

Designing and Establishing a Cambodian Low-Carbon Development Plan

Cambodian Low-Carbon Policy and Research Workshop

Synthesis Report

-Key findings from the dialogue-



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Preface

Cambodia is one of the Asian and Pacific countries experiencing rapid economic growth. Cambodia, like the rest of the global community, is becoming increasingly aware that climate change is caused by intensive human industrial activities and unsustainable economic development. It impacts not only the present generation but also future generations who will need to adapt to and mitigate the effects of volatile changes in the climate.

Having understood the consequences of such impacts, “*Cambodian Low-Carbon Policy and Research Workshop: Designing and Establishing Cambodian Low-Carbon Development Plan*” was held on 29 May 2012 in Phnom Penh, Cambodia, co-organised by the Cambodia’s Ministry of Environment and the Institute for Global Environmental Strategies (IGES) in its capacity as the secretariat of the Low Carbon Asia Research Network (LoCARNet), in cooperation with the National Institute for Environmental Studies (NIES), Japan, and the Kyoto University (KU). This workshop had the objectives of building capacity and raising awareness among Cambodian researchers and policymakers to develop a low-carbon development plan. The expected goal over the long term is for Cambodia to organise and promote a network of Cambodia’s researchers to develop the study of low-carbon development and to establish a comprehensive research proposal for low-carbon development in Cambodia.

This synthesis report summarises key findings from the dialogue, which covered such diverse issues as an interdisciplinary approach to low-carbon development and collaboration between the policy and research communities. The key messages in this report identify the important issues on which to focus and are designed to assist scientists in developing a future research agenda and policymakers in conducting policy-making based on scientific evidence where possible. The issues covered in this report are expected to be of great interest to policymakers and researchers in making the transition toward sustainable low-carbon development.

We would like to take this opportunity to convey our sincere gratitude to H.E. Samdech Akka Moha Sena Padei Techo Hun Sen, the Prime Minister of the Royal Kingdom of Cambodia, for his ongoing committed leadership and policy guidance to ensure prosperous national growth integrating environmental sustainability into the national development agenda in order to conserve the environment, reduce poverty and increase green job opportunities, and for his holistic envisagement of the environment and support for sustainable low-carbon development in Cambodia. We would also like to express our gratitude to the responsible senior management and Climate Change Department officers at the Cambodia’s Ministry of Environment, other key stakeholders, and the staff of IGES/NIES/KU for their considerable efforts, facilitation and contributions in planning and preparing the workshop. We would also like to express our appreciation to the workshop’s speakers and participants for their active participation and discussion. We will further continue our joint efforts to create a significant forum for collaboration toward sustainable low-carbon development among Cambodia, Japan and other Asian countries.

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Acknowledgement

This Synthesis Report draws together findings from the Cambodian Low-Carbon Policy and Research Workshop. The workshop took place as a meeting, entitled *Designing and Establishing Cambodian Low-Carbon Development Plan*, on 29 May 2012, hosted by Cambodia's Ministry of Environment with co-support from the Institute for Global Environmental Strategies (IGES), Kyoto University (KU), and the National Institute for Environmental Studies (NIES). The Workshop took place at the Himawari Hotel, Phnom Penh, Cambodia and was opened by H.E. Thuk Kroeun Vutha, Secretary of State, the Ministry of Environment of Cambodia with participants from line ministries, academia, non-governmental organisations (NGOs), the Japanese International Cooperation Agency (JICA), research institutes and other stakeholders.

The objectives of the meeting were to build capacity and raise awareness among Cambodia's researchers and policymakers to help develop a Low-Carbon Development Plan. In order to achieve these objectives, the meeting sought to;

- discuss the initiation of a study and research related to a low-carbon development plan and action plan in Cambodia by identifying the current status of climate change and development plans and by generating awareness of the nature of the research and development support that are needed
- promote South-South cooperation

Sixty-six researchers and policymakers participated in the dialogue to discuss these issues.

Taking this opportunity, I would like to express my profound gratitude to all speakers and participants from the Government of Cambodia and academia for their contributions to the meeting. I would also like to add our sincere appreciation to Dr. Tin Ponlok, Deputy Director General, the Ministry of Environment for his guidance and support to materialise this workshop. Special gratitude goes to Mr. Sum Thy, Director, Climate Change Department, and Mr. Hak Mao, Chief of Vulnerability and Adaptation Office, Climate Change Department, the Ministry of Environment for their considerable efforts to coordinate this meeting.

