions from sub sectors in Asia. She explained the background of the APN-funded GCISC project being conducted in parts of South and Southeast Asia, noting its main objectives of:

- providing a conceptual framework to address food security under conditions of water scarcity;
- introducing new approaches for constructing high-resolution climate change scenarios to fill gaps; and
- mainstreaming adaptation and mitigation related to agriculture and crop water management in the region.

Finally, she briefly talked about the importance of next steps and domesticating the Paris Agreement through the implementation of INDCs. Some of the important factors to make this successful are political will and effective governance, long-term mitigation strategies and integrated adaptation planning, climate finance frameworks and implementing effective MRV systems.

3.3. Capacity building under the Paris Agreement: ADAPT Asia's future activities – Dr. Keith Bettinger, ADAPT Asia

The Paris Agreement has a big role for adaptation and explicit acknowledgement that adaptation is on par with mitigation. This has been pushed by developing countries particularly for the past five or six years. We see that there is a recognition for significant resources to be steered towards adaptation at global, national, sub-national and local levels. The explicit language was "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change". This is where capacity building efforts need to focus and, in a sense, operationalizing it. Resilience is a conceptual term. For example, when you are dealing with secondary cities or communities that do not know what a resilience indicator is, you have to figure out what the resilience indicators are for these communities and this requires developing capacity to do so. This is also true with adaptive capacity and vulnerability. The Paris Agreement also describes a bottom-up approach to adaptation but there are no cross-the-board recommendations for adaptation like there are for mitigation. Adaptation is inherently a local endeavour that is shaped by local socioeconomic and cultural considerations. The physical manifestations of climate change are local as well. The Paris Agreement also has cycles of action and most developing countries have included adaptation in their INDCs. After five years, there is a stock take and countries will look at their progress via assessment. These things have been formalized in the Paris Agreement, but how do we make them happen?

There are three specific areas for capacity building.

1. Evidence-based adaptation: Good climate change data and information is needed to develop good projects, strategies, policies and to address uncertainties that could lead to maladaptation. Evidence-based scenarios are also crucial to receive funding from agencies like GCF, ADB and the World Bank. Tools and competences are also important to understand data needs, design and construct monitoring networks, perform gap filling and analysis and incorporate results into planning and projects.

2. Identifying and operationalizing adaptive capacity, and evaluating resilience: This will require moving from theory to practice which will require capacity building; recognizing roles in institutional, collective, and autonomous adaptive capacity; identifying scalable examples and best practices that can be replicated; and developing a strategy to demonstrate progress. Adaptive capacity needs to be developed to undertake these activities effectively.

3. Embedding and mainstreaming: There is a need to go from ad hoc adaptation to integrated adaptation, and from standalone projects to adaptation portfolios that are more embedded in projects of change and have synergies with other efforts, such as the SDGs. Transformative change is needed and this is being called for by many of the financiers mentioned previously. University and technical education is crucial for capacity building for mainstreaming resilience and climate change adaptation, as well as gender considerations. This comes when a core of professionals are trained.

3.4. Climate change technology transfer and capacity building for adaptation and mitigation under the Paris Agreement – Dr. Sudhir Sharma, UNEP-ROAP, Thailand

The focus of the Climate Technology Centre and Network (CTCN)[16] is strengthening cooperative action on technology development and transfer supported by a Technology Mechanism (TM). The technology framework provides overarching guidance to the work of the Technology Mechanism in order to support the implementation of the Paris Agreement. The Paris Agreement notes that support, including financial support, shall be provided to developing country parties for the implementation of the technology support and that this support would be through the established technology and finance mechanisms with enhanced collaboration between the two mechanisms. Support would be provided in a balanced way for mitigation and adaptation. He noted that the global stock take occurring every five years, would review support on technology development and transfer for developing country parties, and appropriately guide the TM and FM. For capacity building, and as part of the Paris Agreement, information on the Paris Committee for Capacity Building (PCCB)[17] was relayed. PCCB's key responsibility is to identify capacity gaps and needs, both current and emerging, and enhance capacity building efforts. A work plan on capacity building for 2016-2020 has been developed that considers nine elements, a 12-member PCCB committee, and draft terms of reference for the committee. The PCCB is expected to ensure coordination and coherence in the capacity building work of disparate entities and its effectiveness will be determined by the quality of its membership and their experience in capacity building. The elements of the capacity building work plan will be to:

- assess how to increase synergies through cooperation and avoid duplication among existing bodies;
- identify capacity gaps and needs, and recommend ways to address them; promote the development and dissemination of tools and methodologies for the implementation of capacity building;
- foster global, regional, national and subnational cooperation; identify opportunities to strengthen capacity at the national, regional and subnational level; and
- foster dialogue, coordination, collaboration and coherence among relevant processes and initiatives under the Convention.

[16] Climate Technology Centre and Network (CTCN)
[17] http://unfccc.int/cooperation_and_support/capacity_building/items/10053.php

3.5. Climate change technology transfer and capacity building for adaptation and mitigation under the Paris Agreement: Experience from India – Dr. Ajay Raghava, Ministry of Environment, Forests and Climate Change, Government of India, India

Limiting future climate change would require substantial and sustained reductions in emissions across the globe and in the context of climate change; the following key elements need to be considered:

- India faces extreme weather events and variation in rainfall patterns posing risks to agriculture;
- forest cover has increased steadily over time; About 70% of rural households depend on fuelwood for cooking;
- 29.5% of population below poverty line;
- 33% households have no access to electricity;
- 55% households with *kuccha* and *semi-pucca* houses; and
- Low per capita energy consumption.

The impacts of climate change on India are multiple. These are increasing extreme rainfall events, reduced forest cover, reduced sorghum yield to 14% by 2020, with worsening yields by 2050 and 2080, reduced wheat yields in the Indo-Gangetic Plains, and country-wide agricultural loss by 2030 severely affecting income of 10% of the population. He noted that extreme events are expected to be more catastrophic on the east coast.

For mitigation under the Paris Agreement, India made a voluntary pledge to reduce emissions intensity of its GDP by 20-25% by 2020 compared with 2005 levels. Emissions from the agriculture sector would not form part of the assessment of emissions intensity. For its INDC, India plans to reduce GDP emissions by 33-35% from 2005 level by 2030, and that India already achieved a 12% reduction in emissions intensity between 2005 and 2010.

For adaptation, India's goal is to better adapt to climate change by enhancing investments in development programme in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, and health and disaster management. India realizes its highly vulnerable position when it comes to climate change impacts, mainly due to poverty and dependence of a large population on climate sensitive sectors for their livelihoods. Strategies and initiatives to reduce vulnerability include actions in agriculture, water, health, coastal regions and islands, disaster management, protection of biodiversity and the Himalayan ecosystem, and security of rural livelihoods. Initiatives being implemented in India include, among others, new missions on health and coastal areas and the establishment of the National Adaptation Fund [INR 350 Crores] (USD 55.6 million). In order to realize its adaptation goals, India aims to mobilize financial resources from other sources.

On technology needs and transfer, India's goal is to build capacity, create domestic frameworks and international architecture for quick diffusion of innovative climate technology in India and for joint collaborative research and development for such future technologies. The country also stresses the need for critical technologies to be facilitated via GCF, global collaboration in research and development, and a preliminary and illustrative list of select technologies provided in India's INDC. On capacity development, he stressed that capacity building needs to take key precedence and be a continuous process. Additional capacity needs include proper training and upgrading skills across sectors, a continuous process of capacity building, and national- and state-level programmes. In

closing he underscored that international mechanisms should support thematic knowledge networks including, *inter alia*, training in different aspects of renewable energy.

3.6 Panel Session

Dr. Mukand Babel, Chair of the Climate Change Asia (CCA), introduced the CCA initiative launched by the Asian Institute of Technology. CCA aims to meet the diverse range of capacity building needs required to pursue low carbon development and achieve climate resilient societies in Asia. The programme is designed to support the Paris Agreement and the 2030 Developmental Agenda. A key feature of the programme is to develop capacities in Asia to prepare, finance, and implement bankable climate change mitigation and adaptation projects through capacity building, mentoring and training programmes.

Mr. Jens Radschinski of the UNFCCC Secretariat introduced himself and provided some information of the work being conducted from the UNFCCC Regional Collaboration Centre (RCC) in Bangkok. The RCC, Bangkok was set up in September 2015. The background of the RCC is to support the enhancement of regional distribution of CDM projects under the Kyoto Protocol in Asia and the Pacific. RCC Bangkok is operated in partnership with the Institute for Global Environmental Strategies (IGES), and supports all countries in the region in identifying and designing CDM projects and offering opportunities to reduce transaction costs. The RCC, Bangkok works in collaboration with the other RCCs in Africa, Latin America and the Caribbean.

Dr. Huq challenged the panel on a number of questions related to Article 7 of the Paris Agreement. He stated that for adaptation there are no collective indicators or goals. He asked the panel what an adaptation goal would look like and what would be the parameters/indicators/metrics for adaptation at the local level or national level, or in sectors such as the agriculture sector.

On indicators, Dr. Bettinger said we need to agree on a set of capabilities and competencies that are associated with adaptation. Not measures, he emphasized, but abilities. For example, the ability to use data. A benchmark could be the ability to set up a monitoring station to collect data or downscaling global climate models, as well as the ability to interpret the information and include them in planning processes. Clear and discreet indicators can be established for such mechanisms that could be associated with adaptation parameters.

Dr. Sharifi stressed that while adaptation measures are more relevant at the local scale, the establishment of indicators would be more easily identified at the global scale. The challenge is how to aggregate across the countries.

In light of the Paris Agreement, Ms. Shaheen stressed that adaptation needs to be addressed from a bottom-up level. Adaptation is mostly a problem for developing countries that are more vulnerable to climate change, particularly in areas such as food and water security.

Mr. Jha noted that some of the most common adaptation indicators at the city level are responsiveness, flexibility and access to information.

Mr. Keo noted the slowness of technology transfer as a barrier to adaptation.

Dr. Babel stressed that there has been a lot of dialogue on technology transfer and in actual practice technology development in the north is in the hands of the private sector, which has invested a large amount of resources to research and development. The private sector will not provide technology without any cost and this is a fundamental problem in terms of unaffordability for the developing

south. One of the solutions could be that GCF funds could subsidize the procurement of such technologies for both adaptation and mitigation.

Dr. Huq then raised Article 11 of the Paris Agreement on capacity building and one of the things it proposes is a new paradigm for capacity building, which moves away from short-term to much longer term embedded in-country capacity building systems. He posed the question of how can we make the transition from short-term to long-term capacity building systems that are sustainable.

Dr. Bettinger responded that partnerships among universities at the regional level could help operationalize long-term capacity building. He mentioned the creation of national in-country hubs that partner with universities and other educational facilities to ensure long-term sustainable capacity building through training programmes and other services, etc. to governments and other bodies for planning and implementing adaptation strategies. In essence, this would create a nexus for capacity building between governments and academia.

Dr. Acosta-Michlik shared her thoughts on the important role of academia for local government units in the Philippines, particularly for developing capacity to undertake vulnerability assessments. She referred to vulnerability of Philippines in the face of disasters including landslides and flooding and the immediate response of the international community in providing support. While this support is crucial, she noted that there are local institutions that see problems on a daily basis and that can provide support to enhance the livelihood of the local people and build their resilience. Some of the good practices would be to empower the local institutions to be able to respond to climate change impacts and provide capacity-building opportunities to ensure more resilient local communities.

Café Kiosks Session Three

Kiosk I: Science-Policy

In the context of the presentations and panel discussions in the session on adaptation and mitigation under the Paris Agreement, the science-policy group focused its discussion on exploring how science and policy interactions could reinforce the existing and future efforts in achieving the targets that individual countries have set in their respective NDCs documents. The group observed that in many instances, particularly in developing countries, steering committees for policymaking do not involve scientists and researchers. This needs to change if we are to ensure to meet the NDC targets at the national level and eventually the success of the Paris Agreement at the global level. The roles of the scientists and policymaker are different but mutually reinforcing. The involvement of scientists and researchers in the policymaking committees will ensure that policymakers receive and understand crucial inputs on technical issues and concerns relating to the ways the NDCs can be achieved.

The group further noted that while climate change is a global issue, the concerns are equally serious at the local level. Consequently, actions also need to be at the local level as well. Actions at the local level concern the public. The involvement of the public and other stakeholders thus was deemed important. Along with policymakers, the general people also need to understand the consequences of inaction or even late action, since impacts of climate change may not wait. In this situation, scientists can provide suggestions on how to adapt to impacts and mitigate climate change. The instances of some of the presentations delivered during the session, such as the one relating to

climate smart agriculture, demonstrates this point. The group underscored that along with mitigation efforts, adaptation measures should also be strengthened especially at the local level.

In terms of capacity building, the need for long-term capacity building was emphasized again for both scientists and policymakers to understand the role that each group has in dealing with climate change. The transfer of low carbon technologies for mitigation and adaptation was found to be another important area. However, it was also noted that Asian countries often are at different stages of development, which, even with successful technology diffusion, can make technology absorption difficult. Furthermore, country-specific circumstances may make technologies from one country less effective in another. Hence, capacity building for technology transfer and absorption, as well as technology innovation and renovation, was deemed necessary.

The group noted that efforts needed for achieving the NDCs are anything but trivial. In this context, the researchers can play an important role by providing science-based information on required additional measures as well as on how to prioritize actions based on country specificities and key categories.

Last but not the least, the science-policy group observed that that there is an increasing need for stronger cooperation at the global level. Many of the developing countries' NDCs include both unconditional and conditional pledges. Conditional pledges in most instances are subject to receiving technical and financial cooperation from the international community. Global policymakers can play a critical role in fostering cooperation for achieving these conditional targets. International cooperation can also help share best practices and experiences from across the globe, which can be scaled up or replicated where applicable. To make these efforts successful, the group reiterated that policymakers and scientists need to work together with the common goal of achieving the NDCs and the Paris Agreement.

Kiosk II: Knowledge Management

The knowledge management group discussed capacity building related to the session's presentations on adaptation under the Paris Agreement. As in previous kiosks, the group discussed how to take concepts and operationalize them in a systematic process that can be replicated elsewhere. The group discussed the question of what capacity building looks like for adaptation. ICLEI provided an example of a system that they apply in cities that is a replicable system. This system assumes that city officials and other stakeholders have no background at all in adaptation, mitigation and climate. This is a difficult situation and there is a temptation to just say, "your city is not ready and is not meeting our requirements" to receive aid from donors. Therefore, this brings us to a potential vicious cycle as the greatest vulnerability lies within those cities who have not knowledge or background. ICLEI's system starts with identifying the stakeholder and providing some basic questions while moving into the process of dialogue and engagement with the basic questions allowing for a mapping process for the city in primary and secondary systems. The system is a straightforward activity procedural wise that identifies climate risks and discusses mechanisms that can be placed to reduce those risks. These steps can be replicated and followed by other cities via a guidebook or toolkit. This said, there are aspects of such a system that will not take care of themselves and intensive involvement would be needed with the city itself. This is where capacity building takes a further step where cities need intensive intervention and remediation. For example, stakeholder identification could be a problem. For example, in cities, the people who are marginalized and vulnerable are in these positions for reasons. These reasons could be socioeconomic, cultural, and historical processes that are pushing these people into situations of

vulnerability. Because of this, these people may not be involved in planning and decision-making processes if the cities are left to their own devices. As such, this is where capacity building needs to take place. In conclusion, the group identified weak points in the procedure where capacity building is needed.

The second part of the discussion focused on knowledge sharing, where there is a large gap. There is not enough knowledge and experience sharing. While this is considered a major problem, the group focused on one small but important aspect, which is a lack of collaborative research. Essentially, the group discussed research being undertaken in isolation. This could be a climate modeller who is happy to run models and does not communicate with the outside world except to publish in high-end academic journals. The group thought of ways to address this problem and agreed that cooperation is, essentially, what is needed between the modeller and policymakers.

The group agreed that communication gaps compound the problem as well as a lack of incentives that would entice the modeller to reach out to policymakers. Communication gaps also materialize because the modeller is not a policymaker and is therefore not able to communicate in a language that is understandable to meet policymakers' needs. The modeller does not possess this skill set, has no incentives to gain this skill set and has no channel through which he could communicate results. For this reason, capacity building is needed where we can build some kind of coordination mechanism that includes a skills set so that communication can be readily transferred from research to policy and vice versa. This coordination mechanism is essential to transfer results to policy makers. Structural promotion systems within universities that provide incentives to researchers to gather the required communication skills was discussed as a potential solution to the problem that may help bridge the divide between scientists and policy makers.

Dr. Acosta-Michlik raised a point that was discussed just following the close of the kiosk. She said we should see the other side of the coin because even if scientists are active and willing to support the provision of policy-relevant information, the politicians themselves need to be willing to do something on their side or the communication gap will remain. There should be a system in place on the policy side that ensures local government officials reach out to scientists. Communication needs to be both ways. In local development plans were local government units in the Philippines are obliged to undertake vulnerability assessments, and they are very keen to get help from academia and are reaching out. There should be a system in place where both sides actively wish to communicate. On the side of academia, this could be through some kind of incentive system and on the side of the government a structure that ensures that both sides meet should be in place.

Mr. Jha explained ICLEI's processes further. He said that one of the important points is that in order to work with cities, identification of stakeholders is crucial and a mapping process needs to be put into place to do this to ensure there is a catalytic response to a climate change event that extends support to vulnerable people and systems. The stakeholders should also comprise scientists with experience in vulnerability research and assessment. The stakeholders, during the mapping process, need to be categorized into the framework either system-wise or sector-wise and, based on that, a planning process can begin that would give an expected result.

Kiosk III: Communication and Networking

Dr. Mendes spoke on behalf of the communication and networking kiosk. The group discussed networking and communication for adaptation and mitigation under the Paris Agreement. The discussion first focused on hierarchical levels: national (e.g. ministries), regional (e.g. ASEAN), civil

society (e.g. NGOs) and global (e.g. COP meetings and related side events). The major constraint is communications between science and policy because they do not talk at the same level or in the same language. This said, as every country has some kind of master, strategic or action plan (e.g., NDCs was mentioned as a common plan among all countries under the Paris Agreement). Scientists should look at these plans and target their scientific action towards the planned goals and objectives. The group provided some examples. To improve the gaps between science and policy, AIT has institutionalized programmes like the CCA and conducted activities that bring together scientists and policymakers to discuss policy relevance of the scientific activities, and undertake capacity building as well. The group talked about the stakeholder engaged in the climate change community to whom scientists would be communicating and networking. These included policymakers, civil society, local communities, and the private sector. It is very important to ensure that the information being communicated is reliable. Effective communication cannot be undertaken without good, reliable results and information. Good networking is needed between different organizations to ensure that multidisciplinary and transdisciplinary issues are addressed across different stakeholder groups. Further elaborating, harmonized standards to allow sharing of data across these disciplines is a crucial part of the process.

The group talked about means of and tools for communication. They discussed the role of the mass media and social media and highlighted that journalists need to be responsible for what they write and for ensuring accuracy in their reports. For this reason, workshops for journalists are considered as important ways to develop their capacity on climate change adaptation and mitigation to ensure more accurate reporting across these disciplines. Other tools for communication included publications, white papers, policy briefs, info graphs and press releases. For adaptation, the issue of high costs, capacity development needs for implantation of adaptation action, and identification of priority areas that are most vulnerable for effective action. The group also discussed why there is a need to communicate when it comes to adaptation. In doing so, they agreed that communication is important to identify priorities and share that information, build capacity for adaptation implementation, identify technology needs and identify appropriate adaptation methods and tools in order to avoid practices that might lead to maladaptation. This could be through the transfer of best practices and success stories.

Discussion Session

Dr. Adiningsih also stated that we have to consider the level of communication in adaptation and mitigation under the Paris Agreement as well as the tools available for effective communication. The problem of communication, she said, should be a concern across all levels from national and global levels to community levels. As an example, she emphasized communicating climate change at the local level through conducting cultural events. Further, scientists can communicate via networking means and expanding their networking base. Finally, she emphasized the need to build capacity in the area of “effective communications” and that entire skill set needs to be acquired to act as communicator between science, policy and other relevant stakeholders, including mass media. She also mentioned the importance of knowledge sharing though transparent communications.

Dr. Stevenson spoke to participants on science and policy communications, noting that we need more communications between institutions and international organizations. A lot of this is happening and is visible in the global, sub-regional, national and local levels in Asia and the Pacific. She stated an example in that APN has been an intergovernmental organization over the past 22 years and APN works with numerous scientists and policymakers. APN does not seem to have a

problem communicating across these disciplines. However, when it comes to communicating with other sub-regional and regional organizations, the process can be quite difficult. Using ASEAN as an example, she noted that trying to establish a communication channel between ASEAN in Southeast Asia and APN has posed to be a great challenge. The same problems are also faced with South Asia regional bodies, such as SAARC. Why is it so difficult to create channels of communication with other regional and sub-regional organizations? Why is it so difficult to get representatives from regional organizations engaged in climate change adaptation and mitigation to come to the APN science-policy dialogues?

Dr. Sriratana responded by saying that her institution was successful in bringing together around ten donor organizations working on climate change issues to a meeting in Thailand to discuss their various projects. These included USAID and JICA, among others. What she noticed was the duplication of the work being undertaken by some of these organizations. A suggestion was made to create a website that every donor could report to and exchange information with other donor organizations. APN is one of those organizations that could have been invited to such a meeting, since it appears that the website will be developed. This comes back to communications across the region with various donor agencies and other stakeholders. Sometimes for such dialogues, communication from ministries, for example the Ministry of the Environment, Japan, to send out invitations to such dialogues may be effective.

Dr. Babel wondered if the problem is because APN is not given the kind of importance or recognition that is deserves in the policy community. Is it the process that is failing or is it that the organizations being contacted are not interested? This is a key question to help solve the problem. The participants considered that both issues are valid in this context.

Dr. Sriratana stressed that interest might be there, but communication is not via the correct channels and some advice and expertise is required here. While she believes that APN is making great strides in global change for the region, there are communication issues with policymakers that need to be overcome.

Ms. Lucia Enggong provided her experience and stressed that APN has very high visibility in the region and the disconnect to regional bodies such as ASEAN and SAARC came as a surprise. She said that if APN could have a focal point or liaison officer within ASEAN or SAARC to take on the role as communicator, this might help. It would also help raise the visibility and importance of APN in these regional bodies.

Ms. Shaheen noted that the problems might be because of some local administrative issues and the fact that, in some countries, academics need government approval to attend events such as the science-policy dialogue.

Dr. Sriratana stressed that APN should communicate with the ASEAN Secretariat involved in climate change and ask them what their specific needs are in climate change and start a dialogue from there. If research is focused around some of the themes that are of interest to ASEAN, then APN will be welcomed.

Dr. Babel added that in the previous year, AIT organized a forum on climate change in a way that policymakers from ASEAN countries were seated with scientists with the aim of scientists providing help towards negotiations for COP21.

Dr. Sriratana stressed an add-on problem of rotation of people sitting in government offices and in ASEAN itself.

Dr. Babel closed the discussion and asked each of the groups to submit their reports to APN.

Sharing Thoughts and Closing

Chaired by Dr. Mara Mendes and Dr. Linda Stevenson, a roundtable ensued that considered feedback from the audience on the 2-day deliberations.

