This research was performed by the Environment Research and Technology Fund (JPMEERF20192008) of the Environmental Restoration and Conservation Agency of Japan.

Contribution of AIM (Asia-Pacific Integrated Model) to decarbonized society in Asia

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National Institute for Environmental Studies (NIES)

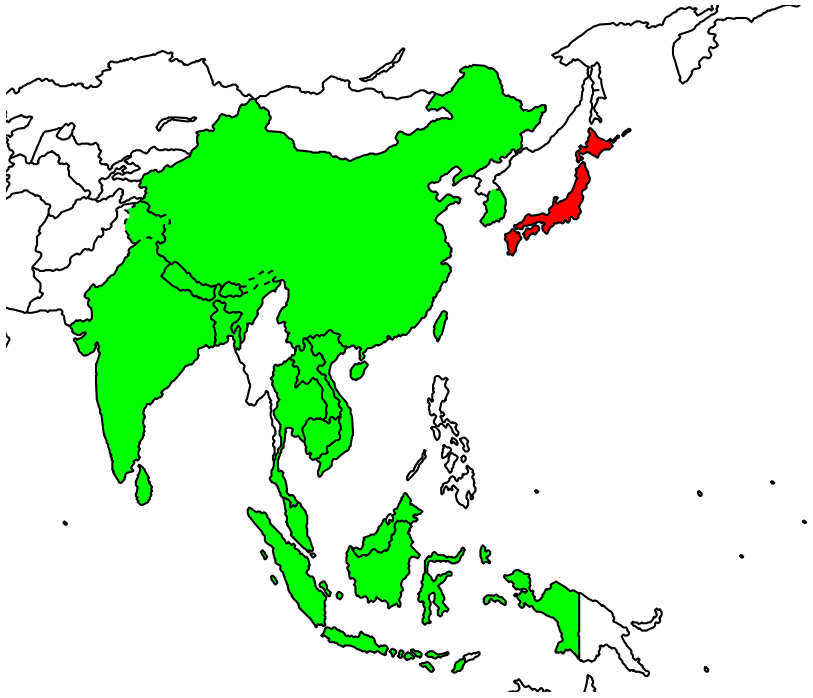
LCS-RNet 12th Annual Meeting
Session 3: International Cooperation for Leveraging Climate Neutral Societies

Online
December 16, 2021

AIM ASIA-PACIFIC INTEGRATED MODEL
Asia-Pacific Integrated Model
http://www-iam.nies.go.jp/aim/index.html

NIES JAPAN

International Network of AIM (Asia-Pacific Integrated Model)