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Key Findings

○ **Cambodia is in the process of developing its own capacity to formulate a national low-carbon policy**

- Cambodia is ready to mainstream climate change into its national strategic development planning by developing a climate change strategic programme, implementing climate change activities for both mitigation and adaptation, building knowledge regarding climate change, raising awareness among government officers and the public, and mobilising financial resources for climate change-related projects.
- The Royal Government of Cambodia has been aware of the importance of taking measures against climate change and has made a strong commitment to address climate change at both the international and national levels.
- Progress has been made in implementing policies in each sector for economic development in Cambodia. However, amongst the challenges is the question of how to deal with the environmental issues accompanying economic development.

○ **The Cambodian vision for a low-carbon society can provide the principle guideline for Cambodia's future development**

- Cambodia seeks a direction to green growth through the effective, efficient and sustainable utilisation of its limited human, natural and economic resources and capital.
- A low-carbon society (LCS) and green growth will serve as guiding principles and strategies to turn the challenges of today into opportunities for sustainable economic growth and environmental sustainability.

○ **Cambodia needs low-carbon research for low-carbon development**

- Cambodia's low-carbon development can be achieved by elaborating and strengthening the current national low-carbon policy through input and participation from Cambodian researchers.
- As for the role of researchers, data collection and capacity building for analysis are the first priority in order for Cambodia to involve researchers in the policy-making process. Research should be straightforward and understandable so that policymakers can understand the findings and implications indicated by researchers.

○ **A low-carbon network in Cambodia can support and develop decision-making capacity in Cambodia**

- Cambodia needs to initiate a research network to build up its research capacity in order to develop and analyse the country's development capacity and options through its own resources.
- Capacity development of Cambodian researchers is necessary. Notably, collaborative research regarding climate change should be undertaken with researchers in neighbouring countries, taking advantage of the international support and support from researchers' network for capacity development.

○ **Linkage of the domestic network with the international network will be key in enabling Cambodia to leapfrog ahead**

- The Low Carbon Asia Research Network is a tool to promote and encourage dialogues and close cooperation among policymakers, researchers, and other stakeholders including businesses and citizens, in Asian countries. It fosters their ability to work together to ensure sustainable economic development and environmental sustainability.

Synthesis Report

Cambodia is in the process of developing its own capacity to formulate a national low-carbon policy

Cambodia is ready to mainstream climate change into its national strategic development planning by developing a climate change strategic programme, implementing climate change activities for both mitigation and adaptation, building knowledge regarding climate change, raising awareness among government officers and the public, and mobilising financial resources for climate change-related projects.

Although Cambodia is still facing many challenges including limited human resources, awareness, research, analysis, technology and financial resources, Cambodia now stands at a starting point for developing a climate change policy.

Cambodia's overall policy is structured under a National Strategic Development Plan (NSDP), a single overarching medium-term development plan for the government to follow. The NSDP 2009-2013 was updated by the Ministry of Planning (MOP) in consultation with other stakeholders including other governmental ministries and institutions, external development partners and civil society entities. The plan includes the promotion of forest conservation and renewable energy as climate change-related matters. The government also established some climate change priorities for further identifying and fostering the implementation of the Clean Development Mechanism (CDM) and greenhouse gas (GHG) reduction projects within the NSDP 2009-2013.

The policy recommendation by the Deputy Prime Minister (Oct. 2011) of the national climate change policy and action plan shall support the four pillars revolving around good governance, which lies at the core of the Rectangular Strategy, Cambodia's long-term development vision. These four pillars are the enhancement of the agricultural sector, further rehabilitation and construction of physical infrastructure, capacity building and human resource development, and private sector development and employment generation. This plan shall give priority to

the sectors that are the backbone of the national socio-economy such as agriculture, water resources, fisheries, forestry, protected area management, energy and physical infrastructure. It also places focus on cross-sectoral issues such as institutional strengthening, human resource development, research, resource mobilisation, application of appropriate technologies, education and awareness raising, and gender at both the national and sub-national levels. In addition, some recommendations of the Deputy Prime Minister can be considered during the decision-making process in order to respond to climate change at both the national and international levels. These recommendations are, first, the development of a policy and strategic plan on climate change; second, institutional and technical strengthening and coordination; third, the implementation of climate change response projects; fourth, financial mobilisation; fifth, education and awareness raising; and sixth, international negotiations to address climate change.