The science-policy dialogue provided an opportunity to network with others and build relationships. It allowed for a common platform for all participants to communicate openly and share their ideas, practices and opinions. There was consensus in that participants learned a lot about the dynamics between science and policy interactions including barriers and best practices. It is even more important for science and policy to work together, and events like these will help us achieve this.

While gaps exist, the dialogue itself was inspiring according to one participant in that it allowed for closer engagement and frank communications. Scientists, policymakers and other participants were able to express and share their opinions in a relaxed manner. The atmosphere and style of the dialogue allowed for interaction in a casual and informal way. From the discussions that took place, it was clear that most of the participants engaged are clearly passionate about achieving informed decision-making that ensures a resilient region.

Interesting to many participants was the combined sub-regions of South and Southeast Asia and each sub-region learned a lot about what the other is doing at the sub-regional level to enhance science-policy practices and use them in planning processes for increased resilience, especially in cities.

It was deemed important to listen to others' thoughts on science-policy interactions, existing gaps, and the kind of strategies put in place to narrow these gaps. The technical kiosk sessions were useful in this respect as they comprised thought-provoking discussions with new and different dimensions for knowledge management, networking and communications, and science-policy interactions. One of the important take-home messages is to understand that best-practice projects being executed in the region can be replicated in other parts of the region provided the geographical typography is similar.

The dialogue identified some of the gaps between policymakers and scientists, and ways in which these could be addressed. In the context of climate change, the science-policy interface has been a serious topic of discussion for more than two decades. If we compare how the situation was perhaps 10 or 20 years ago and how it has changed to the present situation, the interface between science and policy has improved significantly, but at the same time we have still have challenges. There also needs to be political will to address these challenges.

There is a new, overlapping species within the science-policy interface known as the "negotiator". Some negotiators are neither from the science platform nor from the policy platform, and interactions with these negotiators are important, particularly for decision-making at the global level.

One policymaker said that it was his first time to attend a science-policy dialogue and noted that having more frequent dialogues would not only provide greater visibility of the work that APN is doing in bridging the science policy interface, but strengthen ties between APN and individual governments as well.

It is difficult for any one body to have a complete set of tools that would be transferable across the globe in bridging science with policy. Each country and region is unique. Policymakers try to involve the scientific community in the process of negotiations in UNFCCC and other international negotiations.

Climate change is an ultimate crosscutting issue and requires different disciplines working together and different technical expertise. What APN is doing is developing a community of practice. We can take any or all of the practices and experiences shared by participants and consolidate those into a discipline of practice.

An early-career scientist expressed his gratitude about the research findings and the practical insights provided by participants. On the issue of science and policy, it is important that in as much as science-informed policy can be made, it is also important to engage these groups and contextualize science in the context of the problems being faced. Engaging policy from the start of a research project is important to ensure that policymakers can get targeted results that they will need for decision-making purposes.

Over the years international organizations such as APN, LoCARNet, Climate Change Asia, etc. have matured and become more committed and enthusiastic. This has developed into a community of practice that is highly visible.

During the dialogue, it became clear that some projects have not been able to effectively go to the regional and sub-regional groups and make an impact. What might be useful would be to take one topic, let all countries at the sub-regional or regional level study that one topic, come back in a regional forum, and discuss the results. Further, having an effective communicator on board that works across the science-policy interface would allow the results to be effectively communicated to the sub-regional or regional decision-making body.

One participant spoke about the role of APN in bringing together projects it funds and disseminating successful stories to the community such as in the present science-policy forum. In Asian countries, there are very mature practices on climate mitigation technology in place and some technology is readily available for practice in Asian countries, particularly developing countries. This said, we are still missing some gap analyses. For example, there are successful stories about the water-energy nexus, and good results from a project on bioenergy and ecosystems in China, India and Philippines.

We need a continuous science-policy platform to encourage best practices in technology in countries in Asia. These kinds of activities need funds and co-financing mechanisms are important to ensure the sustainability of the kinds of science-policy dialogues that are arranged by APN.

It was generally agreed that, whether scientist, policymaker or practitioner, we all share the same challenges posed by climate change. Although there is a degree of uncertainty in the science, taking no action to prepare for adverse events will be costly. For this reason, both mitigation and adaptation need to be integrated to survive in future decades and centuries to come.

The relationship between policymakers and scientists is strong compared with other areas such as Africa and South America. Development in Asia is rapid compared with these other regions.

The Paris Agreement requires stakeholders to act now. The most important stakeholders are the scientists from the research community. They are the sources of knowledge because climate change mitigation and adaptation must rely on scientific data and knowledge, and we must be more active in engaging with policymakers through good communications so that the right, informed-decisions

are made. In Asia, particularly, to achieve low carbon society, the responsibility to do so is very large given the rapid economic growth of the region compared with other regions.

The dialogue presented some of the best practices and success stories, and these success stories can be replicated in the region with some modification. Adopting technology from developed countries may come with strings attached, and using existing technologies available in other developing countries is important.

The APN national Focal Point for Thailand, Dr. Monthip Sriratana, expressed her sincere appreciation to all participants. In the last few days, we have had a very good opportunity to exchange our views and opinions on appropriate mitigation actions, and national strategies for low carbon development including technology assessment, finance and capacity building. There were many discussions among our experts in global change perspectives on low carbon development, and one of the most interesting was on water-energy-carbon nexus in cities, transfer of climate change technology, and capacity building for mitigation and adaptation. Agreeing with Dr. Lohani, she said we should aim a little further by seeing how we can propose to get funds from the Green Climate Fund or the Adaptation Fund. In addition, with that, perhaps a few countries who have the same interests could formulate a proposal together with APN and propose to get funds from different sources.

She finished by thanking APN, LoCARNet and RRC.AP for organizing the meeting and for all participants in ensuring the success of the meeting.

Appendix 1: Report of Capacity Building Workshop on Day One

Summary Report on Day One Capacity Building Workshop

APN, LoCARNet and AIT-RRC.AP Capacity Building Workshop and Science-Policy Dialogue on Climate Change: Low Carbon and Adaptation Initiatives in Asia[18]

SUMMARY

The Low Carbon Asia Research Network (LoCARNet), together with the Asia-Pacific Network for Global Change Research (APN), the Regional Resource Centre for Asia and the Pacific (RRC.AP) of the Asian Institute of Technology (AIT), and the Climate Change Asia (CCA) Initiative organized a three-day capacity-building workshop and policy dialogue on climate change, low carbon and adaptation initiatives in Asia. The three-day event took place in Bangkok on 6-8 February 2017. This report presents a brief summary of the proceedings from the first day relating to LoCARNet's capacity building workshop on climate change and low carbon development in Asia. LoCARNet works to foster dialogues between researchers and policymakers. Its core activities focus on three specific means: policy dialogues, capacity development, and knowledge sharing. With financial support from the Ministry of the Environment of Japan, the Network has facilitated dialogues in several Asian countries such as Bangladesh, Cambodia, Indonesia, Malaysia and Thailand. In continuation with its previous activities, the recently held workshop will bring together regional and national policymakers and experts as well as other public and private stakeholders for informed and practical discussions on challenges and progress toward low carbon development in Asia.

It focused on three thematic sessions:

- *The role of Asia in mitigating climate change: The Paris Agreement and beyond*

This session started with an overall understanding of how Asia has fared so far in its path toward low-carbon society. Following this, the session focused on identifying the gaps in building synergies between research, policymaking and implementation, and highlighted the growing importance of capacity development in Asia.

- *Science-based research and integrated climate policy*

This session discussed science-based methods for assessing low-carbon society measures. Several instances of quantitative tools such as the Japan 2050 Low Carbon Navigator was presented. One presentation highlighted the use of the Asia-Pacific Integrated Model (AIM) and its contribution to developing Thailand's Nationally Determined Contributions (NDCs). The session also presented national perspectives from Thailand for achieving its NDCs.

- *The role of the research community in supporting capacity building for low-carbon development*

This session discussed how to strengthen regional capacities for low carbon development by making use of some of the already existing activities and how to scale up these activities. For this, regional, national and sub-national level experiences from Thailand and Malaysia were presented. This session also highlighted the effort of LoCARNet to support capacity development in Asia.

A panel session followed the thematic sessions to propose the next steps in integrating researchers from different disciplines, taking into consideration the global policy processes (the Paris Agreement and Sustainable Development Goals (SDGs)) and with a focus on Asian regional perspectives.

OPENING SESSION

The opening session set the context of the workshop with welcome remarks senior representatives of the LoCARNet, APN and AIT/RRC.AP. **Mr. Osamu Mizuno, Director of AIT/RRC.AP,** noted that Asia needs to initiate actions to achieve the SDGs and the Paris Agreement. However, Asia faces serious

[18] This report presents the summary of the day one workshop (LoCARNet-related) on capacity building for low carbon development. The science-policy dialogue (APN-related) on days two and three are not included. This brief report has been prepared by Dr. Mustafa Moinuddin, Senior Policy Researcher of Green Economy Area at the Institute for Global Environmental Strategies (IGES).

gaps in capacity in the region's efforts to combatting climate change. He argued that Asia needs capacity building in all areas, but perhaps the most urgent need is for moving from policy to action. Mr. Mizuno informed the audience about a new initiative – Climate Change Asia (CCA), which was launched in January 2016 to meet diverse but specific needs of capacity development in Asia. CCA's activities aim at supporting Asian countries, in particular on capacity development for implementing the SDGs and the Paris Agreement. However, to promote this initiative, CCA needs partnership with like-minded institutes to mobilize available expertise and resources. Mr. Mizuno supported and praised the collaboration between AIT/RRC.AP, LoCARNet and APN for holding the workshop and a policy dialogue in Bangkok, noting that it is a small but important step for low carbon development in Asia.

In his welcome remarks, **Professor Shuzo Nishioka, Secretary General of LoCARNet,** pointed out that a breakthrough in global climate policy was realized at COP21. In order to achieve the 2°C target, knowledge and wisdom from around the world must be collated. Further, having entered the stage of action, for sharing scientific knowledge with civil society, private industry, financial sector, cities and local administrative bodies, it is necessary for the actors involved to implement mitigation and adaptation measures and take action. COP21 bookended an era of protracted climate negotiations and led to a new era for action and implementation towards realizing low-carbon, or decarbonized societies, where not only national governments but also non-state stakeholders will be focused on as actors of the transition. In other words, actual actions on the ground at all levels will take centre stage. Moreover, to carry out the make-it-happen for the transition, we will need to foster science-based expert communities in each country and develop systems to keep the stakeholders concerned, and updated with all available and pertinent knowledge. Professor Nishioka reminded the audience that 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. Improving capacities in this region therefore is utmost important. LoCARNet, together with other institutions sharing similar values, is working on supporting Asia's low carbon development efforts through promoting dialogues among researchers and policymakers. He praised the workshop and policy dialogue initiative, and encouraged the audience to actively participate in the workshop discussions.

Dr. Monthrip Sriratana of APN expressed her satisfaction to the policymakers, experts and other participants at the three-day event. She noted that since its establishment in 1996, APN has been actively promoting low carbon development in Asia. From 2010 onwards, APN has adopted a three-pronged strategy to support (i) regional initiatives (such as low carbon development pathways, scenarios etc.); (ii) capacity building activities, development of educational toolkits, and dialogue between researchers and policymakers; and (iii) communication and networking activities. Dr. Sriratana recalled that the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) noted the optimism that substantial reduction over the next few decades can indeed reduce the threat of climate change in the 21st century and beyond. She further noted that climate technology development and transfer is important in combatting climate change and in developing resilience. She concluded by wishing the success of the workshop and the policy dialogue.

SESSION I
THE ROLE OF ASIA IN MITIGATING CLIMATE CHANGE: THE PARIS AGREEMENT AND BEYOND

This session was chaired by **Professor Shuzo Nishioka of LoCARNet**, and it included three keynote presentations. **Dr. Bindu Lohani, currently a faculty at AIT and former senior official of the Asian Development Bank (ADB)**, talked about Asia's path to a low carbon society. He held that the significance of Asia's role in combatting climate change is clear, and that Asia urgently needs to make some transformational strategies and take actions in order to ensure the success of the Paris Agreement. Dr. Lohani then focused his talk on what Asia looks like now, and what Asia needs to do

to ensure resilient low carbon development. He observed that Asian countries' NDC targets could be achieved just by business as usual activities, but in fact, Asia can contribute far more to the Paris Agreement's success. This, he argues, is logical because it is in Asia's own interest to choose a low carbon path. If nothing is done, then as much as 10% of Asia's GDP can be lost by the year 2100. Dr. Lohani suggested that for Asia, transforming the energy sector would be the key. Under the current or business as usual option, fossil-based conventional fuels will be the bedrock of Asia's energy until 2040. Plenty can be done to change this. He proposes several major transformation opportunities of Asia's energy sector. To begin with, Asia's energy efficiency is now same as the world average, but there are many opportunities to improve the region's energy efficiency, which will contribute immensely to reduce emissions. Next, Asia can focus more on increasing the share of renewables in its total energy use. Unlike the past, now in many countries the cost of generating renewable energy is same or below the cost of conventional fossil fuels. Therefore, it seems appropriate for Asia to focus on renewable energy. Next, many Asian countries are heavily dependent on coal-based power plants. It will be hugely beneficial if the old subcritical power plants are retrofitted with supercritical plants. Other areas that need special focus are cities, urban transport, agriculture land use, low carbon infrastructure and so forth. Dr. Lohani argued that Asia needs to transform policies, strategies and mechanisms. For example, putting a price on carbon (carbon tax) generates tremendous results, and in Asia the cost of carbon tax at a global scenario in terms of GDP reduction is quite small and affordable. Asian countries should work together to lead similar initiatives, and to do most of the things by themselves and within Asia.

Ms. Ina F Islam, Deputy Director of the International Centre for Climate Change and Development (ICCCAD), presented her views on building synergies between research, policymaking and implementation for low carbon development in Asia. She noted that Article 11 of the Paris Agreement places climate change education as a central element in climate action. Capacity and transparency are also emphasized, noting the need for short term as well as long-term capacity, while at the same time capacity building should be participatory, crosscutting and efficient. Ms. Islam observes that the Paris Agreement calls for a paradigm shift, for which enabling creativity is important. To generate a paradigm shift, we need appropriate institutions as platforms. Ms. Islam argues that one major institution could be universities. As the tertiary education institution, universities can bring together researchers and policymakers, and has the capacity for generating knowledge. Based on the experience from her own institute, she called for increased collaborations among academic institutions from North and South, as well as between South and South. She further highlighted that her institute is also actively collaborating with the government through several ministries in Bangladesh.

In the last presentation of the session, **Professor Juan M. Pulhin of the University of the Philippines Los Banos** talked about the growing importance of capacity development in Asia. He started with the challenges of capacity development in the context of the Paris Agreement. Then he introduced the basics of the concept of capacity development, including the process, availability of resources, and the dimensions of capacity development. Professor Pulhin explained the capacity development needs for a low carbon Asia and provided several examples of capacity development initiatives towards low carbon society. At the regional level, APN's training workshops that develop scientific capacity to formulate low carbon scenarios and pathways, dialogues between researchers and national/ local policymakers in developing member countries, and development of educational toolkits on low carbon development were emphasized. Professor Pulhin also provided national level examples from the Philippines such as training on the conduct of GHG inventory for incorporation in the Local Climate Change Action Plan and capacity development of local government authorities on climate resilience and green growth. He concluded by highlighting that moving from high carbon path of development towards a low carbon society in Asia requires more comprehensive, integrated, and sustained capacity development process at the individual, organizational, and environment

levels across space and time. Different stakeholders requires different types of capacity development to realize the low carbon society goal in Asia, which requires more investments. Finally, concerted capacity development efforts at the local, national and regional levels in the spirit of collaboration and sharing of resources will better achieve the goal of low carbon development in the Asian Region.

Following the keynote presentations, an open floor discussion was held to allow the audience to have a more lively discussion with the three panellists. One major issue raised from the audience was regarding funding for adaptation measures. Climate funding has typically gone more in the direction of mitigation actions, but in Asian developing countries, adaption may be more important. It was suggested by the panellists that it would be effective to make climate screening for adaptation mandatory for certain projects. For example, renewable energy projects already spare some money for adaptation. In addition, at present, funding for adaption in Asia is not too bad. Another important issue raised during the discussion was about bridging the gap between research and policymaking. The panellists suggested that incremental approach in bringing various stakeholders together is necessary. It takes time to build relationships. One panellist also observed that developing countries probably spend too little in research and development. Finally, it was suggested that, unlike the past, capacity development initiatives need to focus more on the longer-term rather than the short term to ensure effectivity.

SESSION II
SCIENCE-BASED RESEARCH AND INTEGRATED CLIMATE POLICY

Dr. Bindu Lohani of Asian Institute of Technology chaired this session on science-based research and integrated climate policy. The panellists of this session presented several instances of the use of analytical tools that have been used, or can be used in formulating and analyzing climate-related policies. **Dr. Phirun Saiyasitpanich, Director of Climate Change Management Coordination Division of Thailand's Office of Natural Resources and Environmental Policy and Planning,** discussed about achieving Thailand's NDCs from the national perspective. Starting with an overview of Thailand's climate change situation and impacts, Dr. Saiyasitpanich discussed the Paris Agreement and Thailand's response to the Agreement. This was followed by an explanation of Thailand's efforts to address climate change, including the national institutional structure for climate change mitigation. The final part of Dr. Saiyasitpanich's presentation focused on Thailand's INDC/NDC, how they were formulated, the procedures for NDC roadmap development, plans to meet the NDC targets as well as the supporting measures. The national-level example from Thailand provides a clear picture of the interaction between science and policy and its significance in informed, integrated climate policymaking.

The next panellist, **Dr. Bundit Limmeechokchai of Sirindhorn International Institute of Technology at Thammasat University** discussed about quantitative analytical tools for assessing low carbon society measures in Asia. He shared his experience of using the Asia-Pacific Integrated Model (AIM) for Thailand. The AIM model, developed by the National Institute for Environmental Studies (NIES) of Japan, is a very useful tool used for emissions mitigation analysis. The AIM modelling framework can be applied both at national and global levels, which can take a top-down (AIM/CGE), hybrid (Aim/ExSS, AIM/Enduse, AIM/Backcast and AIM/Energy Snapshot), or bottom-up approach (Element/transition (service demand)). Dr. Limmeechokchai introduced the variants of the AIM model. Next, he explained the low carbon society (LCS) modelling for Thailand. For example, the LCS scenarios were developed by AIM/ExSS, the mitigation targets and the roadmap to low carbon Thailand were developed by AIM/Enduse, and economic impacts were analyzed using AIM/CGE. Dr. Limmeechokchai's presentation included the role of Integrated Assessment Model (IAM) in Thailand's domestic discussions. Then he focused his discussion on a policy package for roadmap to "low carbon Thailand". He provided how the IAM was successfully applied to Thailand's LCS,

explaining the high potential scenarios, abatement costs, co-benefits, and identified actions necessary for achieving LCS.

Dr. Mustafa Moinuddin, Senior Policy Researcher at the Green Economy Area of the Institute for Global Environmental Strategies (IGES) then presented the Japan 2050 Low Carbon Navigator, an innovative, easy-to use simulation tool for assessing Japan's energy systems and emissions up to 2050. His presentation focused on how the tool can be applied for assessing climate policy impacts. He provided background information on Japan's energy and climate policies, and the 4th strategic energy plan. Next, the key features of the Japan 2050 Low Carbon Navigator — including the methodologies, scenarios and trajectories setting, how results are generated, and what questions it can respond — were introduced. Dr. Moinuddin then explained how the Navigator tool has been modified to help assess the 3E+S (economic efficiency, energy security, environmental protection, and safety) policies as set forth in Japan's 4th strategic energy plan. Based on the inputs provided by the users of the Navigator, the tool generates results on the impacts related to the 3E+S policy, reflected through changes in a set of predetermined indicators (dependence on imported energy, diversification of energy sources, total and sectoral costs per capita, total greenhouse gas emissions and emissions intensity of energy, and share of nuclear in power generation mix) that are included in the Navigator. Dr. Moinuddin informed the audience that the Navigator has been developed as a tool that gives the users an option to look ahead and to understand what would happen and what could be done. In this end, the inclusion of option to see how the chosen pathways affect governmental policies (i.e. the "3E+S" objectives), is unique and useful. He further demonstrated that the tool could also be used for assessing various pathways for achieving Japan's NDC and associated additional costs. The Japan 2050 Low Carbon Navigator, he concluded, serves as an important tool to generate awareness among researchers, policymakers and the public, provides a platform for engaging debate on the energy and emissions choices that Japan faces, and serves as an easy-to-use but practical education tool.

Following the presentations, the panellists also responded to some queries and questions from the floor. Several questions were asked about the replicability of the discussed scientific methodologies in other country situations. The panellists provided examples of how these and similar tools and methodologies are already being used in some other Asian countries, and informed the audience that all these methodologies can be used in or developed for other countries as well. There were specific issues raised, such as the choice of indicators for safety under the 3E+S policy assessment in the Low Carbon Navigator. Some audience suggested that share of nuclear in the total power generation may not always reflect safety, for which the panellist as well as the session chair explained that the issue of safety varies from country to country and hence it is contextual. In post-Fukushima Japan, given public concerns, nuclear safety is a national issue and the proxy indicator thus is suitable for Japan. On other issues, data sources as well as the quality of data were also discussed. The panellists concerned explained what type of data has been used in the models, how they were treated and how they were reviewed by several other institutions. The overall discussion of the session provided both generic and specific examples and guidance for demonstrating how science-based research can reinforce integrated climate policymaking.

SESSION III
ROLE OF THE RESEARCH COMMUNITY IN SUPPORTING CAPACITY BUILDING TO FACILITATE COUTNRY-LEVEL LOW CARBON DEVELOPMENT

Chaired by **Dr. Bundit Limmeechokchai of Sirindhorn International Institute of Technology at Thammasat University,** this session included three panellists talking about the role that the research community can play in supporting capacity building for low carbon development at the country level. **Ms. Tomoko Ishikawa from the LoCARNet Secretariat at IGES** was the first panellist. Her discussions focused on three major topics: why capacity development is urgently needed in context of Paris

Agreement; present circumstances and opportunities of capacity building for LCD in developing countries, particularly in Asia; and role of research community and Low Carbon Asia Research Network (LoCARNet) as practical example. She noted that in the context of the Paris Agreement, Asia has crucial roles and responsibilities in terms of climate stabilization, and that capacity building for supporting developing countries' leapfrog development should be put forward. LoCARNet, she explained, is working in this end, as demonstrated by various examples provided in her presentation. There are many positive signs that have also emerged recently. For example, Thailand, Malaysia, and Indonesia already established links with science and policy, and some other countries such as Vietnam and Cambodia are in the process of forming research communities. However, Ms. Ishikawa further noted that research communities in Asia are still insufficient and that there is an urgent need to bridge science to actions and implementations in close collaboration with experts in this region.