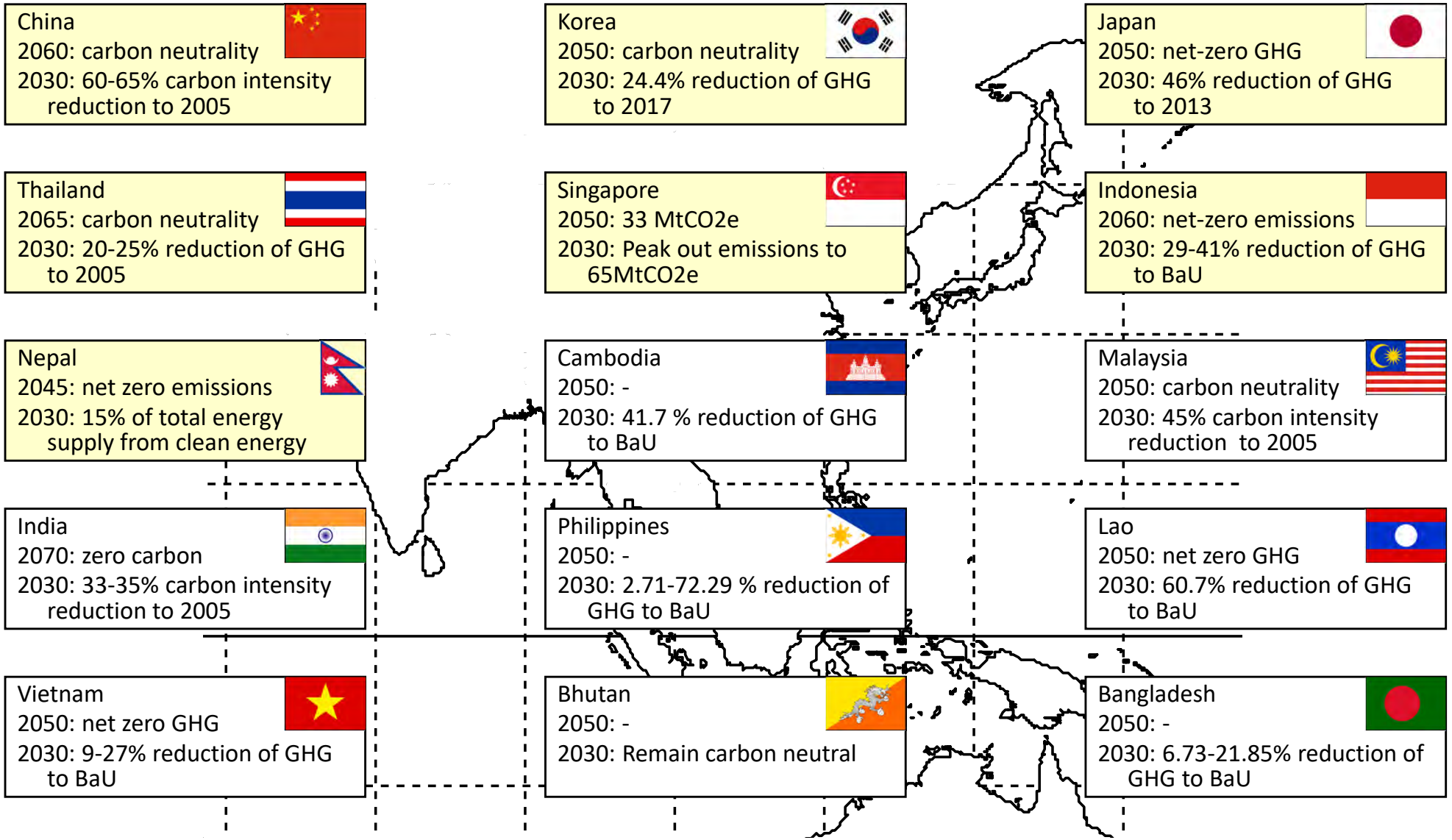


The 27th AIM International Workshop (Online; Sep. 30 & Oct. 1, 2021)

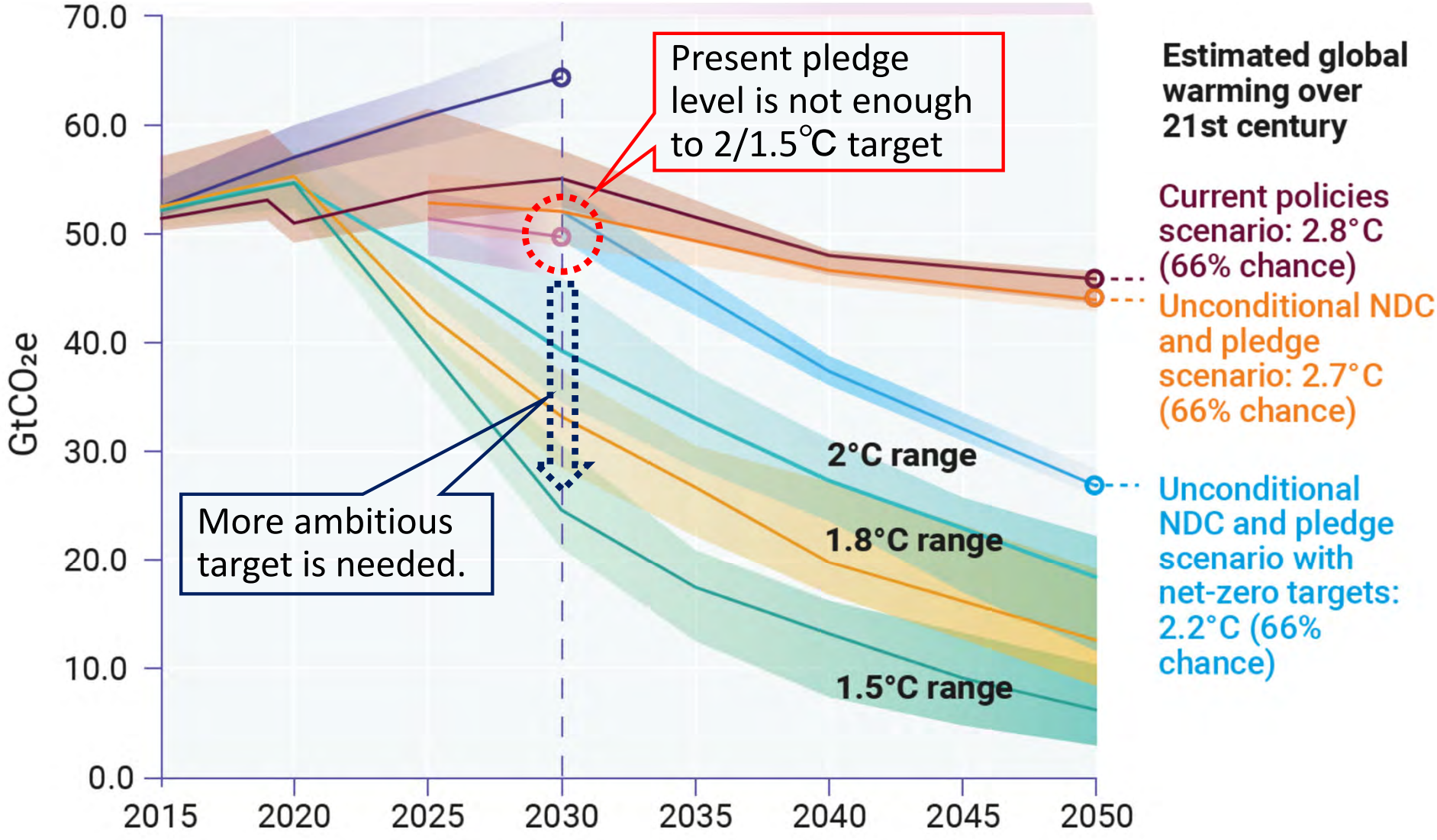
- Asian countries will update their mitigation target and roadmap to achieve the 2/1.5 degree target reflecting their issues to be solved and the resources to be endowed.
- Model can be a collaboration tool between science and decision making process. From the long-term viewpoint, each country will need the capacities to develop model and scenarios by itself.
- AIM (Asia-Pacific Integrated Model) has supported Asian countries to develop the integrated assessment model and their long-term low carbon/decarbonized scenarios.
- https://www-iam.nies.go.jp/aim/index.html