The Royal Government of Cambodia (RGC) has been aware of the importance of taking measures against climate change and has made a strong commitment to address climate change at both the international and national levels.

At the international level, Cambodia ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1995 and acceded to the Kyoto Protocol in July 2002. As a party of the UNFCCC, Cambodia fully supports efforts to address climate change based on the key principles of the UNFCCC and supports the second commitment period of the Kyoto Protocol.

Also, in the draft second national communication, mitigation options for energy industries (electricity supply), manufacturing industries and construction, transport, commercial and institutional industries, and so on were identified, and such mitigations options as energy efficiency measures, solar power, rice husk gasification with combined heat and power, electric vehicles and efficient cook stoves were proposed, among other measures.

As for implementation, Cambodia has contributed to the mitigation of GHG emissions through CDM

projects and others activities such as promoting renewable energy (hydropower, solar, biomass, biogas), energy efficiency and forestry. Thus far (as of May 2012), Cambodia has approved ten CDM projects, of which six have been registered with the UNFCCC CDM Executive Board (EB). Beyond these, Cambodia has been implementing a broad range of voluntary carbon offset activities.

Progress has been made in implementing policies in each sector for economic development in Cambodia. However, amongst the challenges regarding is the question of how to deal with the environmental issues accompanying economic development.

As for progress under Cambodian policy, the Cambodian government has made efforts to collect data and analyse it to shed light on future policy potential and options and to set up a low-carbon vision in Cambodia. From the data, it is clear that Cambodia faces the challenge of balancing economic development and social and environmental issues. For instance, energy fuel combustion GHG source categories shows that the energy industry and transportation sector accounts for more than half of total CO₂ emissions in Cambodia. Cambodia established its energy policy in 1994. It facilitates investment in Cambodia and the development of the national economy while encouraging research and the environmentally and socially acceptable development of energy resources needed for supplying all sectors of the Cambodian economy. It also encourages the efficient use of energy while minimising the detrimental environmental effects that result from energy supply and consumption.

The current target of the energy strategy is that 100% of villages have access to electricity services by 2020 and that 70% of households have access to quality electricity services by 2030. Cambodia's draft energy strategy was created in acknowledgement of the impacts of global warming and climate change. It advocates for developing renewable energy sources such as biomass, solar and mini-hydro while also ensuring a supply of electricity for industry, commercial and residential uses. It is also expected to harmonise economic growth, energy security and environmental protection, strengthen efforts to implement the sustainable energy efficiency programme, and develop capacity and mechanisms to deal with climate change and improve knowledge on

climate change.

On the other hand, current challenges in Cambodia's transportation sector are significant. Cambodia currently consumes about 2.4 million liters of oil per day, according to import statistics for 2006. All petroleum products in Cambodia are imported. Transportation consumes about 65% of all gasoline and diesel while the energy sector uses diesel fuel and fuel oil as the principal source of electricity generation. Rapid growth in the transportation sector has increased CO₂ emissions by a degree greater than those experienced by other economic sectors. One major trend has been a significant increase in traffic, due mainly to economic expansion and improvements to roads. The number of registered vehicles has also been increasing. There have been increases in vehicle emissions as well as traffic accidents, impacting both the environment and health. In urban areas, private transportation, particularly cars, is rapidly expanding and congestion and pollution are consequently worsening, particularly as many of the cars are older second-hand imports which are typically not fuel- or emission-friendly. In addition, no urban areas offer mass transit public transport systems. The vast majority of public transport within urban areas is provided by motorcycle taxis. The number of registered vehicles has been increasing from year to year. The rate of increase year over year was about 19% in 2010 (1,652,534 vehicles). Therefore, Cambodia needs some of measures to reduce emissions from transportation sector, in addition to the measures in energy sector.

The Cambodian vision for a low-carbon society can provide the principle guideline for Cambodia's future development

Cambodia seeks a direction to green growth through the effective, efficient and sustainable utilisation of its limited human, natural and economic resources and capital.