Next, **Professor Ho Chin Siong from Universiti Teknologi Malaysia** talked about the capacity building needs for low carbon development at subnational/city level in Asia. Based on his own work, he shared experiences from Iskandar city project in Malaysia. He explained Malaysia's commitment to address climate change and low carbon development, including country-level plans, issues and visions. Then he explained how the Iskandar city project evolved from a policy blue print to a local action plan. He briefly explained the modelling and policy documentation for the low carbon development project, including the roadmap towards low carbon Iskandar by 2025 and ways to accelerate the implementation of decarbonization. Professor Ho noted that the role of research communities towards NDC development and implementation is by working in collaboration with policymakers with good methodology, baseline study with models, and developing scenarios for policymakers to make better objective decision. Effective implementation of low carbon measures at city level needs multi-disciplinary professional input, and multi stakeholders and buy in. Low carbon measures has to relate to local co benefits (safety, income generation or increase in property value, health improvement, better air quality, saving from commuting, stronger community engagement and interaction). Finally, he highlighted that S2A (Science to Action) paradigm can facilitate the formulation and implementation of science-based policies for low-carbon development in the Asian region in order to realize a sustainable future based on a stabilized climate.

The final presentation of the session was made by **Ms. Chanyaphak Wathanachinda from Climate Change International Technical and Training Center (CITC), Thailand Greenhouse Gas Management Organization (Public Organization) (TGO).** Ms. Wathanachinda share the experience of Thailand from working on capacity building needs for low carbon development. She observed that both the Paris Agreement and the SDGs call for enhancing capacity development for efficient implementation. She recalled Thailand's NDCs and stressed the significance of capacity building for achieving the NDCs. Ms. Wathanachinda then introduced her own institute, CITC with specific illustrations of the activities related to capacity development for climate change. She highlighted that CITC services include training, networking and collaboration, and knowledge dissemination, all of which are significant for capacity development. She further elaborated the CITC knowledge areas, which include climate change policy, climate change actions for adaptation and mitigation, and climate change sciences, and greenhouse gases inventory and accounting. Then she elaborated a number of signature courses on climate change offered by the CITC to policymakers and local government officials, researchers and academicians, practitioners, as well as financial and other specialized agency officials. The courses, ranging from climate change economics to management for sustainable development to climate change finance, are offered both for domestic and international audiences.

A question and answer session followed the panel presentations. There was an inquiry for Professor Ho about the selection of Iskandar, a Malaysian city for the model low carbon development project. Professor Ho explained that a Malaysian city might provide as an intermediate example for the

model project, which other Asian developing countries could follow up. This would not be the case if for example a Japanese city were chosen, because the gap between a Japanese city and another city from developing Asia may be too big and may not be a role model. There was another question whether low carbon development is compatible with economic growth or not. There is a general perception that low carbon development could be expensive and may retard economic growth. The panellist explained that this is not necessarily the case as low carbon actions can also promote growth. One of the audience also pointed to the studies done under UNEP/PAGE's Green Economy Initiative, where it is quantitatively demonstrated that green investment for green growth can in fact generate economic growth and create job opportunities, among other benefits. Another issue discussed was about linking national and local level implementation. The panellists pointed out that at the national level it is more related to political statements but the real actions for implementation take place at the local level. Nonetheless, central and regional governments also play an important role by providing support to these activities.

SESSION IV
PANEL DICUSSIONS/CLOSING

The final session of the day was through a panel discussion followed by closing remarks. P**rofessor Shuzo Nishioka of LoCARNet** chaired this session. The panel members for this session were **Dr. Bindu Lohani of AIT, Ms. Ina F. Islam of ICCCAD, Dr. Bundit Limeechakchai of SIIT/TU, Prof. Ho Chin Siong of UTM, Dr. Shobhakar Dhakal of AIT and Professor Juan M. Pulhin of UPLB.** In the beginning, the chair explained that now that the Paris Agreement is already active, capacity building is emphasized and needs urgent action. The roles of cities, companies and people are also far more emphasized than the past. He outlined three specific questions/issues upon which the panel discussion will concentrate:

- Intervention on how to (i) integrate researchers from different disciplines, and (ii) enhance dialogue among research communities and decision makers;
- Specific focus on global policy process (the Paris Agreement and SDGs); and
- Specific focus on Asian regional perspectives.

One panelist noted that the first question was the focus of the daylong discussion. How to integrate different disciplines is a complex issue that it will require multi-stakeholders involvement. It needs a paradigm shift in terms of breaking the disciplinary barriers. Multi- and transdisciplinary approaches are needed. This needs to be institutionalized at academic and research institutes. A university-based example was given. The university has recently institutionalized an interdisciplinary centre where faculties come from various backgrounds ranging from engineering to social science to identify and address problems in an interdisciplinary manner. There is a need to promote more dialogues on problem-related issues. Engaging targeted stakeholders to the output dissemination is also important. It would be valuable to take an aim-oriented approach, such as what type of knowledge outputs are aimed at. It generates interests among stakeholders. Enhancement of dialogues for effective communication is central to this discussion. Therefore, the question is how to communicate efficiently in a manner that is not only understandable, but also relevant and appreciated by policymakers. Video or images can be helpful to gain the interest of policymakers and address their problems. Thus, it is necessary to look for champions in terms of policymaking and working with them from the beginning.

The need for multidisciplinary approach was endorsed by other panellists as well, particularly because addressing the problems often go through a spectrum of disciplines. The difficulty in integrating researchers from so many different disciplines were noted. It was suggested that the concept of low carbon development should be introduced even at the school level, and that schoolteachers can act as the low carbon champions. Schools thus can play a key role in low carbons society development.

The role that funding agencies can play in the multidisciplinary integration was also discussed. For example, under the Future Earth funding initiative, both research questions and researchers involved must be multidisciplinary. Therefore, it was suggested that how the funding agencies can work to promote multidisciplinary approaches could be further elaborated. The chair supported the question and provided examples of a 1999 Japanese scheme on trans-ministerial research funding plans, noting that it can be a useful way of which other countries can follow. The chair also recalled his experience from reviewing a report of the IPCC, where he found that the task needed multidisciplinary approach, especially from the science community.

One of the panellists pointed out that the intent for integrating researchers and policymakers need to be clear from the very beginning. Then comes the question of what platform should be used for integrating different stakeholders groups. Universities, for example, could be an ideal platform where multiple stakeholders, governments and private groups can be easily brought together. It is also the platform where knowledge is generated. Some important steps are partnerships among universities from developed and developing countries as well as among developing countries themselves.
A gap in the SDGs in terms of inter-related research was discussed when focusing on the question on global policy processes. For example, there are separate goals for water and energy, but nothing related to their nexus. Similar silo approach is seen in academia as well as the multilateral development banks. There is a need for both top-down and bottom-up approaches.

The issue of cost of policy was raised. It is easy to say there is a need for policy change, for example from coal to renewables. However, for many countries it will incur a cost of millions of dollars. So, the process is not as straightforward as it seems. Many other things need to be taken care of.

The role of the media is also important. Politicians often prefer to be present where media is present. To enhance dialogues, media and press can be used. For example, at the local level, media can play an important role in bringing the community and decision makers together. Another way to work with the press, one panellist suggested, is to train the reporters. There is an example from Bangladesh where ICCCAD trained an English language daily newspaper, and now the newspaper even goes to COP events to cover the news. It is often said that there is not enough evidence-based policy. However, often quality research is also not available. So often, it makes a difference to look at how to develop partnership between senior and junior researchers. In Bangladesh, ICCCAD is working on developing a website compiling all publications on Bangladesh, either by researchers who wrote on Bangladesh, or by Bangladeshis who worked on climate change in general. These could be some instances to follow on.

Given the common issues and challenges, the significance of regional cooperation in Asia was emphasized. If foreign direct investment comes in, when there is one country, which applies carbon tax while another country does not, then there is no level playing field. Policy harmonization through regional cooperation is therefore important.

It is clear that Asia needs some transformative changes. The role of networks such as LoCARNet and LCSR-Net are cucial. During one of the presentations, there were explanations of activities conducted by these two networks, with a number of activities already implemented, and the networks very active. However, the challenges ahead for Asia are also huge and LoCARNet and LCS-RNet should be further promoted to address them. These networks can perhaps pick up a few issues from this workshop (such as regional cooperation and common issues) and put them in the agenda for LoCARNet's upcoming Annual Meeting in late 2017.

Appendix 2: Agenda

APN, LoCARNet and AIT-RRC.AP
Capacity Building Workshop and Science-Policy Dialogue on
Climate Change: Low Carbon and Adaptation Initiatives in Asia
6th-8th February, 2017
Venue: AIT Conference Centre, Asian Institute of Technology (AIT), Thailand

DAY ONE: 6th February 2017 – Capacity Building Workshop

	Registration
08:15-08:45	**Registration of delegates and invitees.** *All delegates are kindly asked to be seated by 9:00am for the official opening of the Capacity Building Workshop and Science-Policy Dialogue.*
	Opening Session
09:00-09:10	**Welcome Remarks** *Mr. Osamu Mizuno, Regional Resource Centre for Asia and the Pacific (RRC.AP), AIT*
09:10-09:20	**Welcome Remarks** *Prof. Shuzo Nishioka, LoCARNet*
09:20-09:30	**Welcome Remarks** *Dr. Monthip Sriratana Tabucanon, APN*
09:30-11:00	**Session I: The Role of Asia in Mitigating Climate Change: The Paris Agreement and Beyond** *Chair: Prof. Shuzo Nishioka, LoCARNet*
09:30-09:50	**Asia's Path to a Low Carbon Society** *Dr. Bindu Lohani, Asian Institute of Technology*
09:50-10:10	**Building Synergies between Research, Policymaking and Implementation for Low Carbon Development in Asia: Identifying the Gaps** *Ms. Ina F. Islam, ICCCAD*
10:10-10:30	**Growing Importance of Capacity Development in Asia** *Dr. Juan Pulhin, University of the Philippines Los Baños*
10:30-11:00	**Open Discussion**
11:00-11:15	***Refreshments***
11:15-13:00	**Session II: Science-based Research and Integrated Climate Policy** *Chair: Dr. Bindu Lohani*
11:15-11:40	**Achieving Thailand's Nationally Determined Contributions: National Perspective** *Dr. Phirun Saiyasitpanich, ONEP*
11:40-12:05	**Quantitative Analytical Tools for Assessing Low Carbon Society Measures: Country-level Examples** *Dr. Bundit Limmeechokchai, SIIT/TU*
12:05-12:30	**Japan 2050 Low Carbon Navigator: Possible application for assessing climate policy impacts** *Dr. Mustafa Moinuddin, IGES*
12:30-13:00	**Open Discussion**
13:00-14:30	**Lunch**

14:30-15:50	**Session III: Role of the Research Community in Supporting Capacity Building to Facilitate Country-Level Low Carbon Development** *Chair: Dr. Bundit Limmeechokchai, SIIT/TU*
14:30-14:50	***General introduction on LoCARNet Setting the Scene – Roles and Objectives*** *Ms. Tomoko Ishikawa, LoCARNet*
14:50-15:10	***Capacity Building Needs for Low Carbon Development at the Sub-National Level in Asia: Experiences from Iskandar City Project*** *Prof. Ho Chin Siong, UTM*
15:10-15:30	***Capacity Building Needs for Low Carbon Development in Asia: The Thailand Experience*** *Dr. Jakkanit Kananurak, TGO*
15:30-15:50	**Open Discussion**
15:00-16:10	***Refreshments***
16:00-17:15	**Session IV: Panel Discussion/Closing** *Prof. Shuzo Nishioka, LoCARNet*
16:15-17:15	**Panel Discussion** • Intervention on how to (i) integrate researchers from different disciplines and (ii) enhance dialogue among research communities and decision makers • Focus on global policy processes (The Paris Agreement and Sustainable Development Goals) • Focus on Asian regional perspectives **Panellists (Tentative Names, TBC)** *Dr. Bindu Lohani, AIT* *Dr. Ina F. Islam, ICCCAD* *Dr. Bundit Limmeechokchai, SIIT/TU* *Prof. Ho Chin Siong, UTM* *Dr. Shobhakar Dhakal, AIT* *Dr. Juan Pulhin, UPLB*
17:15-17:25	**Closing Remarks and Vote of Thanks** *Prof. Shuzo Nishioka, LoCARNet*
17:25-17:30	**Housekeeping Announcements** *APN & AIT-RRC.AP*

DAY TWO: 7th February 2017

Science-Policy Dialogue

09:00-09:20	**Setting the Scene – Roles and Objectives** *Dr. Linda Anne Stevenson, APN Secretariat*
09:20-09:40	**Participants Self Introduction** *Facilitated by Dr. Linda Anne Stevenson, APN Secretariat*
09:40-10:10	**Group Photo and Refreshments** All participants have a group photograph taken before the refreshments

Session One: Case Studies from APN Low Carbon Initiatives Framework
Co-Chairs: Dr. Juan Pulhin and Dr. Sangam Shrestha

Session One **10:10-11:20**	**Keynote Speech and Rapid Talks**
10:10-10:30 (20 min)	**Keynote Speech: Towards a better Water-Energy-Carbon nexus in Asian Cities** – *Dr. Shobhakar Dhakal, Asian Institute of Technology*
10:30-10:40 (10 min)	**1. Scaling up low carbon technology in construction & infrastructure Sector** – *Ms. Pratibha Ruth Caleb, Development Alternatives, India*
10:40-10:50 (10 min)	**2. Low carbon infrastructure investment – Indonesia Case** – *Prof. Rizaldi Boer, Bogor Agricultural University, Indonesia*
10:50-11:05 (15 min)	**3. Policy Talk: Integrating Scientific Knowledge into Policy in Asian Cities: A case of Bangkok, Thailand** – *Dr. Monthip Sriratana Tabucanon, NRCT, Thailand*
11:05-11:20 (15 min)	**4. Policy Talk: Low carbon development in cities for a sustainable and resilient South Asia** – *Mr. Keshav Kumar Jha, ICLEI South Asia, India*
11:20-12:00	**Panel Discussion Session on Low Carbon Development in Asian Cities** Panellist 1: Dr. Shobhakar Dhakal Panellist 2: Dr. Rizaldi Boer Panellist 3: Dr. Monthip Sriratana Tabucanon Panellist 4: Mr. Keshav Kumar Jha Panellist 5: Ms. Pratibha Ruth Caleb
12:00-13:00	***Lunch***
13:00-14:00	**Participatory Games: Full details will be provided during the SPD.**
14:00-15:00	**Knowledge-Sharing Café Kiosk**

Café Kiosk 1 – Science & Policy Moderator: Dr. M. Moinuddin Rapporteur: Mr. Dorji Wangchuk	Café Kiosk 2 – Knowledge Management Moderator: Dr. K. Bettinger Rapporteur: Dr. Ina F. Islam	Café Kiosk 3 - Communication Moderator: Dr. R. Boer Rapporteur: G.S. Immanuel

15:00-15:30	***Refreshments***
15:30-16:00	**Reports from Kiosks 1, 2 and 3** Led by Co-Chairs for the session with summaries from each Kiosk session (A moderator and reporter will be assigned for each Kiosk team who will have 10 minutes to provide a brief summary of the outcomes via PowerPoint)
16:00-16:45	**Roundtable Discussion on Kiosk Outputs** Led by Co-Chairs of the session

DAY THREE: 8th February 2017

Science-Policy Dialogue

Session Two: Case Studies from APN related to LCD and Climate Change

Co-Chairs: Dr. Erna Sri Adiningsih and Dr. Muhammad Helmi Bin Abdullah

Session Two **09:00-10:00**	**Rapid Talks**
09:00-09:10 (10 min)	1. **Role of bioenergy in enhancing energy, food and ecosystem sustainability** – *Dr. Lilibeth Acosta-Michlik, University of the Philippines Los Banos College, Philippines*
09:10-09:20 (10 min)	**2. Strengthening community responses in REDD+ policy** – *Mr. Tai Keo, Non-Timber Forest Product – Exchange Programme, Cambodia*
09:20-09:30 (10 min)	**3. Identification of best agricultural practices with better GHG benefits in salinity-affected areas in South Asia** – *Dr. Erandathie Lokupitiya, University of Colombo, Sri Lanka*
09:30-09:40 (10 min)	**4. Policy Talk: Designing, developing and managing climate change information and knowledge management systems in Cambodia** – *Ms. Vichet Ratha Khlok, Department of Climate Change, Government of Cambodia*
09:40-09:50 (10 min)	**5. Policy Talk: Importance of gender equity in low carbon development for a sustainable Asia** – *Mr. Marvin Lagonera, ICLEI Southeast Asia, Philippines*
09:50-10:30	**Panel Session** Panellist 1: Dr. Lilibeth Acosta-Michlik Panellist 2: Ms. Tai Keo Panellist 3: Dr. Erandathie Lokupitiya Panellist 4: Ms. Vichet Ratha Khlok Panellist 5: Mr. Marvin Lagonera
10:30-10:50	***Refreshments***
10:50-11:40	**Knowledge-Sharing Café Kiosk Session Two**

Café Kiosk 1 – Science & Policy Moderator: Dr. M. Moinuddin Rapporteur: Mr. Dorji Wangchuk	Café Kiosk 2 – Knowledge Management Moderator: Dr. K. Bettinger Rapporteur: Dr. Ina F. Islam	Café Kiosk 3 - Communication Moderator: tbc Rapporteur: tbc

11:40-12:10	**Reports from Kiosks 1,2 and 3** Led by Co-Chairs of the session with summaries from each Kiosk session (A moderator and reporter will be assigned for each Kiosk team who will have 10 minutes to provide a brief summary of the outcomes via PowerPoint)
12:10-13:00	**Roundtable Discussion on Kiosk Outputs** Led by Co-Chairs of the session with summaries from each Kiosk session (A moderator and reporter will be assigned for each Kiosk team who will have 10 minutes to provide a brief summary of the outcomes via PowerPoint)
13:00-14:00	***Lunch***

Session Three: Adaptation and Mitigation under the Paris Agreement

Co-Chairs: Dr. Saleemul Huq and Prof. Mukand Babel

14:00-14:50 10 min	**Rapid Talks** **1. Integrated, resilience-based planning for mitigation and adaptation in Asia** – *Dr. Ayyoob Sharifi, NIES, Japan*

10 min	**2. Climate smart agriculture: Using best practices for mitigation and adaptation in Asia** – *Ms. Nuzba Shaheen, GCISC, Pakistan*
10 min	**3. Capacity building and the Paris Agreement: ADAPT Asia's future activities** – *Dr. Keith Bettinger, ADAPT Asia*
10 min	**4. Climate change technology transfer and capacity building for adaptation and mitigation under the Paris Agreement** – *Dr. Sudhir Sharma, UNEP-ROAP*
10 min	**5. Climate Change Technology Transfer and Capacity Building for adaptation and mitigation under the Paris Agreement: Experience of India** – *Dr. Ajay Raghava, Government of India, India*
14:50-15:20	**Panel Session** Prof. Mukand Babel will take two minutes to briefly introduce Climate Change Asia (CCA) before the panel session begins. Panellist 1: Dr. Ayyoob Sharifi Panellist 2: Dr. Keith Bettinger Panellist 3: Ms. Nuzba Shaheen Panellist 4: Dr. Ajay Raghava Panellist 5: Mr. Jens Radschinski Panellist 6: Dr. Sudhir Sharma
15:20-16:00	**Knowledge-Sharing Café Kiosk Session Three (with Refreshments)**

Café Kiosk 1 – Science & Policy Moderator: Dr. M. Moinuddin Rapporteur: Mr. Dorji Wangchuk	Café Kiosk 2 – Knowledge Management Moderator: Dr. K. Bettinger Rapporteur: Dr. Ina F. Islam	Café Kiosk 3 - Communication Moderator: tbc Rapporteur: tbc

16:00-16:30	**Reports from Kiosks 1,2 and 3** Led by Co-Chairs of the session with summaries from each Kiosk session (A moderator and reporter will be assigned for each Kiosk team who will have 10 minutes to provide a brief summary of the outcomes via PowerPoint)
16:30-17:00	**Roundtable Discussion on Kiosk Outputs** Led by Co-Chairs of the session with summaries from each Kiosk session (A moderator and reporter will be assigned for each Kiosk team who will have 10 minutes to provide a brief summary of the outcomes via PowerPoint)
Session Four: Outcomes of the Dialogue Co-Chairs: Dr. Linda Anne Stevenson and Dr. Mara Mendes	
17:00-17:30	**Sharing Thoughts – Round table dialogue were participants will be asked to give their thoughts on:** What we have learned to facilitate better science-policy interactions.
17:30-17:45	**Closing Remarks and vote of Thanks** Dr. Monthip Sriratana Tabucanon, APN Prof. Shuzo Nishioka, LoCARNet Mr. Osamu Mizuno, AIT-RRC.AP

Appendix 3: Participants list

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Appendix 4: PowerPoint Presentations

Setting the Scene
Roles & Objectives

Dr. Linda Anne Stevenson

APN, LoCARNet and AIT-RRC.AP Capacity Building Workshop

And Science-Policy dialogue on Climate Change:

Low Carbon and Adaptation Initiatives in Asia

Objectives of the Dialogue

These are simple. There are only five:

- ✓ To hear about **Low Carbon Initiative Projects'** outputs from APN's Low Carbon Initiatives Framework (LCI) as well as APN projects on adaptation/mitigation under our CRRP research programme
- ✓ To listen to perspective on low carbon development from **policy makers**
- ✓ To hear about regional programs such as ICLEI South and Southeast Asia's perspective on Low Carbon Development as well as ADAPT Asia's initiatives in the Asia-Pacific region
- ✓ To share **knowledge** & **best practices in 3 areas:**
  - **Science-Policy Interactions**
  - **Knowledge Management**
  - **Communication & Networking**
- ✓ To **network, communicate, make friends through game playing** and **build relationships** that last.

Activities & Engagement: Everyone has a Role!

- ✓ Keynote presentation from (one of our champions) Dr. Shobhakar Dhakal
- ✓ Rapid Talks around 3 main themes:
  - ❑ APN LCI Framework Projects
  - ❑ Cases studies from other LCD Projects run by APN
  - ❑ Adaptation and Mitigation under the Paris Agreement
- ✓ Interactive Panel Sessions
- ✓ Participatory game on resilience to climate impacts
- ✓ Café Kiosks (look at the back of your name tag)
  - ✓ **Science-Policy**
  - ✓ **Knowledge Management**
  - ✓ **Communication and Networking**
- ✓ Panel and Roundtable Discussions

Successfully addressing regional-level climate issues in the Asia-Pacific region requires some basics

- ✓ **UNDERSTANDING:** regional and cultural diversities that exist in the region; traditional knowledge is powerful (one size does not fit all)…
- ✓ **CREATING:** opportunities for informal dialogues with stakeholders at sub-regional levels (addressing common issues, builds trust sense of ownership and less intimidating)…
- ✓ **ENGAGING:** in activities that involve all stakeholders and engaging in and listening to those who are most at risk…
- ✓ **SHARING & COMMUNICATING:** the most important factor across the region is the human factor: sharing information, data, transferring knowledge, experiences and best practices…

History & Content of Science-Policy Dialogues

1. Thailand, Bangkok mid-2013 (Southeast Asia)
- Science-policy
- Knowledge management
- Networking and communication

2. Bhutan, January 2015 (South Asia)
- Science-policy
- Knowledge management
- Networking and communication

3. Mongolia, November 2015 (East Asia)
- Science-policy
- Knowledge management
- Networking and communication

BHUTAN SPD

BHUTAN SPD

Science-Policy Effectiveness

1. Mechanism is needed to monitor and evaluate research findings that have been effective on the ground in developing policy and REWARD such incentives.
2. Intermediate agents need to take an active role to narrow gaps in communication between policy makers and scientific community
3. For science-policy dialogues to be more attractive, involvement of a champion is desirable
4. Regional dialogues provide opportunities to gain knowledge from other countries and scientific studies

Outcomes & Outputs

✓**Expected Outcomes:**

1. Dialogue at the sub-regional levels of South and Southeast Asia were participants don't feel that they are representing their institutions' or parties' perspectives
2. "Serious" fun through interactive games and café carousels
3. Shared understanding on Low Carbon Initiatives and Adaptation in South Asia and Southeast Asia and under the Paris Agreement
4. Strengthen interactions among scientists and policy makers.
5. understanding the uncertainty of environmental changes and boosting the importance on low carbon society, adaptation, preparedness

✓**Expected Outputs:**

1. Questionnaire feedback on usefulness of dialogue (this will be sent to participants later)
2. Science-Policy Dialogue "Policy Brief" for dissemination
3. Contribution to the Synthesis of dialogues in the Asia-Pacific region.