Current constraints are economic expansion with significant environmental degradation, wide disparities between urban and rural areas with disproportionate benefits to urban residents, and less effective and less efficient resource management. Economic analysis and transportation statistics reveal that gradual economic growth has contributed to transportation development in Cambodia. The Royal Government of

Cambodia (RGC) is committed to addressing climate change challenges within this context. The RGC is committed to implementing green growth, low-carbon development, a low-carbon society, low-carbon growth and other initiatives which contribute to and support sustainable development and poverty alleviation.

Cambodia established a National Green Growth Policy Tool aimed at realising a vision for economic growth and development, human well-being and environmental quality, all of which will promote the improvement of livelihoods. The focus of the green growth roadmap is access to clean water and sanitation, food security and non-chemical products, and sustainable land use, renewable energy, means for better mobility, information and knowledge, and finance and investment. The long-term goal (over the next 10 to 20 years) is to promote sustainable and inclusive growth and the achievement of Cambodia's Millennium Development Goals for economic development and social and environmental stability. Regarding further progress within Cambodian efforts to achieve low-carbon development, Cambodia is the first least developed country (LDC) in Asia to adopt a green growth strategy. It has created the RGC-ESCAP¹ National Green Growth Roadmap (2009), established a general secretariat for green growth, and formulated a national green growth policy. Furthermore, Cambodia is now working to establish a National Committee on Green Growth and it is in the process of preparing a green growth legal framework, a Green Growth Master Plan, and green growth implementation plans.

Green growth strategies are compatible with Cambodia's economic fundamentals, and their adoption can be expected to make Cambodia a strong force in the region. The Cambodian government acknowledges that prosperity is not due to resource endowments and also that poverty is not due to a lack of resource endowments. Prosperity and poverty are, instead, the outcome of policy choices. A unique blend of both vision and action in the area of green growth may enable Cambodia to achieve rapid economic transformation. Cambodia seeks to achieve continued rapid economic development while preserving environmental integrity by shifting the current development pathway into a more climate-sustainable green growth trajectory, significantly boosting economic growth, allocating both human and

natural resources in more efficient and effective ways, and adapting legal and regulatory frameworks to future environmental and economic stresses.

A Low Carbon Society (LCS) and green growth will serve as a guiding principle and strategy to turn today's challenges into opportunities for sustainable economic growth and environmental sustainability.

Cambodia is currently developing its Low-Carbon Development Strategies focused on adaptation and mitigation. Adaptation is the first priority for addressing climate change issues in Cambodia. Prior to developing low-carbon strategies, Cambodia initiated a low-carbon development (LCD) committee in order to implement LCD activities by coordinating line ministries. The Royal Government of Cambodia has set up various government ministries and other institutions, national committees and inter-ministerial working groups and research institutes in collaboration with international organisations in order to ensure overall coordination of and cooperation between different policies and measures, including those related to climate change issues.

Currently the Cambodia Climate Change Strategic Programme (CCCSP) is being formulated focusing on priority sectors. In the area of adaptation, it includes agriculture, water resources, fishery, forestry, human health, coastal zones, protected areas, and other key national policy priorities, while in the area of mitigation strategies, it addresses energy development, renewable energy, energy efficiency, transportation, industry processes, waste management, forestry, agriculture, and other sectors providing support to the country's sustainable development priorities. In addition, it addresses meteorology, disaster risk reduction, R&D, education and awareness raising, gender and financing issues as cross-cutting areas. The Climate Change Technical Team (CCTT) has also been established and it has responsibility for technical activities and the provision of advice related to climate change issues. Cambodia now needs to forge a pathway to low-carbon development.

Although Cambodia has made progress in preparation for climate change within its national strategies related to climate change, the country currently lacks a unified policy framework on climate change adaptation and mitigation, and as a least developed country under

¹ RGC-ESCAP: the Royal Government of Cambodia and the Economic and Social Commission for Asia and the Pacific

the UNFCCC, Cambodia is not required to reduce GHG emissions and economic growth is regarded as an important priority. In that sense, the pursuit of low-carbon development/green growth that gives Cambodia good opportunities to attain co-benefits of economic development in a low-carbon manner has important implications for policy development.