ขอขอบคุณ

THANK YOU

Towards a better Water-Energy-Carbon nexus in Asian Cities

Shobhakar Dhakal, Ph.D.
Head, Department of Energy, Environment & Climate Change,
School of Environment, Resources and Development
Asian Institute of Technology

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

Water-Energy-Carbon Nexus

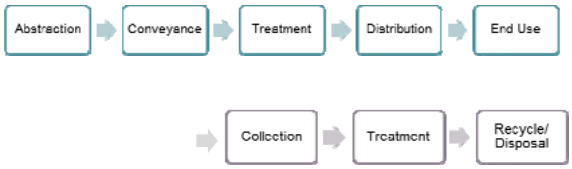
- Mostly Water & Energy are managed as separate entities
- Water and Energy management are fundamental to many other sectors (Agriculture, energy, cities, wastewater treatment etc.)
- Global water withdrawals for energy production - 583 bn m^3, or some 15% of the world's total water withdrawals in 2010 (IEA, 2012)
- Need a coupled understanding of Water-energy-carbon comprehensively and quantitatively for multiple objectives

1. Energy use in water sector is growing to meet increasing water demand
2. Energy sectors are growing which needs more water.
3. This nexus contribute to the emission of GHGs

Where water in needed in energy sector?

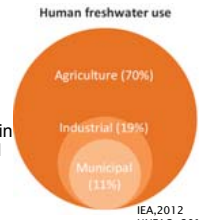
- Oil and gas- Drilling, hydraulic fracturing, reservoir injection enhanced oil recovery, oil sands mining etc.
- Coal – cutting and dust suppression, washing, coal slurry transport, etc.
- Biofuels- irrigation, washing etc.
- Thermal power generation- boiler feed, cooling, pollutants scrubbing
- Concentration solar power and geothermal – steam generation, cooling etc.
- Hydropower – electricity generation, storage

Where energy is needed in water sector?



Significance to cities

- Cities are the major consumer of water and energy, along with other materials or resources.
- Per capita carbon footprints of cities, especially in developing countries, are much higher compared to peri-urban and rural, with large contribution to national emissions.
- Low carbon cities need to optimize many low carbon opportunities in the urban systems across all sectors.



IEA,2012
UNFAO, 2012

Better WEC Nexus

Three pressing urban policy Issues
- Climate change mitigation
- Energy security
- Water security

APN- Project

Understanding and Quantifying the Water-Energy-Carbon Nexus for Low Carbon Development in Asian Cities

Project Reference Number: LCI2013-02CMY(R)-Dhakal

http://www.wec-nexus.ait.asia

Dr. Shobhakar Dhakal, AIT
Dr. Sangam Shrestha, AIT
Mr. Ashish Shrestha, AIT
Prof. Shinji Kaneko, Hiroshima University
Prof. Arun Kansal, TERI University

Our project framework

- Energy for water is more significant than water for energy in city-context.
- Energy footprint has implications on carbon footprint.
- Quantification of footprints to clarify the avenues and extent to optimize systems.
- Focus on urban water and waste water sector

Case Studies

Bangkok Metropolitan Region

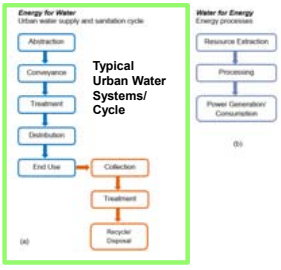
- Cover total area of 7,761.50 km²
- Population: 10.5 million

Tokyo

- Cover total area of total area of 1,235 km²
- Population: 13 million

National Capital Territory, Delhi

- Cover total area of total area of 1,486 km²
- Population: 16.7 million



Energy Use: Typical Figures from Literature Survey

Countries	Energy requirements	Energy Intensity (kWh/m³)	
		Range	Average
Australia	Energy: Water Utilities	0.09 – 1.84	0.72
	Energy Wastewater Utilities	0.47 – 1.13	0.77
United States	Production & distribution of potable water in Western US	1.32 – 3.96	-
	Production & distribution of potable water in Eastern US	0.48 – 0.66	-
	Range for water supply utilities	0.08 – 1.00	
	Range for wastewater utilities	0.20 – 0.90	
	California – Water conveyance	0.00 – 1.06	-
	California – Water Treatment	0.03 – 4.23	-
	California – Water Distribution	0.18 – 0.32	-
	California – Wastewater collection & treatment	0.29 – 1.22	-
Germany	Water conveyance & treatment	0.12 – 1.13	-
	Water Distribution	0.03 – 0.58	-
	Wastewater collection & treatment	0.39 – 0.83	-
Singapore	NEWater for uses such as industry	0.7–1.2	0.95
	Seawater desalination	3.9–4.3	4.1
	Wastewater treatment	0.52 - 0.89	
Norway (Oslo)	Electricity use in Water treatment and supply (2000- 2006)	0.38 – 0.44	0.40
	Electricity use in Wastewater collection and treatment (2000-2006)	0.67 – 0.87	0.80

Abstraction and conveyance energy intensity- what matters?

Ground water withdrawal

Surface water withdrawal

Distance of transport

Storage or dams

Loss – piped network or open canal

Case Studies – Findings

Abstraction → Conveyance → Treatment → Distribution → End Use → Collection → Treatment → Recycle/ Disposal

- Source: **Surface Water** from Chao Phraya river and Mae Klong river.
- Ground water extraction is prohibited since 1983.
- **Energy Intensity** = **0.10 kWh/m³**
- **Carbon Footprint** = **0.49 kg CO_2/m³**

Bangkok (BMR)

- Source of water: **Surface Water** from Yamuna and Ganga River; & **Ground water**.
- **Energy Intensity** = **0.58 kWh/m³**
- **Carbon Footprint** = **0.47 kg CO_2/m³**
- (Only abstraction)

Delhi

- Source : **Surface Water** from Edogawa, Tonegawa, Tamagawa, Sagamigawa rivers.
- Small portion from confined groundwater aquifers.
- **Energy Intensity** = **1.78 kWh/m³**
- **Carbon Footprint** = **0.90 kg CO_2/m³**

Tokyo

Long distance hauling, pressure and

Technology, water quality

Case Studies – Findings

Abstraction → Conveyance → **Treatment** → Distribution → End Use → Collection → Treatment → Recycle/ Disposal

- **4 WTPs**: Bangkhen, Samsen, Thonburi & Mahasawat
- **Energy Footprint** = **1.10 kWh/m³**
- **Carbon Footprint** = **5.28 kg CO_2/m³**

Bangkok

- **10 WTPs**: Wazirabad (I, II & III), Hayderpur, Sonia Vihar, Bhagirathi (North Shahdara), Nangloi, Chandrawal (I & II), Bawana
- **Energy Footprint** = **0.16 kWh/m³**
- **Carbon Footprint** = **0.13 kg CO_2/m³**

Delhi

- **11 WTPs**: Kanamachi, Misato, Asaka, Misono, Higashi-Murayama, Ozaku, Sakai, Kinuta, Kinuta-shimo, Nagasawa, Suginami.
- **Energy Footprint** = **3.21 kWh/m³**
- **Carbon Footprint** = **1.67 kg CO_2/m³**

Tokyo

Tokyo Energy Intensity is high as treatment standards are higher and technologies are energy intensive. Low treatment quality increases treatment needs at end use which is more energy intensive

Gravity, pressure, loss, system

Case Studies – Findings

Abstraction → Conveyance → Treatment → **Distribution** → End Use → Collection → Treatment → Recycle/ Disposal

- **Piped** Network
- **Energy Footprint** = **0.39 kWh/m³**
- **Carbon Footprint** = **1.86 kg CO_2/m³**

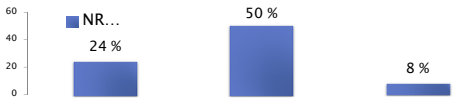
Bangkok

- **Piped** networks + **Tankers**
- **Energy Footprint** = **0.10 kWh/m³** for Piped networks
- **Carbon Footprint** = **0.005 kg CO_2/m³** for Piped networks

Delhi

- **Piped** networks
- **Energy Footprint** = **1.27 kWh/m³**
- **Carbon Footprint** = **0.66 kg CO_2/m³**

Tokyo

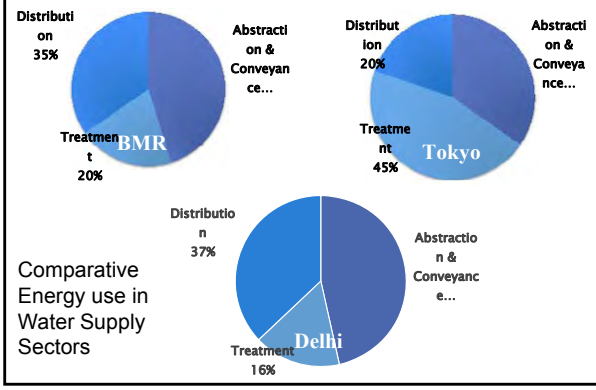


Non Revenue Water Losses in three cities

Bangkok Delhi Tokyo

- Bangkok and Tokyo have efficient network system for water distribution
- Coverage within Delhi is less and tankers supply water to different parts of cities. Water loss is higher in Delhi

Case Studies – Findings



Comparative Energy use in Water Supply Sectors

Case Studies – Findings

Abstraction → Conveyance → Treatment → Distribution → End Use → Collection → Treatment → Recycle/ Disposal

Bangkok

- **7 WWTPs**: Si Phraya, Rattanakosin, Dindaeng, Chong Nonsi, Nong Khaem, Thung Khru, Chatuchak
- **Energy Footprint = 2.16 kWh/m³**
- **Carbon Footprint = 10.35 kg CO_2/m³**

Bangkok has higher footprint as massive pumps are used for collection of waste water

Delhi

- **12 WWTPs**: Rithala, Coronation Pillar, Okhla, Kondali, Pappankalan, Najafgarh, Yamuna Vihar, Vasant Kunj, Sen Nursing Home, Delhi Gate, Nilothi
- **Energy Footprint = 0.45 kWh/m³**
- **Carbon Footprint = 3.0 kg CO_2/m³**

Tokyo

- **13 WWTPs**: Shibaura, Mikawashima, Sunamachi, Ariake, Nakagawa, Kosuge, Kasai, Ochiai, Nakano, Miyagi, Shingashi, Ukima, Morigasaki
- **Energy Footprint = 6.31 kWh/m³**
- **Carbon Footprint = 2.61 kg CO_2/m³**

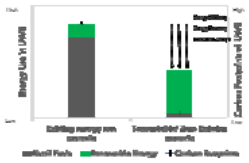
- Tokyo has highest footprint as water are treated to higher quality
- Resource and energy are recovered in some treatment facilities of Tokyo

Summary: Existing policies & practices

	Summary of Policies and Practices	Major Issues
Bangkok	• Regulatory policies for GW • Reduce pollution of canals • Reduce NRW and optimize energy use	• Pollution of canals within city due to inadequate wastewater treatment. • Increased GW table affecting underground infrastructures.
New Delhi	• Reduce water losses, rehabilitate and upgrade existing infrastructure. • Increase coverage and optimize capacity utilization.	• GW abstraction increased by 2.4 times and energy consumption by 3 times in last 10 years. • Change in treatment technology choices e.g. simple filters to Reverse Osmosis.
Tokyo	• TMG aims to reduce GHG emitted by the sewerage industry by 25% or more by 2020 and 18% or more by 2014, based on 2000 levels. • Advanced leakage prevention • Recover chemical energy for treatment byproducts	• Comparatively best practice, aims towards reducing energy-carbon footprints through use to alternative energy source.

Towards net zero GHG emission and self-sufficiency

- Shift towards cleaner energy sources.
- Improving measures for energy efficiency and energy recovery.
- Reducing water losses. In Asian countries NRW levels ranged from 5 to 56 % in 2009 (ADB, 2010).
- Compact settlements have lower footprints of water distribution and wastewater collection infrastructures that reduces embodied energy footprints.
- Operational energy depends on type of systems: decentralized versus centralized, scales of UWS utilities and their capacity utilization. The optimum operating condition have minimum water, energy and carbon footprint.



Conclusion

- Cities' water-energy-carbon nexus is a key area to look into- both from direct and indirect perspectives
- There is a growing need for cities' transition into a cleaner, healthier, sustainable and economically secured future.
- There are number of approaches that cities must adopt in water-energy systems, including investments in renewable technologies, improving efficiency of water and energy systems, reforming the necessary regulations and policies
- Cities play a significant role in determining the future of water and energy resources as well as combating climate change.

Further readings

Dhakal, S., Shrestha, S., Shrestha, A., Kansal, A., and Kaneko, S. (2015). **Towards a better water-energy-carbon nexus in cities** (APN Global Change Perspectives Policy Brief No. LCD-01). Kobe: Asia-Pacific Network for Global Change Research. (http://www.apn-gcr.org/2015/10/26/policy-brief-towards-a-better-water-energy-carbon-nexus-in-cities-lcd-01/)

Dhakal, S. and Shrestha, A. (2017). **Optimizing Water-Energy-Carbon Nexus in Cities for Low Carbon Development**, In Creating Low Carbon Cities (Ed. Shobhakar Dhakal and Matthias Ruth), Springer International Publishing. DOI: 10.1007/978-3-319-49730-3.

Prevailing driving forces

Scaling up low carbon technology in construction & infrastructure Sector

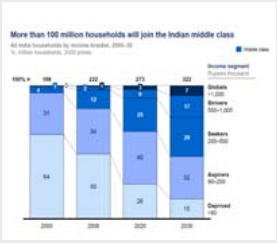
Pratibha Ruth Caleb, Development Alternatives, India

SCIENCE POLICY DIALOGUE

06-08 FEBRUARY 2017
BANGKOK, THAILAND

Urbanisation in South Asia
growth and demands on built space

- In **India** the total urban housing shortage was estimated to be **18.78 million** (2012)
- In **Pakistan** housing shortage was estimated at **7.57 million** (2009)
- In **Nepal** an additional **1 million** urban houses will be required from 2011-21

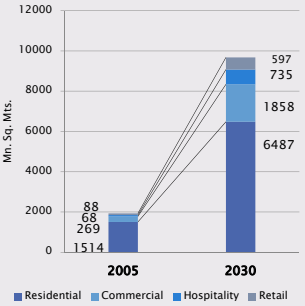


Predicted Growth in Indian Middle Class (Sankhe et al. 2010)

Development Alternatives

Urbanisation
pressure for more and new materials

- Worldwide buildings account for upto **30% raw materials use**
- In 2011, gross built up urban area grew by 10% (CII)
- A major share, almost **80% of the GHG burden** of the building sector, is borne by the building materials alone.
- Cement, steel, lime and bricks are the **largest bulk consumption items** in the Indian construction industry and also the most energy-guzzling.



Projected Growth in Building Sector of India (Parikh, 2011)

Development Alternatives

Construction Materials
growth trends in India

Development Alternatives

What are Green Materials

- Low in **embodied energy**
- Low in **resource footprints**
- **Cleaner production** processes
- Contribute to **thermal comfort**
- **Low or nil conflicts** with other uses of greater ecological and economic value
- **Recyclable/Reusable** – low life cycle costs

...low environmental impacts, small ecological footprints

Development Alternatives

Case example: Fly ash brick production in India

Development Alternatives

Case example: Vertical Shaft Brick Kiln in Pakistan

- **30% to 50%** lower CO2 emissions,
- **80%** reduction in suspended particulate matter
- **35-40% fuel reduction,** resulting in **30% increase in profit.**

- **Lessons learnt:**
  - Environmental hazards and threat to human health due to emissions by brick kilns have been given less consideration
  - Involvement and support from Pakistan Environment Protection Agency was critical
  - Cost effectiveness of the technology as well as collaborations with local investors (Small & Medium Enterprise Development Authority)
  - Greater public awareness among all stakeholders

Development Alternatives

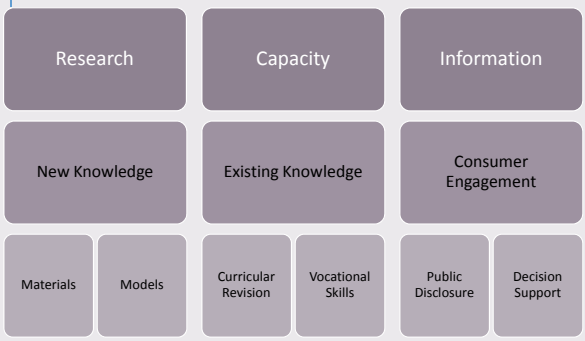
Case example: Hollow Concrete Blocks, Nepal

- Precast concrete blocks produced from an appropriate mixture of **cement, sand and aggregates with manual or mechanical compressions** that have hollow cavities in between the cells.
- **Less embodied energy** that fire bricks
- HCB houses are **30-40% cheaper** compared to RCC buildings and more energy efficient

- Lessons learnt:
  - Low carbon construction materials are **not included in the Building Codes and Standards**, thus no compliance for use of sustainable building materials
  - **Lack of awareness** for use of alternative sustainable materials in the construction sector.
  - With **no existing norm and guidelines** for manufacturing these alternative materials, there is no assurance of strength and quality.
  - Lower cost of these materials is often thought of as being of lower quality by end-users. **(perception)**

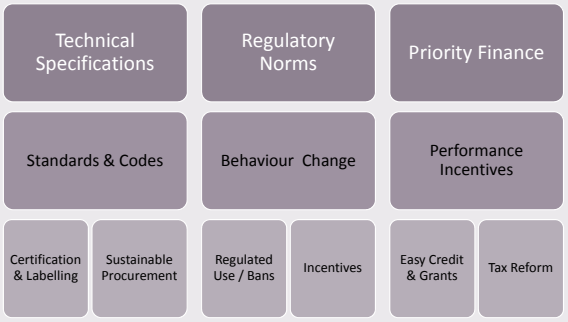
Development Alternatives

Imperatives for upscaling low carbon technologies



Development Alternatives

Imperatives for upscaling low carbon technologies



Development Alternatives

Thank you

pcaleb@devalt.org

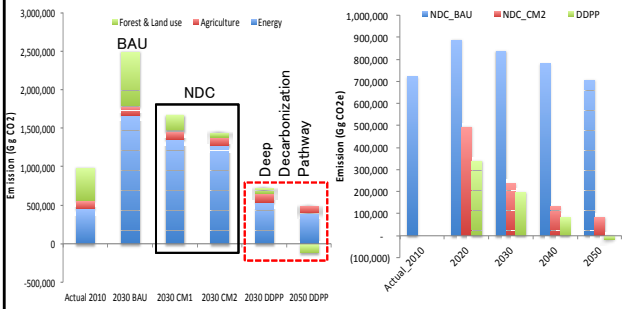
Development Alternatives

LOW CARBON INFRASTRUCTURE INVESTMENT: Indonesian Case

Rizaldi Boer
Centre for Climate Risk and Opportunity Management in Southeast Asia and Pacific (CCROM-SEAP),
Bogor Agricultural University

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

Indonesia Low Carbon Emission Development Scenarios

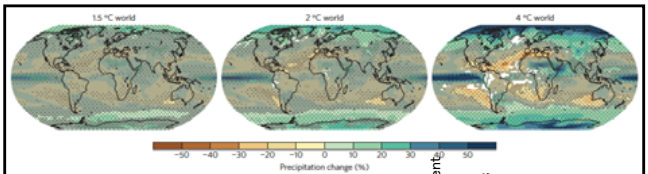


Most of emission reduction target until 2030 will be met through Forest and land use sector

1. consultation with stakeholders
2. Data requirements
3. Procurement
4. Set up you monitoring network
5. Maintenance schedule & funding
6. Data extraction and smooting
7. Data analysis and synthesis
8. Data to information products
9. Dissemmination and use

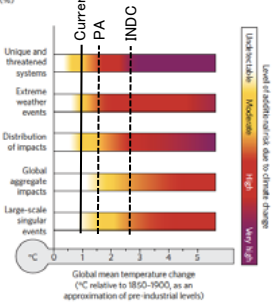
Implications

- Involvement of all stakeholders, particularly local governments and private is crucial to meet the national target
- Long-term commitment → it will beyond the election cycle
  - How to ensure the commitment will be carried over by the new governments?
  - What legal instruments?
  - What fiscal policies?
  - How science helps local government to integrate the climate change into long-term development plan?