As stated earlier, while the green growth initiative is related to Cambodian future economic development, low-carbon development provides Cambodia with an effective long-term development path incorporating leapfrogging. Although an examination of long-term benefits is not easily done, long-term planning and a low-carbon strategic perspective are necessary in order for Cambodia to leapfrog successfully. Even though green growth and low-carbon development are two separate initiatives, they are similar conceptually. The Cambodian government is willing to integrate green growth and low-carbon development to harmonise these into specific national priorities and consider them within the national plan. That is, while Cambodia is now focusing on a dual approach of green growth and low-carbon development, these two approaches can be coordinated in the future despite their different areas of emphasis. Cambodia's sectoral policies need to reflect its green growth and low-carbon development policies to ensure the effective implementation of national policies, strategies and plans. A climate change policy has been established to coordinate sector policies and to direct policies linked with climate change issues.

Cambodia needs low-carbon research for low-carbon development

Cambodia's low-carbon development can be achieved by elaborating and strengthening current national low-carbon policy through inputs and participation from Cambodian researchers.

In order to design a policy for low-carbon development, Cambodia needs to collect data using its domestic resources. Cambodian research institutes and universities already conduct research activities on a project basis. Currently, many projects are related to low-carbon or have elements related to low-carbon issues, but these activities are not directly linked to the information and findings required for low-carbon policymaking.

Current challenges for research in Cambodia are the

limited capacity of researchers and the expectations within academia, as faculty at Cambodian universities are expected to teach as their primary duty rather than conduct research. Most universities in Cambodia play roles as educational institutions more than research centres. Recently, more universities are launching research programmes through the efforts of faculty who have graduated from institutions abroad. Despite this, these programmes are typically still separately-conducted endeavors and pursued on a project basis. They usually share neither common programmes nor priorities with each other. Moreover, research is typically conducted individually and there are few forums to discuss the research, resulting in challenges for designing and conducting future research. Moreover, to enhance future research, it is important to link research with policy. The more Cambodia develops, the more research results are needed in the areas of the low-carbon sector and energy, in order to incorporate them into policy appropriately and accurately.

For instance, the mission of the Royal University of Phnom Penh (RUPP) is to promote research for academic advancement and national development, to enhance knowledge and technological transfer and development towards national self-reliance, to provide service to the public and private sectors and community development, and to promote cultural preservation, exchange and development. The curriculum is not consecutively offered not designed in ways that are relevant to low-carbon issues. In contrast, at the Royal University of Agriculture (RUA), since 2011 sector-based contributions have been made for climate change issues, which are the focus of six projects out of 33 on-going projects. RUA set up the "Vision for Future Climate Change" in order to enhance awareness of climate variability among students and farmers and increase research and participation in other projects related to climate change. It also seeks to contribute to the work of the government and other organisations in order to secure food production, promote climate change adaptation campaigns, and so on. However, this is mainly sector- and project-based research. Therefore the continuity and cross-sectoral integration required within climate change research has not been developed. A private university such as Pannasastra University of Cambodia has also included environment subjects into its curricula and created many activities concerned with

the environmental sector. However, this programme is mainly for teaching, not for research.

Against this backdrop, data collection and capacity building for analysis are the first priority for Cambodia in order to involve researchers in the climate change policy-making process. Research should be straightforward and understandable so that policymakers can understand the findings and implications from the researchers' point of view. Interpretation of research is needed so that research findings can be integrated into national policy. In light of this, another role of researchers is as interpreters of climate impact assessments or economic benefit analyses. Researchers' analyses and findings can be used as communication tools, and such communication tools are of the highest importance for collaboration by policymakers and other stakeholders. However, in order to conduct such research, Cambodia needs long-term research, expertise for development, clear research questions, and the capacity to conduct scientific analyses and explanations. Especially, policymakers need reliable results concerning economic and impact analyses of which implication can be easily understood. The Cambodian government recognises that good policies can be generated from research, and that, conversely, good research results from policymakers' actions.

A low-carbon network in Cambodia can support and develop decision-making capacity in Cambodia

Cambodia needs to initiate a research network to build up its research capacity in order to develop and analyse the country's development capacity and options through its own resources.

The establishment of a research network in Cambodia is very important to engage researchers and decision-makers in order to improve and assist in the development of national climate change policy as well as to bridge gaps between decision-makers and researchers. Such a research network provides basic scientific evidence and findings to support decision-making by the government so that the government is able to set up national policies and strategies related to LCS development plans.