INTRODUCTION

- Paris Agreement: limit the increase of global temperature to less 2°C - safe limit that avoids dangerous climate change
- Current intention of parties under INDC may increase the global temperature to 2.7°C, much higher than the global target
- *Global stocktake*: review the contribution every 5 years and resubmit the NDC (*no-back sliding*)

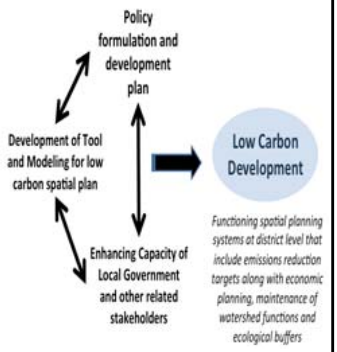


Legal Instruments

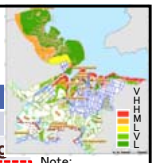
- Environmental Law No 32/2009 and Government Regulation 46/2016: Mandating local all sectors and local governments to conduct strategic environmental assessment (KLHS) in developing their medium-long term development plan revision of the spatial plan
  - Ensuring that plans, policies and development (RKP) programs will not have negative impact on environment and sustainability of development
  - Putting climate change as a mandatory strategic issue in KLHS
  - No development budget provided if the RKP are not conducted
- Government Regulation on Environmental Economic Instrument, an economic policies that can push local governments and other stakeholders to sustain environments functions (services)

Local Appropriate Mitigation Actions-Indonesia (LAMA-Indonesia)

- Focus of sectoral program is to address development issues
- Program/Actions for reducing emission are not priority for local governments
- Increase understanding that addressing climate change also address the development issues
- Availability of tool to assist the local government in integrating climate change into medium and long term development programs (RPJMN)



Mapping Risk and Priority Locations



Matrix of emission risks (historical emission)-Step 1

Rate	Trend: Increasing	Constant	Decreasing
High	VH (5)	H (4)	M (3)
Medium	H (4)	M (3)	L (2)
Low	M (3)	L (2)	VL (1)

Note:
- VH – Very High riks;
- H – High risk;
- M– Medium risk;
- L – Low risk;
- VL – Very Low risk

Location prioritization-Step 2

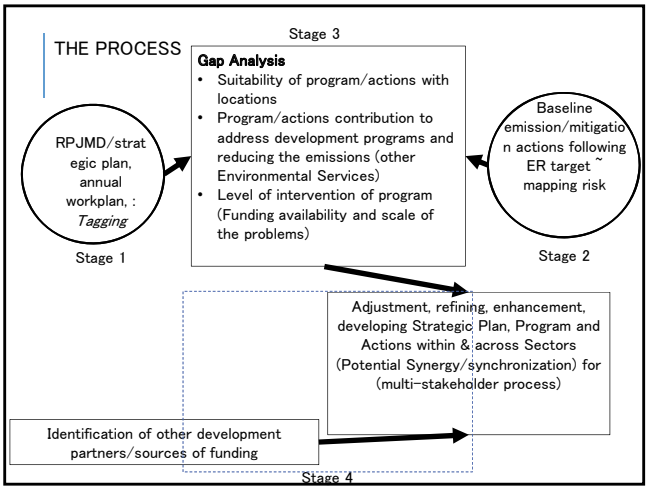
Level of risks (Historical)	Projection of emission: High	Medium	Low
Very high (5)	VH	VH	H
High (4)	VH	H	M
Medium (3)	H	M	L
Low (2)	M	L	VL
Very low (1)	L	VL	VL

Note:
- VH – Very High priority;
- H – High priority;
- M– Medium priority;
- L – Low priority;
- VL – Very Low priority

Four stages for Mainstreaming Climate Change into Local Development Plan

1. Identification of Programs (*Tagging*): Evaluating contribution of current development programs
2. Analysis of historical and Future Emission – Mapping emission risk & priority locations
3. Gap Analysis for Program Enhancement, and establish synchronization & Synergy of Programs within and across sectors
4. Setting mechanisms for coordination on programs synergy, synchronization and integration and MRV

THE PROCESS



INTERATING SCIENTIFIC KNOWLEDGE INTO POLICY IN ASIAN CITIES: A CASE OF BANGKOK, THAILAND

Bangkok and Climate Change

- For Bangkok, climate change is a big challenge and were hit by a large scale flooding and historically economic and social damages were recorded.
- Bangkok is vulnerable to such extreme events that might be induced by climate change.

Climate change is one of the largest challenges to the current and future development of human society

A future vision towards establishment of a low carbon and climate change resilient city

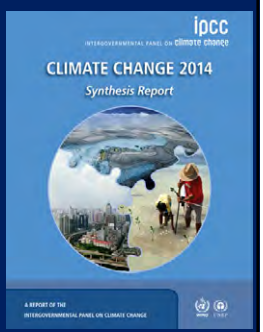
- 5 keys to future vision of Bangkok

1. BMA in partnership with the national government ministries and agencies, takes a major responsibility to mitigate and adapt to climate change.

2. BMA endeavors to establish well balanced action to harness economic and social development and climate change concerns.

IPCC Fifth Assessment Report

- Warning of the climate system is unequivocal since the 1950's.
- Many of the observed changes are unprecedented over decades to millennium.
- Atmosphere and ocean have warned.
- Amounts of snow and ice have diminished.
- Sea level has risen
- Greenhouse gases (GHGs) have increased.

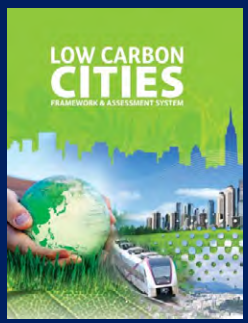


A future vision towards establishment of a low carbon and climate change resilient city

- 5 keys to future vision of Bangkok (Cont.)

3. BMA takes comprehensive approach to the low carbon and climate change-resilient urban development and action- oriented approach to the implementation of the Master Plan, as a vehicle in an evolving nature

4. BMA, as a leading city of Southeast Asia and the world, takes proactive measures to mitigate and adapt to climate change in short, mid and long terms.



A future vision towards establishment of a low carbon and climate change resilient city

- 5 keys to future vision of Bangkok (Cont.)

5. BMA promotes actions by citizens, the private sector, academia,
   - Key players to mitigate and adapt to climate change, which should involve a multi-channel communication platform, innovative ways of promotional schemes
   - Low carbon technology leapfrogging.

Scope of the Master Plan Bangkok Master Plan on Climate Change 2013-2023

(4) Green urban planning;

Comparison of GHG emission in future in different scenarios in 2020 in the green urban planning sector

Unit million t-CO_2 e

Sector	Year 2013	Year 2020		
	GHG emission	Future GHG emission in BAU Scenario	Future GHG emission with Bangkok Master Plan Implementation	Expected reduction/ absorption amount (reduction rate against BAU)
Green urban planning	-0.045	-0.045	-0.049	0.004 (+8.89%)

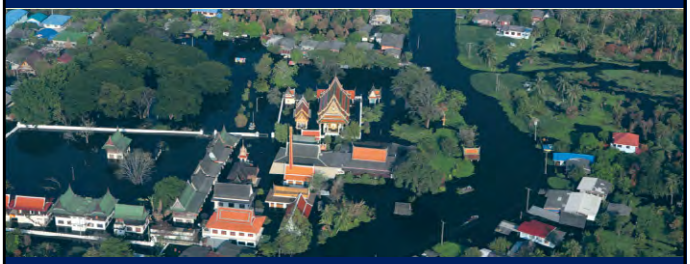
Scope of the Master Plan Bangkok Master Plan on Climate Change 2013-2023

(1) Environmentally sustainable transport;

(2) Energy efficiency and alternative energy;

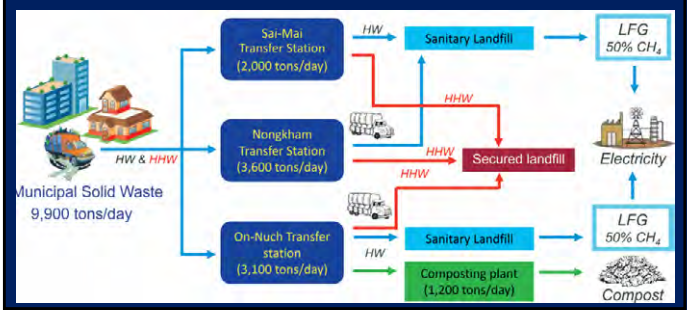
Scope of the Master Plan Bangkok Master Plan on Climate Change 2013-2023

(5) Adaptation planning;



Scope of the Master Plan Bangkok Master Plan on Climate Change 2013-2023

(3) Efficient solid waste management and wastewater treatment;



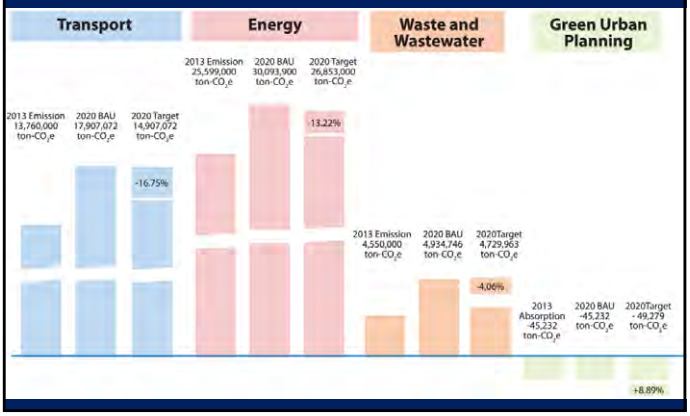
Master Plan includes

- **Assessment of the current and future situations**
- **Prioritizing possible interventions**
- **Proposing concrete implementation plans of feasible measures**

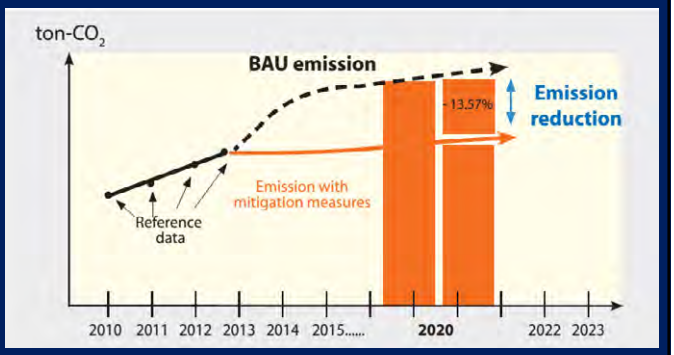
Master Plan contains

- Package of Business as Usual (BAU) setting, target setting and actual mitigation and adaptation measures.
- Monitoring and evaluation (M&E) as well as the Measurement, Reporting and Verification (MRV) mechanisms

GHG emission in 2013 and BAU emission and mitigation targets in 2020 (by sector)



GHGs emission prospects and mitigation targets under the Bangkok Master Plan on Climate Change 2013-2023



Mitigation measures in the transport sector

- Development of environmentally sustainable transportation infrastructures and promotion of model shifts as well as public awareness – *raising.*

Comparison of GHGs emission in future in different scenarios in 2020

Unit million t-CO_2e

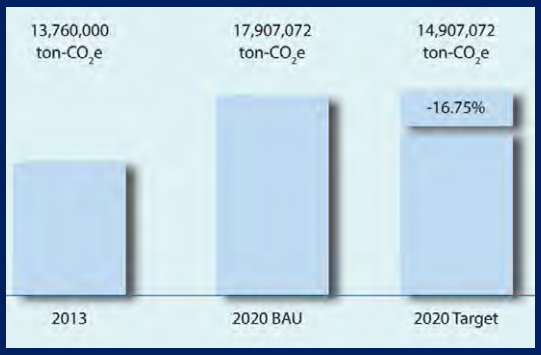
Sector	Year 2013	Year 2020		
	GHG emission	Future GHG emission in BAU Scenario	Future GHG emission with Bangkok Master Plan Implementation	Expected reduction/ absorption amount (reduction rate against BAU)
Transport	13.76	17.91	14.91	3.00 (-16.75%)
Energy	25.60	30.94	26.85	4.09 (-13.22%)
Waste and wastewater	4.55	4.93	4.73	0.20 (-4.06%)
Green urban planning	-0.045	-0.045	-0.049	-0.004 (+8.89%)
Total	43.87	53.74	46.44	7.29 (13.57%)

Comparison of GHG emission in future in different scenarios in 2020 in the transport sector

Unit million t-CO_2 e

	Year 2013		Year 2020	
Sector	**GHG emission**	**Future GHG emission in BAU Scenario**	**Future GHG emission with Bangkok Master Plan Implementation**	**Expected reduction/ absorption amount (reduction rate against BAU)**
Transport	13.76	17.91	14.91	3.00 (-16.75%)

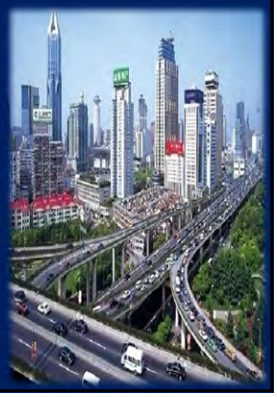
GHG emissions in 2013 and BAU emission and mitigation targets in 2020 in the transport sector



Business as Usual (BAU) emission in 2020

– Future (BAU) CO2 emissions associated with transportation activities (road) within BMA administration area are estimated by multiplying.

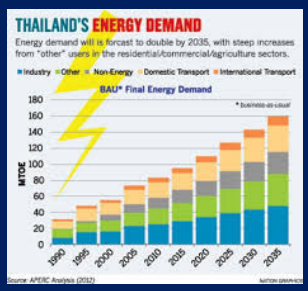
– "Current emission (year 2013)" by "Increase rate of BAU emission"



GHG emissions in 2013

Business as Usual (BAU) emission in 2020

- *Increase rate of BAU energy consumption in transport sector* provided in Thailand 20 year Energy Efficiency Development Plan (2011-2030), Ministry of Energy.



Emission in BMA = emission from road, railways, waterways

- Each sub-sector emission is calculated multiplying activity data and emission factors of fuel or electricity.
- Activity data
  - : Fuel consumption from road sub-sector in Bangkok by fuel types.
  - Electricity consumption of MRT and Sky train in Bangkok.
  - Fuel consumption of waterways in 2013.

Measures for Implementation

Category	Measure
1. Public transportation (Infrastructure)	1.1 Development of Monorail and Light rail Transit System 1.2 Extension of BTS 1.3 Development of MRT 1.4 Development of BRT 1.5 Development/improvement of water transportation

Measures for Implementation

Category	Measure
2. Public transportation (Supporting measures)	2.1 Improvement of connectivity of public transportation 2.2 Improvement of bus service 2.3 Development of passenger shelter at bus station 2.4 Development/expansion of Park & Ride 2.5 Introduction of common ticket system

Measures for Implementation

Category	Measure
5. Traffic volume/flow control	5.1 Development/improvement of road, bridge, tunnel 5.2 Improvement of signal system 5.3 On-street parking control

Measures for Implementation

Category	Measure
3. Measures on motor vehicles	3.1 Introduction of low emission vehicles (LEV) to BMA vehicles 3.2 Introduction of natural gas vehicle NGV to BMTA buses 3.3 Promotion of Eco-driving

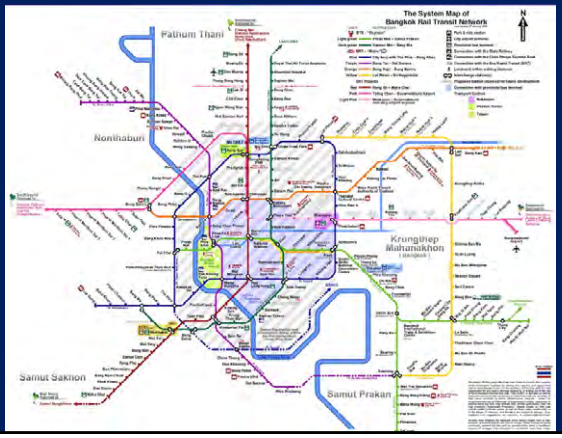
Measures for Implementation

Category	Measure
6. Public awareness rising	6.1 Promotion of public transportation 6.2 Classes for school to learn about environment/transport 6.3 Organizing workshops and seminars

Measures for Implementation

Category	Measure
4. Non-motorized transport (NMT)	4.1 Development/expansion of bikeway 4.2 Expansion of “Bike-for-Rent” 4.3 Development/expansion of pedestrian

Network of Sky Train in BMA



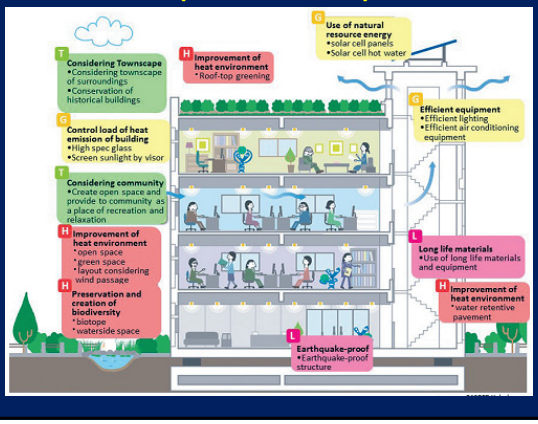
Network of Sky Train in BMA

Energy Management System (BMA owned building)

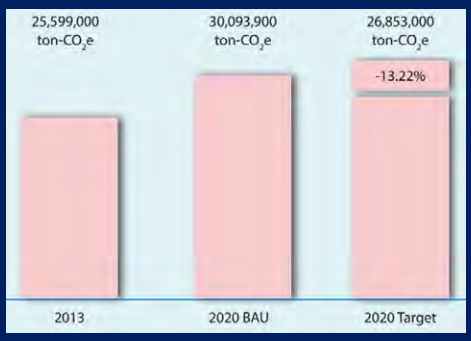
Mitigation measures in energy sector

- Energy efficiency
- Renewable energy

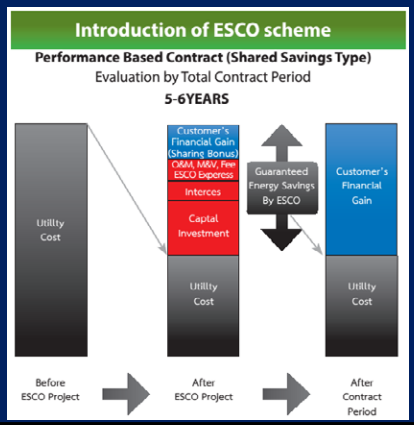
Energy Management System (Private Sector)



GHG emission in 2013 and BAU emission and mitigation targets in 2020 in the energy sector.



Introduction of Energy Service Company (ESCO)



Category			Possible mitigation measures (countermeasures)
1. BMA government buildings & facilities	1.1 Energy saving renovation/ repair work for existing facilities	1.1.1 General tasks	1) Developing systematic schedules of retrofitting BMA's existing building for appropriate management of energy
			2) Systematic implementation of energy saving retrofitting works of BMA's existing building
			3) Selection of model project for energy saving renovation work Intensive adoption of top-runner appliances
			4) Energy saving requirements for retrofitting works of BMA facilities and setting of high-level of energy efficiency Acquisition of certification for energy saving renovation work (CASBEE or LEED etc.)
			5) Consideration of renovation work, extension work, conversion at the time of facilities update (maximum utilization of existing stocks)
			6) Efficient retrofitting/renovation work for energy saving by introducing private capital know-how

Category			Possible mitigation measures (countermeasures)
1. BMA government buildings & facilities	1.2 Energy saving for new construction	1.2.1 General tasks	1) Constructing high energy efficiency building
			2) Introducing requirements of certificate for new construction of BMA facilities (Energy standard such as CASBEE or LEED etc.)
	1.3 Information campaign	1.3.1 Conducting campaign to citizens	1) Promoting environmental education at school
			2) Support to exhibition of energy saving merchandise for BMA facility
			3) Visualization of energy saving of BMA facility Notify saving energy activities by panel or monitor
			4) Promoting "Green Curtain" installation at school to reduce air conditioning load
			5) Holding workshop on energy saving repair work for public participation (schools, public facilities)
		1.3.2 Conducting campaign to the officials	1) Raising preset cooling temperature
			2) Award for saving energy activity
			3) Turning off lightings during lunch break
			4) Thorough power saving setting on PC or OA equipment

Category			Possible mitigation measures (countermeasures)
		1.1.2 Improving insulation performance (renovation technique)	1) Introduction of thermal barrier roof coatings
			2) Improving external insulation and waterproofing
			3) Introduction of roof greening
			4) Improving heat insulating window (high heat insulating glass such as low-e pair glass)
			5) Improving heat insulating window (thermal barrier film)
			6) Controlling solar radiation heat by installing louver or eaves
		1.1.3 Cutting down air conditioning/ ventilation load (retrofitting technique)	1) Replacing existing air-conditioning equipment by high-efficiency one
			2) Introduction of variable flow controller
			3) Introduction of task ambient air conditioning system - controlled by motion/temperature sensor, timer etc.
			4) Introduction of high-efficiency fan (total heat exchanger)
			5) Introduction of cogeneration system
		1.1.4 Cutting down lighting load (retrofitting technique)	1) Introduction LED lighting or hf fluorescent lamp
			2) Introduction of task ambient lighting
			3) Installing motion sensor lighting to bathroom, corridor or staircase
			4) Daytime energy reduction by daylight sensor

Category			Possible mitigation measures (countermeasures)
	1.4 Promotion of low carbon city	1.4.1 Model areas	Setting up low-carbon model area, each fields top runner measure, intensive equipment investment
2. Civil Categories (Residential/ Commercial/ Industries)	2.1 Residential part	2.1.1 Promotion of energy saving house	1) Promotion of low-carbon/energy saving detached house (Publicity of cost benefit from the viewpoint of low carbon community , backup exhibition, provide advertising spaces at BMA facilities
			2) Facility equipment introduction promotion of energy saving house (LED lights, energy-saving air conditioning system or hot-water apparatus etc.)
		2.1.2 Promotion of energy saving repair work	1) Publicity of cost benefit by repair work for energy saving
			2) Promotion of repair work for energy saving: insulation upgrade by double glazing, heat barrier film, renew air conditioning device (subsidy system etc.)
		2.1.3 Promotion of energy saving home appliances	Purchase promotion of energy saving home electric appliances (air conditioning, fridge, TV etc.)

Category			Possible mitigation measures (countermeasures)
		1.1.5 Energy reduction by water-saving	1) Upgrading water saving sanitary appliances
			2) Introduction of rainwater recycling system
			3) Introduction of waste water recycling system (reuse as toilet bowl flushing water)
		1.1.6 Others	1) Introduction of Solar power generation systems
			2) Introduction of BEMS, building energy management systems
			3) Replacing street lighting to LED

Every DROP counts

Category			Possible mitigation measures (countermeasures)
		2.1.4 Promotion of energy saving measure	Promote better understanding of air conditioner maintenance (conduct free cleaning)
		2.1.5 Others	Promotion of solar panel installation subsidy system or mediating installable roof

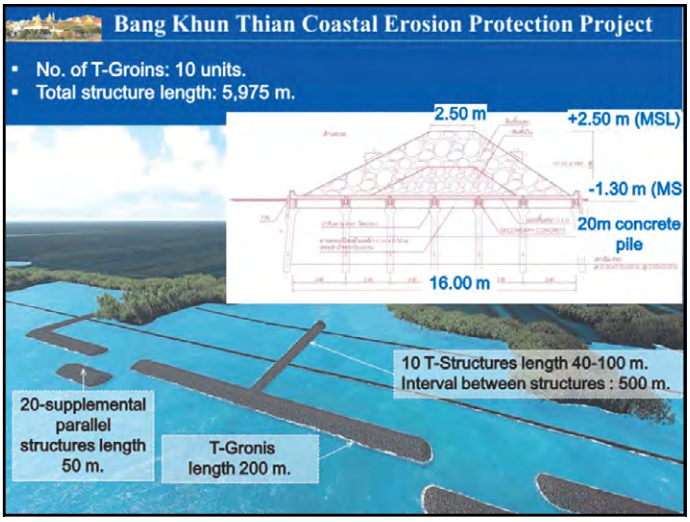
Category			Possible mitigation measures (countermeasures)
2. Civil Categories (Residential/ Commercial/ Industries)	2.2 Commercial/ Business part	2.2.1 Promotion of energy saving building	Incentive for constructing/repairing saving energy factory (tax reduction, subsidy, zero-interest finance etc.)
		2.2.2 Promotion of energy saving repair work for existing building	1) Conducting energy saving inspection of public buildings
			2) Promotion of ESCO business for existing buildings (Explaining ESCO business, advertisement promotion support, subsidy system for energy saving diagnostic)
			3) Promotion of repair work for energy saving: insulation upgrade by double glazing, heat barrier film, renew air conditioning device (subsidy system etc.)
			4) Publicity of cost benefit by Electricity Peak-Cut Introduction support for automatic control facility of Electricity Peak-Cut

ADAPTATION MEASURES

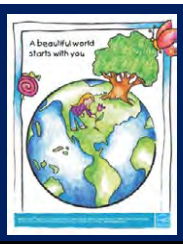
- Bangkok Problems
  - Land subsidence.
  - Flood and drought.
  - Sea level rise.