Academia and research institutes can contribute to mainstreaming LCS into research plans. For

mainstreaming LCS, a research network is needed for academia to have a strong commitment both to LCS research activities and to sharing research findings on LCS with decision-makers. Such a research network encourages researchers to conduct LCS research, allocates a budget for LCS research activities, shares research findings with decision-makers and other stakeholders, and enables decision-makers to take the research findings into account through clear explanations and references. The research findings generated through pilot projects are also useful. Researchers in Cambodia can also work with other international communities addressing LCS and participate in international climate change conferences such as the Conference of the Parties (COP) in the UNFCCC.

In addition, the involvement of other stakeholders is important in order to share information and data from their respective offices/stations. For instance, non-governmental organisations (NGOs) can contribute by mainstreaming LCS issues into their respective strategies. LCS research by those stakeholders can also provide the basis for recommendations, guidance and advice.

Integration of broad knowledge is necessary in order to develop an appropriate low-carbon growth policy. In particular, in order to achieve low-carbon development targets, Cambodia needs good collaboration and engagement among national agencies, local governments and concerned non-government stakeholders, research institutes, and academia. LCS researchers can cooperate with government agencies to ensure effective LCS implementation and work with other stakeholders and international communities. The Cambodian government can encourage researchers to conduct LCS research and activities. Meanwhile, Cambodia should work to build confidence, strengthen capacity and engender a stronger sense of ownership among them.

Capacity development of Cambodian researchers is necessary. Notably, collaborative research regarding climate change should be undertaken with researchers in neighbouring countries, taking advantage of the international support and support from researchers' network for capacity development.

Cambodia needs to build the domestic capacity and capabilities sufficient for addressing LCS challenges by enabling its researchers to share knowledge and

also by providing opportunities to gain experience and knowledge from researchers in other countries. Workshops or gatherings to discuss domestic climate change issues, as well as training, will provide additional opportunities for Cambodia to establish a low-carbon research network and prepare its low-carbon development strategy.

Cambodian researchers can increase their collaboration with universities and institutions in other countries (such as IGES and NIES in Japan) through LCS training and workshops. It is also possible to develop the capacity of government officials and researchers at universities such as the Royal University of Agriculture and Royal Phnom Penh University as well as at private universities through participating in LCS training and research activities (such as those provided by Kyoto University, Japan) or through collaborative undertakings.

Linkage of the domestic network with the international network will be key in enabling Cambodia to leapfrog ahead

The Low Carbon Asia Research Network is a tool to promote and encourage dialogues and close cooperation among policymakers, researchers, and other stakeholders including businesses and citizens, in Asian countries. It fosters their ability to work together to ensure sustainable economic development and environmental sustainability.

While a domestic low-carbon research network is established, Cambodian researchers can be able to participate actively in international research networks to learn about the progress of low-carbon policies and actions in other countries through knowledge sharing activities. The global trend of knowledge sharing networks reflects the realisation of the urgent need to develop mitigation activities. Cambodia needs to participate in such activities since it will take time for Cambodia to conduct comprehensive research and reflect the outcomes into policy-making. This is a matter of urgency in order to respond to Cambodia's rapidly changing social and economic structures and prevent society from developing in an energy-intensive manner.

Research networks such as the International Research Network for Low Carbon Societies (LCS-RNet) have produced clear results as a network for sharing the

knowledge and wisdom of world-leading researchers with both researchers and policymakers. Given Asia's great importance in various aspects of global climate policies, the Government of Japan together with the LCS-RNet Secretariat took the step of proposing the establishment of a network called the "Low Carbon Asia Research Network" (LoCARNet) at the ASEAN+3 Environmental Ministers' Meeting held in Cambodia in October 2011.

LoCARNet is a network for researchers who are engaged directly in LCS policy-making processes. LoCARNet aims to work within the Asian region to strengthen and sustain the region's fundamental research capacity to enable the formulation of science-based policies for low-carbon development. Asia enjoys various opportunities for leapfrogging. The integration of Asian wisdom is a basic principle for low-carbon Asia research networks. LoCARNet promotes research that supports the development of policies for low-carbon growth by enabling dialogue between scientists and policymakers. It encourages the establishment of research communities in each country including Cambodia through collaboration amongst researchers having research capacity and scientific knowledge firmly grounded in their home countries, and who enjoy full ownership of such knowledge.

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King Mongkut's University of Technology
Thonburi (KMUTT), Thailand

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