Category			Possible mitigation measures (countermeasures)
		2.2.3 Promotion of energy saving measure	1) Promotion of saving energy activity (publicity of cost benefit etc)
			2) Raising preset cooling temperature at public buildings Turn off lightings during lunch break
			3) Thorough power saving setting on PC or OA equipment
			4) Award for saving energy activity
		2.2.4 Others	Promotion of solar panel installation subsidy system or mediating installable roof
	2.3 Industrial part	2.3.1 Promotion of energy saving factory	Incentive for constructing/retrofitting saving energy factory (tax reduction, subsidy, zero-interest finance etc.)
		2.3.2 Promotion of energy saving repair work for existing factory	1) Conducting energy saving inspection of factories
			2) Promotion of repair work for energy saving (subsidy system etc.)
			3) Publicity of cost benefit by Electricity Peak-Cut Introduction support for automatic control facility of Electricity Peak-Cut



Category			Possible mitigation measures (countermeasures)
		2.3.3 Promotion of energy saving measure	1) Promotion activity for factory's energy saving technique (for SMEs)
			2) Commendation for saving energy activity
		2.3.4 Others	1) Promotion of Solar Energy subsidy system or mediating installable roof
			2) Promotion of beneficial use of factory exhaust heat



Measures for Implementation in Adaptation Area

1	Flooding	
Time scale of impact	Adaptation level	Adaptation measure
Short term 1-3 years	Level 1 Prevention	1. Strengthening measures for retention areas e.g., construct and improve temporary retention basins (BMA et al., 2009)
		2. Dredging of drainage channels
		3. Installing drainage pumps
		4. Improving small scale irrigation facilities e.g., gates, weirs and etc. (NESDB et al., 2013)
		5. Constructing flood protection system (e.g., pumping station, water gate, flood dyke, tunnel) with proper supporting system such as alternative power sources and transmission lines
	Level 2 Minimizing impacts	1.Providing catchment area to store water and reduce volume of flood water flow rate
		2.Ensuring feed for livestock (NESDB et al., 2013)
		3.Designating evacuation areas (MOEJ, 2010) with appropriate facilities/equipment
		4.Developing disaster evacuation plan and revise the plan as necessary

Measures for Implementation in Adaptation Area

1	Flooding	
Time scale of impact	Adaptation level	Adaptation measure
		5.Developing emergency preparedness plan
		6.Strengthening emergency communications (BMA et al., 2009)
		7.Promoting people's participation to maintain community canal
		8.Educating/informing citizens on flood related issues e.g., risk of residing in flood prone area, health care during flood, situation of flood
		9.Establishing "Flood Aid Units" which are ready to help promptly and thoroughly
		10.Compensating for damaged farmland and properties
	Level 3 Chang and Reconstruction	1.Coordinating with government/related organizations/neighboring provinces to develop agreement on flood water management
		2.Formulating business continuity plans (MOEJ, 2010)
		3.Providing financial support during inundation period (NESDB et al., 2013)

Measures for Implementation in Adaptation Area

1	Flooding	
Time scale of impact	Adaptation level	Adaptation measure
Long term 5-10 years	Level 1 Prevention	Continuing the implementation of Flood Prevention Plans
	Level 2 Minimizing impacts	1. Continuing the implementation of Flood Prevention Plans
		2.Ensuring operational guidelines for flood control facilities
		3.Enforcing law on land use and integrated land use planning (BMA et al., 2009)
		4.Improving flood management information system (NESDB et al., 2013)
Long term 5-10 years		5.Upgrading monitoring and warning systems (MOEJ, 2008)
	Level 3 Change and Reconstruction	1.Continuing the implementation of plans
		2.Providing government sponsored flood insurance (for areas outside of flood protection facilities) (BMA et al., 2009)
		3.Establishing funds and subsidies for post disaster restoration (MOEJ, 2008)
		4.Conducting research and develop countermeasures technologies (MOEJ, 2010)

Measures for Implementation in Adaptation Area

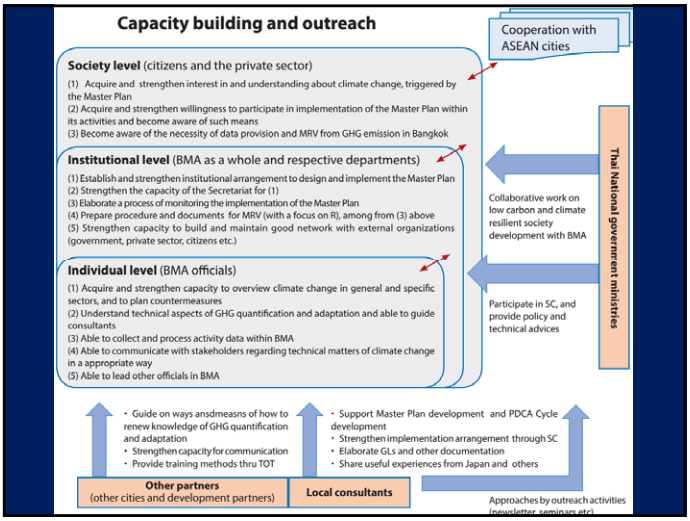
1	Flooding	
Time scale of impact	Adaptation level	Adaptation measure
Midterm 3-5 years	Level 1 Prevention	1.Continuing the implementation according to the plan
		2.Constructing community-based small scale retention pond
		3.Maintaining canals/rivers and increase drainage capacity (NESDB et al., 2013) e.g. maintenance of levees and river bank dredging
		4.Developing Ayutthaya bypass channel regulation
		5.Operating existing dams effectively and revise dam water management plan as appropriate
		6.Constructing and elevate outer ring road as alternative for transportation during flood
		7.Providing alternative power source and power transmission lines of drainage system
		8.Constructing flood proof buildings (BMA et al., 2009)
		9.Effectively utilizing existing flood protection facilities and extending their lifetime via regular maintenance (MOEJ, 2008)

Measures for Implementation in Adaptation Area

2	Coastal erosion	
Time scale of impact	Adaptation level	Adaptation measure
Short term 1-3 years	Level 1 Prevention	1.Constructing temporary coastal area protection fence (Bamboo)
		2.Improvement of dike system (BMA et al., 2009)
	Level 2 Minimizing impacts	1.Promoting people's knowledge on benefits of mangrove forest and its conservation
		2.Promoting mangrove forest plantation
		3.Developing emergency preparedness plans (BMA, et al., 2009)
		4.Public information campaigns and training exercises (World Bank, 2010)
	Level 3 Change and Reconstruction	1.Setting clear goal for coastal area protection measures and develop action plan accordingly
		2.Setting up joint committee of stakeholders to develop the coastal area management master plan by adopting integrated coastal zone management approach (MOEJ, 2008)

Measures for Implementation in Adaptation Area

1	Flooding	
Time scale of impact	Adaptation level	Adaptation measure
	Level 2 Minimizing impacts	1.Establishing flood hazard maps
		2.Improving accuracy of weather forecast and upgrade monitoring and warning systems (MOEJ, 2008)
		3.Developing flood management information system with link to other sectors e.g., planting schedule
		4.Establishing guidelines for flood control facilities operation
		5.Enforcing law on land use and adopt integrated land use planning e.g., prohibit construction in flood prone area
		6.Implementing intervention measure in agricultural sector when appropriate (NESDB et al., 2013)
		7.Developing emergency preparedness plans (BMA et al., 2009)
		8.Providing more catchment areas
		9.Relocating housing in flood prone areas
	Level 3 Change and Reconstruction	1.Utilizing urban planning measures
		2.Conducting research and develop countermeasures technologies (MOEJ, 2010)




THANK YOU

Low Carbon Development in Cities for a Sustainable and Resilient South Asia

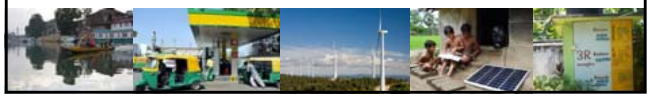
Keshav Jha
ICLEI Local Governments for Sustainability, South Asia

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

ICLEI - Local Governments for Sustainability is the leading global network of more than 1,500 cities, towns and regions committed to building a sustainable future.

Sustainable City	Low-carbon City	Resource-efficient and Productive City	Resilient City	BiodiverCity
Smart City	EcoMobile City	Happy, Healthy, and Inclusive Communities	Sustainable Local Economy and Procurement	Sustainable City -Region Cooperation

ICLEI's Mission "to build and serve a worldwide movement of local governments to achieve tangible improvements in global sustainability with special focus on environmental conditions through cumulative local *actions*."



ICLEI South Asia's Initiatives

Members	carbonn	COMPACT of MAYORS		Actions related to creating sustainable communities
66	22	5	3	436

Energy	Sustainability	Water	Solid Waste	Urban
Urban-LEDS	Strengthening Resilience – ACCCRN	Adopt – IUWM	Revision of the CPHEEO Manual on Municipal Solid Waste Management	Transport Governance Initiative
India GHG Platform	Urban Vulnerability Assessment	IDRC "Cities and Climate Change"	Kota Holistic Waste Management	Integrated Resource Management in Asian cities: the Urban Nexus
District Energy Systems (DES)	City Resilience Index	Integrated Water Resources Managemen t	SUNYA: Towards Zero Waste in South Asia	Heritage City Development and Augmentation Yojana (HRIDAY)
Melaka State GHG Emission	AdaptCap	The Water Campaign™		Urban Green Growth
Solar Cities	Project Preparation and Financing – Adapt Asia Pacific			

ICLEI South Asia's Recent Projects Results

Cities Baseline GHG Emission Inventory in the South Asia and South East Asian Region → 68

URBAN LEDS

Cities	Target GHG emission reduction (Million tCO_2e)	GHG emission reduction target by 2019-20 from the base year 2012-13 (%)
Rajkot	0.45	26
Thane	0.62	31
Panaji	0.02	19

Solar Cities targets 10% reduction in conventional energy demand

Ten* Indian Solar Cities cumulative targets

Energy Saving	GHG Reduction	Renewable Energy Potential	Investment
1777 Million kWh	1.37 Million tCO2e	244942 kW	864 Million USD

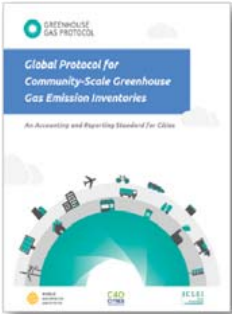
ICLEI South Asia prepared Panaji Smart City Plan worth 266 Million USD focusing on Retrofitting of city core area and Solid Waste and Mobility for Pan-City.

Handholding support for SCP extended to Jaipur, Udaipur and Kakinada

*Agra, Aizwal, KDMC, Kohima, Thane, Nagpur, Gurgaon, Rajkot, Imphal, Coimbatore

Harnessing ICLEI's global network of support

The Global Protocol for Community Scale GHG Emissions (GPC)



- First global standard to consistently measure city-level emissions
- Flexible accounting framework, easily used for **boroughs, wards within cities, towns, districts, counties, prefectures, provinces and states**

www.ghgprotocol.org/city-accounting

Cities Alliance Joint Work Program

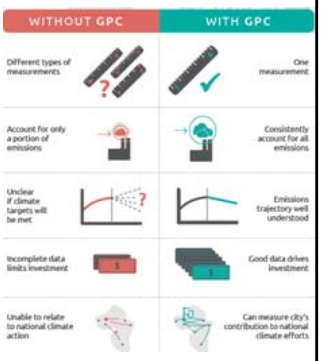
Purpose of GPC

Help cities develop a comprehensive and robust GHG inventory to support **climate action planning**

Ensure **consistent** and **transparent measurement and reporting** of GHG emissions between cities

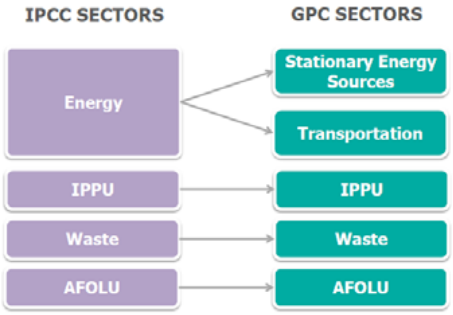
Empower city's endeavor in reporting its mitigation performance in **national or international framework**

Demonstrate the importance of cities play in tackling climate change, and facilitate insight through **benchmarking**, and **aggregation**, of **comparable data**



www.ghgprotocol.org/city-accounting

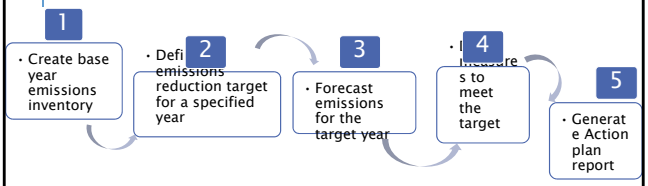
GHG emission sources



HEAT+

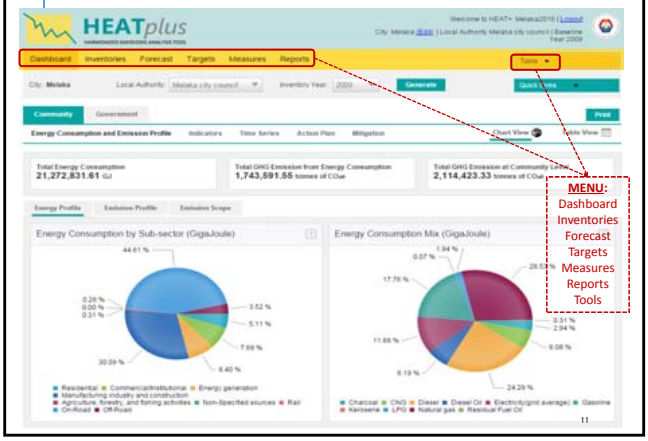
http://heat.iclei.org

HEAT+ Functionalities



- *Build inventories* – Inventory records are built with respect to modules, sectors, subsectors, emission source categories and
- *Forecast* – Emissions are forecasted for respective sector and desired year with estimated growth rate.
- *Targets* – Set according to sector and base year to desired target year and % of reduction
- *Measures* – Mitigation measures built for various sectors
- *Reports* – multiple reports for both modules, for all sectors, measures and for action plans.

HEAT+ Interface



Rajkot City, Gujarat – Urban-LEDS pilot project results

Total investment 1,56,000 Euros

100 KLD at Jilla garden to treat waste water of Vokhda (open drain)

- ✓ **4000 kWh** Annual electricity savings
- ✓ **15 tCO2e** GHG emission reductions
- ✓ **8212 m3/year*** Biogas Generation

Replacement of 291 existing HPSV lights with LED lights on preselected roads

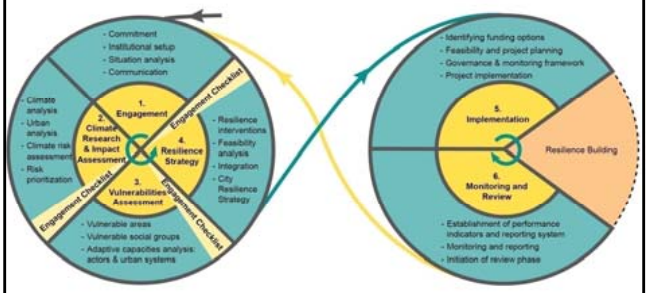
- ✓ **70,000 kWh** Annual electricity savings
- ✓ **59.83 tCO2e** GHG emission reduction

20 kWp roof top SPV on a Sarojini Naidu Municipal High School

- ✓ **30,000 kWh** Annual electricity savings
- ✓ **24.68 tCO2e** GHG emission reduction

*It can replace 3942 kg of LPG

ICLEI ACCCRN Process



Pilot projects of ACCCRN through Small Grants Program (SGP)

Total of 250,000 USD available for Project Cities to Implement Scalable Resilience Building Measures

Rockefeller Foundation

City	Pilot Project Title	Amount
Shimla, Himachal Pradesh	Rejuvenating the Traditional Water Sources to Augment Water Security in Shimla Municipal Corporation Area, Himachal Pradesh	28,510/- USD
Mandi, Himachal Pradesh	Reclamamtion of green and clean hill slopes, surface water run off and improving quality of water in Khads before merging in river Beas	47,490/- USD
Panaji, Goa	Municipal Solid Waste (MSW) management – Awareness Building on Segregation at source among School Students	26512/- USD
Nainital, Uttarakhand	Mainstreaming the role of ecosystem services in Water Supply	27,847/- USD

14

Urban-LEDS India Pilot projects

Particular	Pilot Projects	Annual Energy Generation/ Savings (Million kWh)	Annual GHG Emission Reduction (t CO2e)
Renewable Energy	100 KLD Decentralized Water Treatment Plant, Rajkot	0.004	15
	20 kW Solar PV System at Municipal School, Rajkot	0.02	24.68
	15 kW Solar PV System with smart energy saving appliances at School, Thane	0.054	66.63
Energy Efficiency	ESCO Project Retrofitting 12000 sodium vapor streetlights with LED streetlights, Thane	4.5	3700
	Retrofitting 291 sodium vapor streetlights with LED streetlights, Rajkot	0.07	59.83
	Retrofitting 522 sodium vapor streetlights with LED streetlights, Thane	0.11	86
	Tender for replacing 5600 streetlights and infrastructure with smart LED and control infrastructure, Panaji	2.3	2,221
	Redesigning electrical infrastructure with smart and energy efficient appliances at municipal market, Panaji	0.2	165
Others	Study on Solid Waste Management Planning, Gwalior: 280 TPD Waste to energy and 40 TPD Bio-methanation plant	~37.5	98501.41*

*emission reduction in comparison to business as usual scenario in 2018, when projects implementation scheduled to be

carbonn® Climate Registry

The world's leading reporting platform to enhance transparency

carbonn Climate Registry

726	67	660	>1	43
Number of reporting entities	Countries	Million people, represents 9% of the world population	gigaton of CO_{2e} reductions by 2020	Adaptation and resilience committments

The cCR is the reporting platform of:

In partnership with:

www.carbonn.org

Compact of Mayors

COMPACT OF MAYORS

At engagement	Within 1 year	Within 2 years	Within 3 years
COMMITMENT	MEASUREMENT	TARGET	ACTION PLAN
Mitigation: Commitment to reduce GHG emissions	GPC Inventory (CO_2, 2 sectors)	GPC Inventory (CO_2, 2 sectors, activity data, emissions factors)	GPC Inventory (3 gases, 3 sectors, activity data, emissions factors)
		GHG reduction target	GHG reduction target
			Climate action plan
Adaptation: Commitment to address climate change risks	Hazards reporting	Hazards reporting	Hazards reporting
		Vulnerability assessment	Vulnerability assessment
			Adaptation plan

Reporting to: CDP, carbonn

Transition to:

Solutions Gateway

Low Carbon Solutions for Urban Development Challenges

Solutions	Solution Packages	Case Studies
Processes which Local Governments can implement to enhance low emissions development in their communities	A group of Solutions under a given theme, clustered to generate synergies and optimize impacts	Examples of the implementation of Solutions and/or Solutions Packages by cities

Solutions Gateway

www.solutions-gateway.org

Role of bioenergy in enhancing energy, food and ecosystem sustainability

Dr. Lilibeth Acosta-Michlik
University of the Philippines Los Banos

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Integrated sustainability assessment of bioenergy potentials in Asia: An application of a hybrid approach on trade-offs and pathways (PIC-STRAP)
- Funded by the APN Low Carbon Initiatives (LCI) Programme

- Partners: Dr. D. Magcale-Macandog, University of the Philippines Los Baños
  Dr. X. Cui, Beijing Normal University
  Dr. K.S.K. Kumar, Madras School of Economics
  Dr. L. Acosta-Michlik, Potsdam Institute for Climate Impact Research

Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Definition: Bioenergy refers to energy from biomass
- Categories: (1) raw biomass - use for heating and cooking (e.g., wood)
  (2) processed biomass - use to generate energy for transport, industry and household purposes (e.g., bioethanol, biodiesel)

Bioenergy	Food Crops	Non-Food Crops
First generation	Sugar-rich like sugarcane, beets	
	Starch-rich like corn, wheat, cassava	
	oil-rich like soya, palm, coconut	Oil-rich like jathropa
Second generation		Agriculture and forest residues
		fast-growing trees/perennial grass
		Algae

Country	Bioethanol (million litres)			Biodiesel (million litres)		
	Feedstock	2010	2014	Feedstock	2010	2014
Philippines	sugarcane	10	110	Coconut oil	124	112
India	Molasses	1522	2036	Jatropha, Pongamia	90	130
China	Corn, Wheat, Cassava	2179	2787	Waste vegetable oil	568	1133

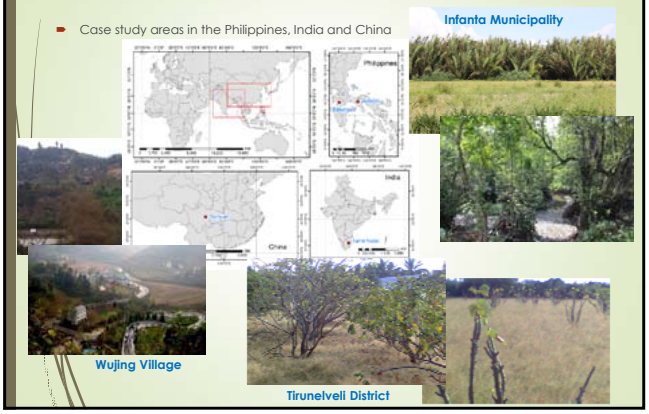
Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Policy objectives: energy security, clean and renewable energy, source of foreign revenue and rural income, rural development, economic growth, etc.

Bioenergy	Advantages	Disadvantages
First generation	Potential source of rural income and development	Competes land use for food production
	Mature technologies at local SME scale	environment degradation and biodiversity loss
		Cause social exclusion and conflicts
Second generation	Less competition on land use for food production	Less organic fertilizer from crop residues
	Less production inputs like labor, water, fer	Cutting trees cause carbon emission
		Technology not yet mature

Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Case study areas in the Philippines, India and China



Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Online and field survey in the Philippines, India and China

Knowledge and Familiarity	Philippines		India		China	
	AGRI	NON-AGRI	AGRI	NON-AGRI	AGRI	NON-AGRI
Familiar with the term bioenergy	74.0	87.0	100.0	100.0	36.5	63.8
Work is related to bioenergy	28.4	6.1	95.6	94.3	7.7	11.2
Bioenergy affects food security	62.4	42.0	50.0	21.4	15.4	50.9
Bioenergy is good for the economy	94.7	95.0	98.9	100.0	98.1	92.2

Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Conjoint questionnaire and survey

Determinants (Attributes)	Indicators (Attribute levels) for Specific Type of Biomass		
	Sugar-rich Crops	Oil Crops	Fast-growing Trees
Economic Stability			
A. Energy security	Low domestic energy demand	High domestic energy demand	Low domestic energy supply
B. Technology progress	High R&D investment	Low R&D investment	High technology deployment
C. Market organization	High market incentives	Low market incentives	Good market infrastructure
Choose one option:			
Social Equity			
A. Food security	Increase food self-sufficiency	Increase purchasing power	Increase affordability of food
B. Social welfare	Increase livelihood sources	Increase job opportunities	Improve household lifestyle
C. Social justice	Hinder equal property rights	Cause home displacement	Cause land dispossession
Choose one option:			
Ecological Balance			
A. Ecosystem capacity	Potential affected by population pressure	Put more pressure on natural resources	Improve landscape and species diversity
B. Production potential	Very high potential	Moderate potential	Very low potential
C. Land management	Support nature conservation	Compatible with organic farming	Available good farming practices
Choose one option:			

Conjoint-based Choice Hierarchical Bayes method

$$Y_i = X_i\beta_i + \varepsilon_i$$

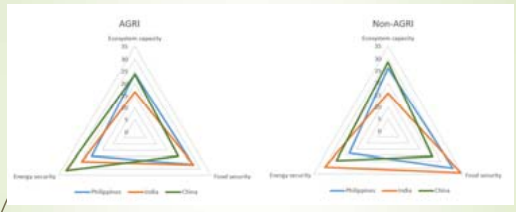
$$\beta_i = \Theta z_i + \delta_i$$

$$w_{ij} = \left(R_{ij} / \sum_{j=1}^{n} R_{ij}\right) * 100$$

$$R_{ij} = \Phi_{ij}^{max} - \Phi_{ij}^{min}$$

Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Main results of the conjoint analysis



- Conjoint preferences revealed significant trade-offs among energy security, food security and ecosystem capacity in the Philippines, India and China.
- The preferred role of bioenergy for sustainable development reflects the social and economic concerns in the respective Asian countries:
  - Philippines - ecosystem degradation
  - India - food security
  - China - energy security and environmental condition
- Policy needs to carefully weigh the impacts of bioenergy development on sustainability issues that are closely interlinked in an energy-food-ecosystem nexus.

Role of bioenergy in enhancing energy, food and ecosystem sustainability

- Recommendations on future regional actions/initiatives that may help to overcome already existing issues/gaps in the region:

1. Replication of conjoint survey in other major biofuels producing countries in Asia like Malaysia, Indonesia and Thailand
2. Identification of local technologies that are appropriate for production of biofuels at the farm level or for farmers' cooperative
3. Scientific investigation on the impacts of bioenergy on the biodiversity and ecosystem services, and how these impacts translate into decline in economic growth

Strengthening Community Voices to REDD+ Policy:

Experience from The REDD+ Community Carbon Pools Programme (REDD+ CCPP)

Tai KEO (Mr.)
Country Coordinator
NTFP-EP Cambodia

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

Overview on the REDD+

- Forestry sector shares between **14-19%** of global GHG emission
- **REDD+:** Reducing Emission from Deforestation and Forest Degradation; result from COP13 & COP16…
- From voluntary REDD+ Projects to National REDD+ Policy/Strategy in many developing countries
- Safeguards Information System (SIS) is one of four elements required for REDD+ referred to as the 'Warsaw Framework' including;
  - ❑National Strategy of Action Plan
  - ❑National forest Reference Level
  - ❑National monitoring system

However, whether carbon rights in REDD+ is compatible with the forest tenure rights (bundles of rights, i.e rights to access, manage the forests...etc is still questionable

The REDD+ Community Carbon Pools Programme (REDD+ CCPP)

- **Implementing Sites**: Cambodia, Indonesia, The Philippines and Vietnam
- **Implementing Organization:** Fauna & Flora International (FFI), NTFP-EP and PanNature
- **Programme period**: Jan 2011- July 2014
- **Main beneficiary groups:** communities and local government institutions

REDD+ CCPP Objectives

- Develop the capacity of local communities and local government in the formation of REDD+ policies
- Stimulate policy dialogue and reform through a bottom-up process
- Expand/increase knowledge on critical community forestry and REDD+ themes.

REDD+ CCPP (APN-LCI support)
Knowledge sharing component

Strengthening Community Voices in REDD+ Policy

How did we do this?

1-REDD+ Benefit Sharing Workshop & field work	2-Community Partners Learning Exchange Visit to the Philippines	3-ASEAN REDD+ Policy Workshop



Some lesson learnt from the REDD+ CCPP

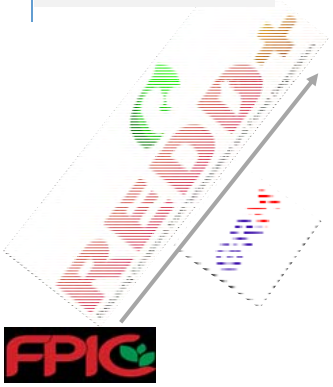
- ❖ The timing, content and understanding of localized context is important in the establishment of REDD+ benefit sharing frameworks.
- ❖ Securing community and local government participation in REDD+ cannot be assumed or automatically guaranteed
- ❖ Community livelihoods as co-benefits to REDD+ is critical.

……Up to 2016, all the four countries piloting the REDD+ CCPP have developed own National REDD+ Strategy, but there are some concerns from forest dependent communities particularly on;

- ❑ Insufficient FPIC implementation (free, prio, informed, consent) and somehow with top-down process in introducing REDD+
- ❑ Inadequate grievance readiness mechanism (GRM) in the SIS/REDD+

Would be challenging space for community voices on REDD+ Policy Development and implementation & might lead to some implication in the future

Way forwards



- REDD+ information dissemination should be conducted nationwide esp. to IP/forest communities for their right decision on REDD+ implementation
- CSO REDD+ Consultation Groups more focus & more support government in both forming and implementing proper and adequate FPIC & GRM
- Carbon rights and forest tenure rights should be assured their compatibilities

Thanks

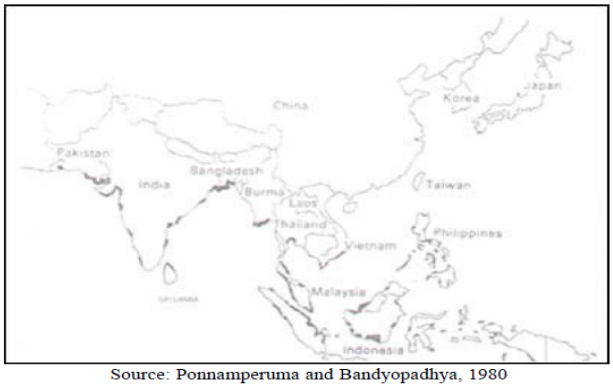
Identification of best agricultural practices with better GHG benefits in salinity-affected areas in South Asia

Erandathie Lokupitiya
University of Colombo, Sri Lanka
and
Madhoolika Agrawal, Tofayel Ahamed, Rana Naveed, Keith Paustian,
Sirisena, DN, Pandey, D. (and other in-country collaborators from S

Background

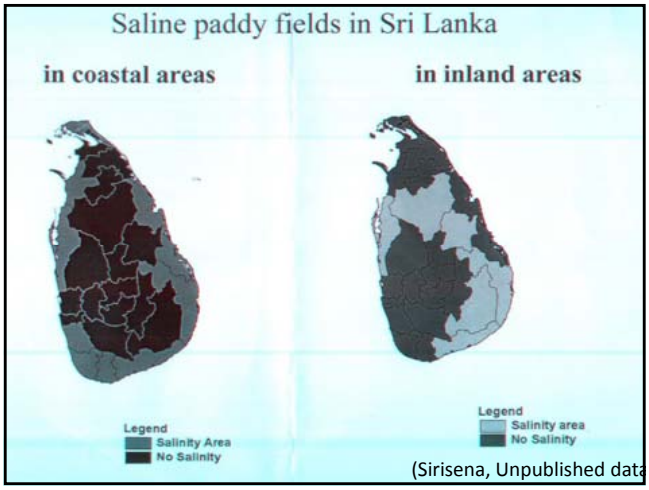
South Asian region

- Agriculture employs ~60 % of the workforce and ~20% of the total GDP
- ~32% global rice production and rice is the staple food
- Salt water intrusion in paddy areas due to Sea level rise and irrigation
- With climate change, the number of people annually affected by coastal flooding will significantly increase, along the coasts from Pakistan through India, Sri Lanka and Bangladesh (Church et al., 2013)
- second lowest in terms of regional level food security and salinity intrusion could significantly affect the food security
- Soil salinity is a major challenge for rice production in all four collaborating countries



Source: Ponnamperuma and Bandyopadhya, 1980

Coastal saline soils in South and South east Asia
(The extent is far greater now: Bangladesh- 1.2 m ha; India- >2 m ha; Sri Lanka- ~0.1 m ha)



(Sirisena, Unpublished data

Project overview

- Salt water intrusion has affected the low-lying agricultural areas of South Asia (causing cropland abandonment, reduced plant growth and yields)
- Remedial measures adopted on salt-affected soils will enhance future climate change if they cause high levels of net GHG emissions.
- This study will select the best management practices (BMPs) for the salt-affected rice cropping systems of the South Asia considering net GHG emissions and other socioeconomic benefits
- The outcome will be used to
  - raise awareness among farmers and policy makers on climate-friendly BMPs
  - make recommendations for policymakers in developing adaptation policies and strategies

Planned activities in brief..

- Mapping salinity areas
- Site selection, field visits and greenhouse gas measurements and analyses
- Farmer surveys and focus group discussions (and consistent interaction with the Department of Agriculture and agricultural extension services)
- Analyses on the benefits in relation to changed levels of emissions and socioeconomic aspects
- Selection of BMPs
- Recommendations for policy decision making and farmers (through awareness creation)

Remedial measures for salt-affected soils and potential benefits

- Vary depending on the country and the type of soil
- Some remedial measures include
  - Soil reclamation (land leveling and efficient irrigation management (flood water level))
  - Soil amendments (e.g. organic manure)
  - Salt tolerant varieties
- Potential impact on emissions
  - Reduced CH_4
  - Increased N_2O with lower water level
  - Increased soil carbon stocks
- Socioeconomic benefits

Relevance to improved policy decision making

- Long-term Goal of the Paris Agreement: To keep the increase in global average temperature to **well below 2°C** (3.6°F)

  (mostly through reduced emissions)
- Paris Agreement is a legally binding instrument with equal commitment to all member countries
- NDC's have incorporated salt water intrusion impacts on agriculture and reclamation of marginal areas:
  "Introduce suitable land and water management practices for central highlands and other marginal areas to minimize land degradation and to improve land and water productivity" (Source: NDC of Sri Lanka)
- Quantified emission reductions and other benefits of BMPs will provide a tangible outcome for improved policy decision making

Designing, developing and managing climate change information and knowledge management systems in Cambodia

Ms.Vichet Ratha Khlok, Deputy Director of Department of Climate Change, Government of Cambodia

SCIENCE POLICY DIALOGUE

06-08 FEBRUARY 2017
BANGKOK, THAILAND

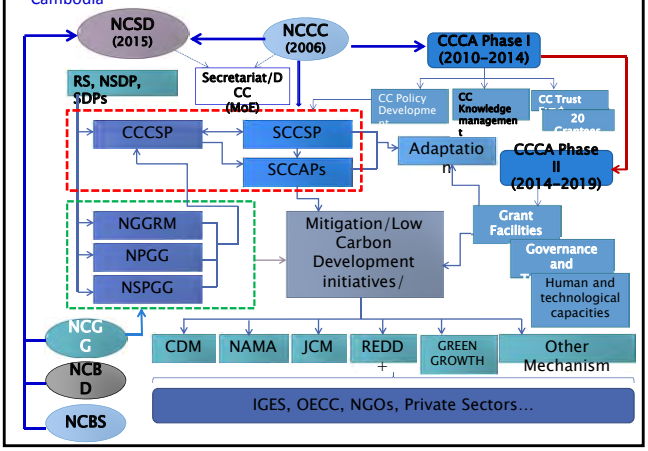
Contents

1. Background

RGC has recognized climate change as a major challenge in the sustainable development of the kingdom.

- **Given the country's high vulnerability** to the impacts of climate variability and change – *e.g. severe floods, droughts, storms, increasing temperatures, sea level rise, and a changing rainfall regime* – **CC could undermine/derail Cambodia's economic growth and poverty reduction efforts**, if no adequate measures are timely put in place.
- The **2009-2013 NSDP** prioritized the development of a strategic response to the challenges imposed by changing climate conditions: *the **climate change strategic plan and action plan***

2. Institutional and Policies Arrangement: Towards Climate Change Response in Cambodia



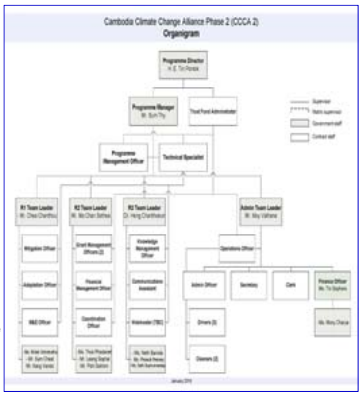
3. The Cambodia Climate Change Alliance (CCCA) Phase 1 (2010-2014): Climate Change Knowledge Management

- **CCCA** was established in 2010, aims to strengthen national systems and capacities to support the coordination and implementation of Cambodia's climate change response, contributing to a greener, low carbon, climate-resilient, equitable, sustainable and knowledge-based society.
- Built up a Knowledge Management and Learning Platform
- The knowledge management activities have been significant involved many stakeholders, which focus on several outputs:

1. Information sharing and knowledge management platforms

2. National CC Information and Knowledge Management and Learning Centre

3. CC outreach and learning campaign



3. CCCA Phase 2 (2014-2019) Result 3: Strengthened human and technological capacities to support climate change response

A Knowledge Management and Information System (KMIS) Framework was developed and approved, and implementation has begun in 2016 (includes transitioning to a more advanced platform for the exchange of CC related information)

- **Climate change web platform** is being upgraded, centralized a single climate change related information resources and database management
- **Datasets from related sectors** will be linkage on the portal to generate information, i.e, GHG inventory data, vulnerability by sectors.
- **Roadmap** 2016-2018 for DCC's database management activities and website/portal maintenance and development will be developed to identify pipeline of climate change data products to be made available to practitioners to best support CCCSP and CCAPs

3. CCCA Phase 2 (2014-2019)
Result 3: Strengthened human and technological capacities to support climate change response

- Ongoing support to the management of the current **climate change website** www.camclimate.org.kh (it will be upgraded as part of the KMIS work)
- Development of **knowledge products**:
  - The **Climate Change Glossary in Khmer** was edited by an independent expert and is by the National Council for Khmer Language (NCKL)
  - **2nd Knowledge, Attitudes and Practices (KAP) Study on CC** has been published (now in use to inform awareness raising and education efforts). Its video is being produced.
- **Support to research and Innovation**
  - **Eight LoA signed with the grantees on Research and Innovation**, under the CCCA Grant Facility Window 3.
  - **Support to awareness raising initiatives and capacity development activities** (including Environmental Day; Earth Hour; University Lectures)

4. Challenges

- Limited of human capacity, technical and financial support
- Limited of knowledge sharing
- Lack of unique mechanism/model for information and knowledge mobilizing/collecting/sharing from various institution
- Lack of collaboration
- Time constraint

5. Future actions

The Knowledge Management programme should further consider actions:

- to improve institutional and human capacity (DCC officers, the national GHG Inventory team…) for supporting awareness raising initiatives and capacity development activities
- to establish a unique mechanism/model for further compile, assess and disseminate information on the technical, financial and social feasibility of livelihood adaptation and mitigation measures
- to extend the practice notes to more detailed best practice guidelines for implementation strategies under the CCCSP/CCAPs
- to engage more public private partnership in research and innovation, in sharing knowledge/experiences
- to develop more relevant knowledge products
- to encourage other line ministries to intergrade communication, education and awareness elements in their climate change action plans
- to scale up library corners in public/private universities and ensure its sustainability
- to build up and strengthen the collaboration/actions/initiatives with various climate change institution/program in the country/region

Policy Talk: Importance of Gender Equity in Low Carbon Development for a Sustainable Asia

Marvin Lagonera
ICLEI Southeast Asia

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

ICLEI Southeast Asia

ICLEI - Local Governments for Sustainability is the world´s leading network of over 1,500 cities, towns and metropolises committed to building sustainable future. By helping our Members to make their cities sustainable, low carbon, resilient, biodiverse, resource efficient, healthy and happy, with a green economy and smart infrastructure, we impact over 20% of the global population.

ICLEI Southeast Asia

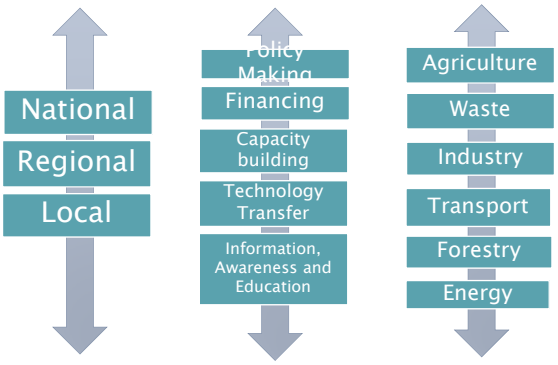
ASIA LEDS PARTNERSHIP · URBAN LEDS · COMPACT of MAYORS

Global Protocol for Community-Scale Greenhouse Gas Emission Inventories · ClearPath AN ICLEI TOOL · carbon Climate Registry

Gender equity at the local, subnational and national level

Capacity-building | Knowledge Products | National Policy

Gender equity as a cross-cutting issue in low carbon development

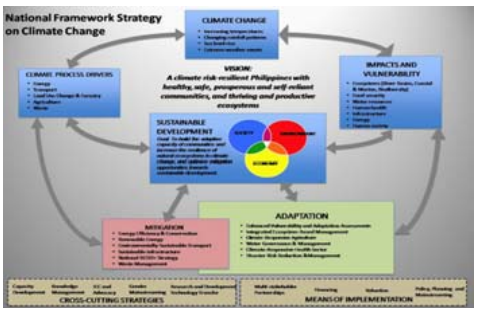


Multi-dimensional, integrated approach to low carbon development

- Do we take a **climate-first** (emission reductions) approach?
- **Multi-dimensional approach** takes into account environmental, social and economic benefits, including gender-responsiveness, instead of merely treating them as co-benefits.
- These **sustainable development goals** include energy security for all, health, sustainable livelihoods, for women and men.
- SDG 5: Achieve gender equality and empower all women and girls

1. LCD must take into consideration the interplay between **techno-economic** and **social-political aspect**. LCD has to include societal change, such as institutional settings (ie care economy), gender-biased power relations, and cultural values.
2. LCD must employ an **interdisciplinary** and **multilevel approach**. LCD must encompass vertical (national-local) and horizontal (academe, private sector, women's groups) levels of governance and decision-making.

Multi-dimensional, integrated approach to low carbon development



"To build the adaptive capacities of women and men in their communities, increase the resilience of vulnerable sectors and natural ecosystems to climate change, and optimize mitigation opportunities towards gender-responsive and rights-based sustainable development."

Gender mainstreaming in low carbon development

Gender mainstreaming is "the process of assessing the implications for women and men of any planned action, including legislation, policies, or programs, in all areas and at all levels. It is a strategy for making women's, as well as men's, concerns and experiences an integral dimension of the design, implementation, monitoring, and evaluation of policies and programs in all political, economic, and societal spheres so that women and men benefit equally and inequality is not perpetuated" (UN ECOSOC, 1997).

Gender mainstreaming in low carbon development

1. Does the policy affect women and men differently and might it lead to positive/negative impacts on gender equality?
2. What data/knowledge is available to assess the impacts of the measure on gender equality, e.g. sex-disaggregated data?
3. To what extent does the project contribute to increasing women's in influence in policy design, planning and decision-making processes?
4. Do the financial resources and measures benefit women to the same extent as men? Does the project lead to a more balanced distribution of public resources among women and men?

Gender mainstreaming in low carbon development: Establishing connections

Key intersections:

1. **Gender and Energy**
2. Gender and Technology
3. Gender and Financing
4. Gender and REDD+
5. **Gender and Cities**
6. Gender and IEC
7. Gender and Agriculture

Gender and Energy Nexus: Gendered Energy Divide

- Energy poverty (especially in rural communities in Asia) has gender dimensions:
  1. Men and women have different energy dynamics (roles in household, decision-making areas, energy needs, coping mechanisms). For example, women are generally more vulnerable to health hazards from household pollution generated by fuels such as coal, wood, and charcoal.
  2. Without access to modern energy services, women spend most of their day performing basic subsistence tasks which limits wage, education opportunities as well as social and political interaction.
  3. Women are often excluded from discussions about energy plans and policies. Excluding women from decision-making is likely to result in gender-blind planning, financing, execution and implementation.

Gender and Energy Nexus: Policy Implications

1. Energy policies and programs need to be gender-responsive. This means incorporating meaningful roles for women in planning, designing and executing energy programs.
2. Energy-health nexus. The provision of modern sustainable energy services to health facilities especially in off-grid areas or rural communities can improve women's health. Improved access to energy (SE4All) can lead to gender equity.
3. Barriers, such as lack of access to credit and training, limit the possibilities for women to develop and use energy-based technologies. Thus capacity-building activities, financing and technological development should incorporate a gender perspective.

Gender and Cities: Synergies between gender and low carbon activities

There is a need to disaggregate the **contribution** made to climate change based on gender, as well as the **differentiated impacts** from climate change based on gender. At the city level, gender lens can inform local policy:

1. **Energy**: Women are more directly responsible for energy use in the home, and therefore, can be more effectively targeted to reduce home-based energy emissions, through choice of appliances and behavior change.
2. **Transport**: With a lower participation rate in the formal economy, women's travel needs are generally less oriented to structured commuting in cities than men's. They may be making more frequent, local trips, which can be targeted in mobility planning to be less energy intensive.
3. **Waste**: Women are still more responsible for household purchasing and consumption. Their choice of goods, and the levels of packaging influences waste volumes.

Moving forward: Recommendations

1. **Planning and Policy Making**. Gender mainstreaming must be done at all levels of planning, decision-making, and programming.

2. **Knowledge and Capacity Development**. Capacity and knowledge development must enhance the roles and status of women as participants and agents of change, build on their strengths and experiences, knowledge and coping capacity, and ensure women's access to information. This includes developing and integrating gendered and accessible capacity building programs.

3. **Knowledge products**. Gendered knowledge products and tools must be developed to improve awareness on gender equity in climate change, supported by information, education and communication activities.

4. **Monitoring System**. Gender-sensitive performance monitoring systems and indicators must be developed and implemented to ensure positive impact on gender equity.

Additional references

ICLEI Local Governments for Sustainability. Women and Climate Change Manual. http://seas.iclei.org/fileadmin/user_upload/SEAS/Documents/Women_and_Climate_Change_Manual.pdf

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UNDP and GGCA. Gender and Energy. http://www.undp.org/content/dam/undp/library/gender/Gender%20and%20Environment/PB4-AP-Gender-and-Energy.pdf

Integrated, resilience-based planning for mitigation and adaptation in Asia

Ayyoob Sharifi, National Institute for Environmental Studies, Japan

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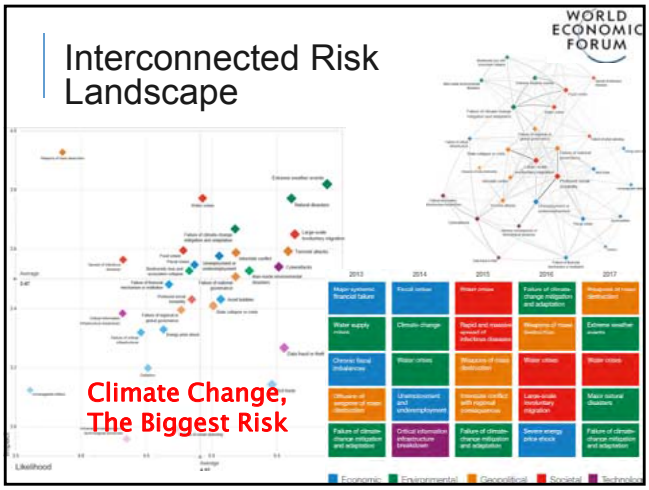
Interconnected Risk Landscape



Resilience and adaptation

Incremental adaptation
- Dominant type
- Small-scale disruptions

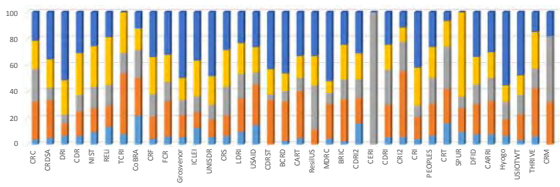
Transformational
- Highly vulnerable system
- Severe/more frequent stresses
- Thresholds are crossed

Source: Sharifi (forthcoming)

Major elements of the framework for analysis

Comprehensiveness
Cross-scale relationships
Temporal dynamism
Uncertainties
Participatory approaches
Action plans

Comprehensiveness



Environmental
Social
Economic
Built environment
Institutional

Dimension	Average
Environmental	6.8
Social	23.5
Economic	18.8
Built environment	21.8
Institutional	29.1

Shortcomings and Challenges, gaps in knowledge

General enough/flexible enough
Spatial and temporal dynamics
Modelling, simulation and scenario making
Dominance of vulnerability (not resilience) measures
Interlinkages and complex interactions
Can resilience assessment shed more light on the uncertain future?
Data availability for conducting assessment
Cost of assessment
A major challenge would be reducing information to an understandable and manageable level (optimization)
Developing integrated tools for assessing both sustainability and resilience

Energy System

IT networks and equipment for system monitoring and control

- Real-time communication of operating conditions with utility mangers
- Optimizing response time to reduce potential loss of system function
- Better sharing of information between system
- Interactive feedback with residents (smart-metering/in-home displays)

Shift from centralized grid to decentralized systems (e.g. microgrid)

- Distributed generation
- Less exposure to extreme events
- Prevent cascading effects
- Energy efficiency enhancement
- Improved diversity, and reliability, clean energy, etc.

Source: Sharifi and Yamagata (2016); Arup, RPA and Siemens (2013)

Buildings

Passive design (orientation, natural lighting, high albedo, PCM, green roof/facade, etc.)

Automated systems to take advantage of local climate

Solar energy panels

High-tech/IT infrastructure for failure detection (smoke, air quality,…)

Indoor human behavior simulation

Source: Raven et al.(2015)

Source: solaripedia.com

Source: Sharifi (2016)

Future challenges and opportunities

Adaptive mitigation

Life cycle costs

- Massive urbanization provides opportunities for eco-design

Nexus issues

- E.g. water-energy nexus

Trade offs

Consider context

- (climate, technical feasibility, site suitability)

Thanks for your attention

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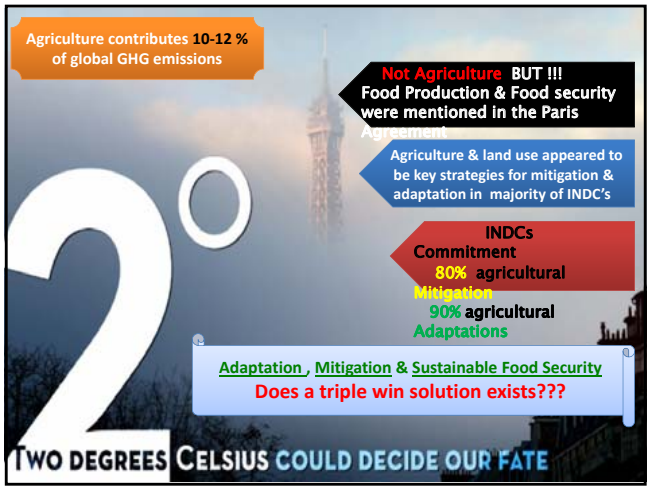
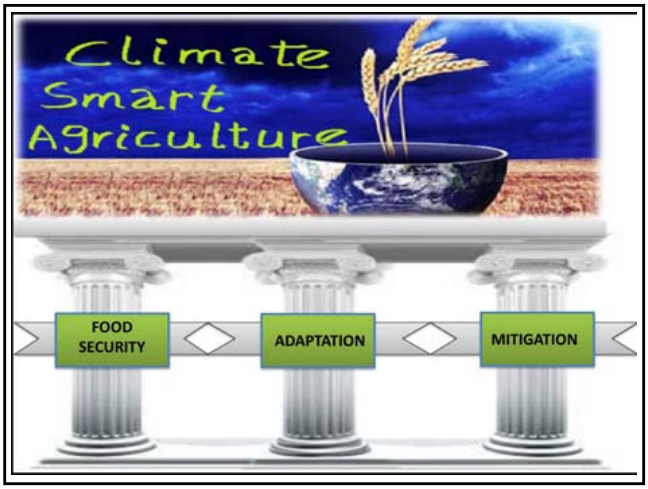
Climate Smart Agriculture: Using Best Practices for adaptation and Mitigation in Asia

Nuzba Shaheen
GCISC, Pakistan

SCIENCE POLICY DIALOGUE
06-08 FEBRUARY 2017
BANGKOK, THAILAND

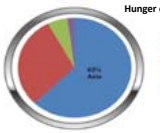




Climate Smart Agriculture: Need for action !

Food security calls for
Transition to Agriculture Production Systems

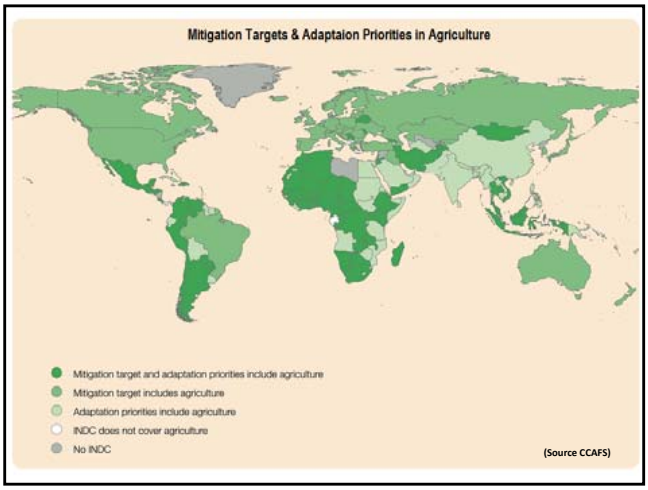
Systems which are



More productive
Use inputs more efficiently
Have less variability and greater stability in their outputs
resilient to risks, shocks and long-term climate variability

Each day 800 million people go hungry





Adaptations in Agriculture

Country driven, forward looking, bottom up approaches

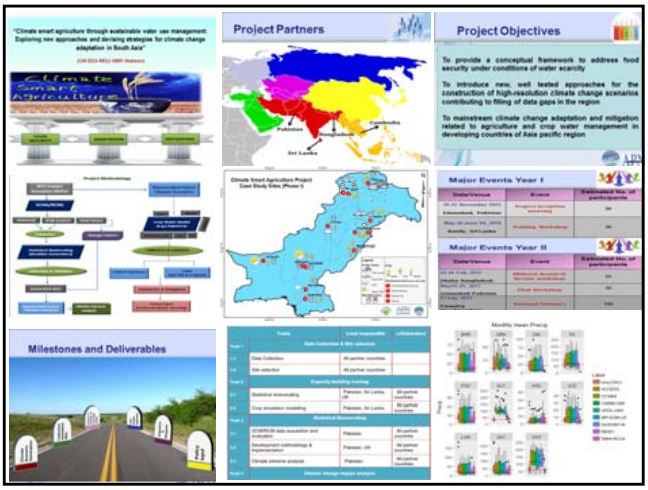
No Regret Options

More crop per drop technologies

WHY is Climate Smart Agriculture Important

Mitigation

It will be Impossible to stay within either a 1.5 or 2 degree C target if Agriculture does not contribute to emissions reductions." (CGIAR)



Next Steps…..Domesticating Paris Agreement

INDC's Implementation

- **Political will and effective governance**
- **Long-term mitigation strategies**
- **Integrated adaptation planning**
- **Climate finance frameworks**
- **Measurement, reporting & verification (MRV) systems**

Thank You!

Adaptation After Paris: Capacity Gaps and Opportunities

Keith Bettinger, PhD, USAID Adapt Asia-Pacific

SCIENCE POLICY DIALOGUE

06–08 FEBRUARY 2017
BANGKOK, THAILAND

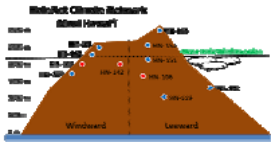
Paris and Adaptation

- "Enhancing adaptive capacity, strengthening resilience, and reducing vulnerability to climate change"
- More support for adaptation
- Development of national adaptation plans
- "Cycles of action": Regular communication and stocktaking

PARIS2015
CONFÉRENCE DES NATIONS UNIES SUR LES CHANGEMENTS CLIMATIQUES
COP21·CMP11

"Evidence-Based" Adaptation

- Making a rigorous case for adaptation
- Addressing uncertainty…guarding against *maladaptation*
- Tools & competencies
  - Understanding data needs
  - Designing & constructing monitoring networks
  - Maintenance & data acquisition
  - Gap-filling & analysis
  - Data → information
  - Dissemination
  - Incorporation into planning and projects



Identifying & Operationalizing Adaptive Capacity; Evaluating Resilience

- Moving from theory to practice
- Recognizing roles in institutional, collective, and autonomous adaptive capacity
- Scalable examples & best practices
- Figuring out how to demonstrate progress

Embedding & Mainstreaming

- Going from "bolt-on" adaptation to integrated adaptation
- From standalone projects to adaptation portfolios
- Synergies with SDGs
- More complementarity and blending
- "Making the canon": University and technical education

Climate Change Technology Transfer and Capacity Building under Paris Agreement

Sudhir Sharma, UN Environment

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Key messages on Technology in Paris Agreement

23 Reference to Technology Mechanisms/CTCN

The focus is on strengthening cooperative action on technology development and transfer

Creation of Technology Framework supported by strengthened Technology Mechanism

Technology framework is to provide overarching guidance to the work of the Technology Mechanism in order to support the implementation of this Agreement

The Technology Mechanism established under the Convention shall serve the Paris Agreement

Agreement recognizes that success of implementation dependant on "accelerating, encouraging and enabling innovation is critical.."

Enhanced action on RD&D and endogenous capacities and technologies - particular for early stages of the technology cycle

Promoting Innovation – collaborative approaches to research and development

Key messages on Technology in Paris Agreement

Support, including financial support, shall be provided to developing country Parties for the implementation of the technology support

Support would be through TM and FM

Enhanced collaboration between Technology Mechanisms and Financial Mechanisms (GEF, GCF)

Support would be provided in a balanced way mitigation and adaptation.

The global stocktake, every five years, will review the support on technology development and transfer for developing country Parties and appropriately guide the TM and FM

CTCN engagement in Technical Expert Meetings with a view to enhance implementation of pre 2020 ambition

Paris Committee on Capacity Building

Paris Committee on Capacity Building Established

Key responsibility – identify capacity gaps and needs, both current and emerging, and enhance capacity building efforts

A work plan on capacity building for the period 2016-2020, to consider nine elements

12-member PCCB, along with a draft terms of reference for the committee

The PCCB is expected to ensure coordination and coherence in the capacity building work of disparate entities

Its effectiveness will be determined, to some extent, by the quality of its membership and their experience in capacity building – which is not always possible through a Party-nomination process

Elements of Capacity building Workplan

Assess how to increase synergies through cooperation and avoid duplication among existing bodies.

Identify capacity gaps and needs and recommend ways to address them.

Promote the development and dissemination of tools and methodologies for the implementation of capacity building

Foster global, regional, national and subnational cooperation.

Identify opportunities to strengthen capacity at the national, regional and subnational level

Foster dialogue, coordination, collaboration and coherence among relevant processes and initiatives under the Convention.

Climate Change Technology Transfer and Capacity Building for adaptation and mitigation under the Paris Agreement: Experience of India

AJAY RAGHAVA
Ministry of Environment, Forest & Climate Change
Government of India

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Global Scenario

- CO_2 in atmosphere: 401 ppm in 2014 from 298 ppm in 1901
- Global mean surface temp. increased by 0.89ºC between 1901 & 2012
- Global mean sea level increased by 0.19 m between 1901 and 2010

Key Findings 5th Assessment Report (2014)

- Most of the growth from middle income countries like China and India
- Per capita emissions still low in most developing countries; lot more growth in emissions expected under business as usual
- To limit **increase in temperature to 2º C** relative to preindustrial level, GHG emissions at global level to be reduced by **40-70%** compared with 2010 by 2050 and near zero by 2100

Historical Emissions & Carbon Space

- Historical emissions since 1750s resulted in global temp. rise by 0.85° C
- **Cumulative historical emissions** in 2009 (1850 as base year):

USA	**29%**
Other Developed countries	**45%**
China	**10%**
Other Emerging Economies	**9%**
India	**3%**

- Limiting future climate change require substantial and sustained reductions in emissions

India: National Circumstances

- Extreme weather events and variation in rainfall patterns posing risks to agriculture
- Forest cover has increased steadily over time
- About 70% of rural households depend on fuelwood for cooking
- 29.5% of population below poverty line
- 33% households have no access to electricity
- 55% households with *kuccha* and *semi-pucca* houses
- Low per capita energy consumption

Projected impacts on India

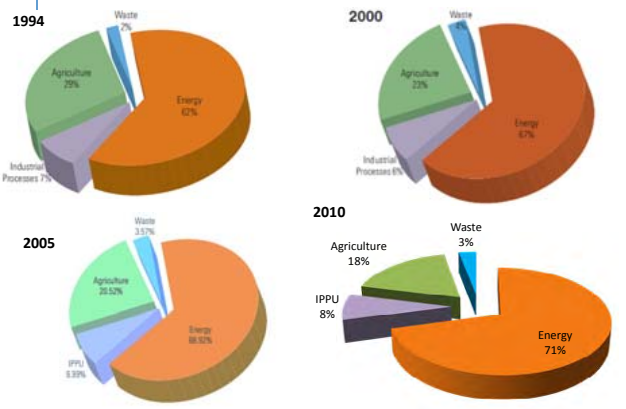
- Increase in extreme rainfall events, mean and extreme precipitation during monsoon
- Changes in more than 1/3rd of forest area by 2100, mostly from one forest type to another
- Reduction in monsoon sorghum yield by 2 to 14% by 2020, with worsening yields by 2050 and 2080
- Reduction in wheat yields in Indo-Gangetic Plains
- Estimated countrywide agricultural loss (more than US$7 billion) in 2030; severely affect income of 10% population
- Extreme events are expected to be more catastrophic for east coast.

India's GHG profile over time

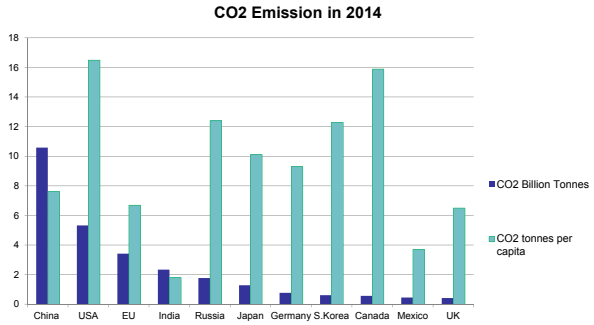
YEAR	1994		2000		2005*		2010	
SECTOR	Emission	Share	Emission	Share	Emission	Share	Emission	Share
ENERGY	7,43,820	62%	10,27,016	67%	12,10,384	69%	1,510,121	71%
INDUSTRIAL PROCESSES & PRODUCT USE	1,02,710	7%	88,608	6%	1,24,017	7%	171,503	8%
AGRICULTURE	3,44,485	29%	3,55,600	23%	3,60,313	21%	390,165	18%
LULUCF	14,292	-	-2,22,567	-	-2,78,721	-	-252,532	-
WASTE	23,233	2%	52,552	4%	62,638	4%	65,052	3%
TOTAL (Without LULUCF)	12,14,248		15,23,777		17,57,352		2,136,841	
TOTAL (Net emissions)	12,28,540		13,01,209		14,78,632		1,884,309	

Values in Gg CO2e; 1 Gg= 10^9g = 1000 t *projected figures

India's GHG Emissions Sector-Wise



Emissions of Some Major Economies



Data Source: Trends in Global CO2 Emissions 2015 Report. PBL Netherlands Environmental Assessment Agency

Per capita GHG emissions (tonnes CO_2e)

	1994	2000	2010
US	21.43	22.54	18.92
Brazil	9.53	11.96	7.10
Russia	14.83	11.24	11.53
China	2.91	4.32	9.35
India	1.31	1.25	1.56
South Africa	8.91	9.48	10.07

Mitigation Actions

Voluntary pledge–
India will endeavor to reduce the emissions intensity of its GDP by 20-25% by 2020 compared with the 2005 level; emissions from the agriculture sector would not form part of the assessment of emissions intensity.

INDC–
To reduce the emissions intensity of GDP by 33-35% by 2030 from 2005 level.

12% reduction in emission intensity has been achieved between 2005 and 2010.

India's INDCs

- Comprehensive, includes Adaptation, Mitigation, Finance requirement, Technology transfer, Capacity Building
- Considers rapid growth till 2030
- 1.5 billion population, with 40% living in urban areas
- Incorporates development priorities such as:
  - Electricity for all
  - Housing for all
  - Poverty eradication
  - Infrastructure for Education & Health for all
  - Make in India
  - Infrastructure development

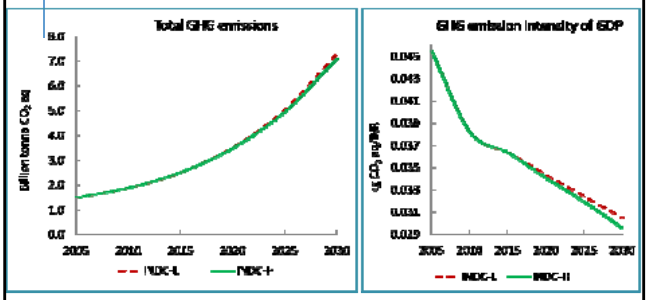
11

Reduce Emission Intensity of GDP

- Goal: ***To Reduce the emissions intensity of its GDP By 33 - 35% by 2030 from 2005 level.***
  75% jump in ambition over 2020
- **Avoided emissions:**
  3.59 billion tonne of CO_2 equivalent over BAU
  - Thrust on Renewable Energy and Promotion of Clean Energy; Enhancing Energy Efficiency
  - Climate Resilient Urban Centres and Sustainable Green transportation Network
  - Swachh Bharat Mission, Cleaning of rivers, Zero Effect Zero Defect, Make in India

12

Total GHG Emission and GHG Emission Intensity



	Total GHG emissions (Billion Tonne CO_2 eq)		GHG Emission Intensity reduction in 2030 from 2005 level
	2005	2030	
INDC-L	1.48	7.30	33%
INDC-H	1.48	7.08	35%

Adaptation

- Goal:

To better adapt to climate change by enhancing investments in development programme in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management

- High vulnerability of India to climate change impacts due to poverty & dependence of a large population on climate sensitive sectors for livelihood

14

Adaptation

- Strategies and initiatives include actions in agriculture, water, health, coastal region & islands, disaster management, protecting biodiversity and Himalayan ecosystem and securing rural livelihood
- New missions on Health and Coastal Areas
- National Adaptation Fund set up [INR 350 Crores] (USD 55.6 million)

15

Mobilizing Finance

- Goal:

To Mobilize Domestic and New & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.

- USD 2.5 trillion (at 2014-15 prices) required for meeting India's climate change actions between now and 2030 as per preliminary estimates
- Ratio of emission avoided per dollar invested & economic growth attained would be relatively more favourable in case of investments made in India

16

Financial needs

- Adaptation related public spending was of the order of 12% of budget in 2013-14 (~2% of GDP)
- Around USD 90 billion will be needed for solar capacity addition to meet enhanced targets in renewable energy
- About USD 21 billion will be required to upgrade the grid infrastructure to support absorption of increased renewables up to 2022.

Technology Development &Transfer

- Goal:

To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

- Critical technologies need to be facilitated via GCF
- Global collaboration in R&D
- Preliminary and illustrative list of select technologies given in India's INDC

18

Government's Initiatives

- National Action Plan on Climate Change- 8 missions
- State Action Plan on Climate Change

Energy sector:

- Increased target of renewable energy capacity to 175,000 MW till 2022
- Renewable Energy Certificate (REC) to promote renewable energy and facilitate Renewable Purchase Obligations (RPOs)
- National Clean Energy Fund by imposing a cess on coal (Rs. 400/ metric tonne)
- Perform Achieve Trade (PAT)
- Clean Coal Technology Initiatives
- Super Efficient Equipment Programme

Government's Initiatives…..contd.

- Promotion of Supercritical coal technology and Advanced USC Technology
- Renovation, Modernization and Life Extension of old power stations
- Civil nuclear power programme

Building, Transport and Waste Sectors

- Energy Conservation Building Code (ECBC)
- National Programme for LED based home and street lighting
- National Mission on Electric Mobility
- Corporate Average Fuel Consumption (CAFE) standards for cars
- New Metro rail networks
- Swachh Bharat (Clean India) Mission

Initiatives

Adaptation Strategies

- Paramparagat Krishi Vikas Yojana - organic farming
- Pradhan Mantri Krishi Sinchayee Yojana - efficient irrigation
- Neeranchal - watershed development
- Namami Gange
- National Initiative on Climate Resilient Agriculture (NICRA)
- Bureau for Water Use Efficiency
- Lifestyle & culture of sustainability

21

Initiatives

Climate Finance Policies

- National Adaptation Fund
- Reduction in fossil fuel subsidies
- Coal Cess increased from Rs 50 to Rs 400 per ton
- Tax free infrastructure bonds for renewable energy

22

Other initiatives

Books on 'Parampara' (COP21) and **'Low Carbon Lifestyle– Right Choices for our Planet' (COP22) released**

Conclusion

- Technology development transfer: slow progress
- Affordable cost, private entities, IPR issues
- Dual use, international regulations
- Obsolete tech
- Technology needs assessment
- Key Category analysis
- India : Technology Vision 2035
- Clean coal technologies, renewable energy, transport, energy efficiency in industries
- International Solar Alliance

Conclusion

- Capacity Building : Continuous process
- Proper training and upgrading skills across sectors
- National and States level programs needed
- International mechanisms should support thematic knowledge networks, training in different aspects of RE, etc
- Estimated 2.5% of the Govt's salary budget reqd

For more information contact

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What have we learned to better understand how methods of communication, knowledge management and science-policy interactions can be undertaken for climate change in the context of low carbon and adaptation initiatives

Dr. Mara Mendes and Dr. Linda Anne Stevenson

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