AIM
ASIA-PACIFIC INTEGRATED MODEL

NDC and LTS of some Asian countries

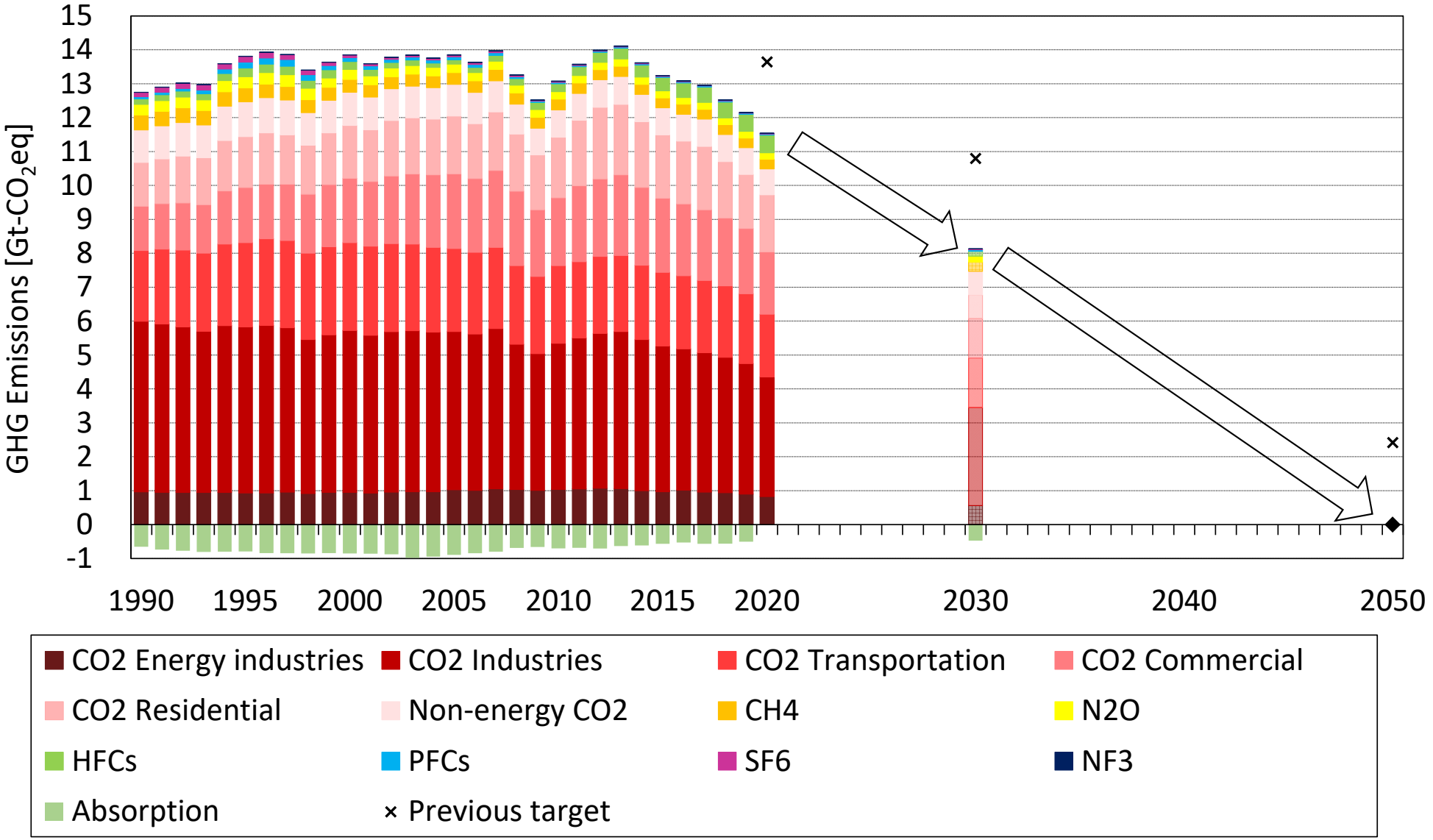


To achieve 1.5℃ target, drastic global GHGs reduction is needed.



Source: UNEP(2021) Emissions Gap Report 2021

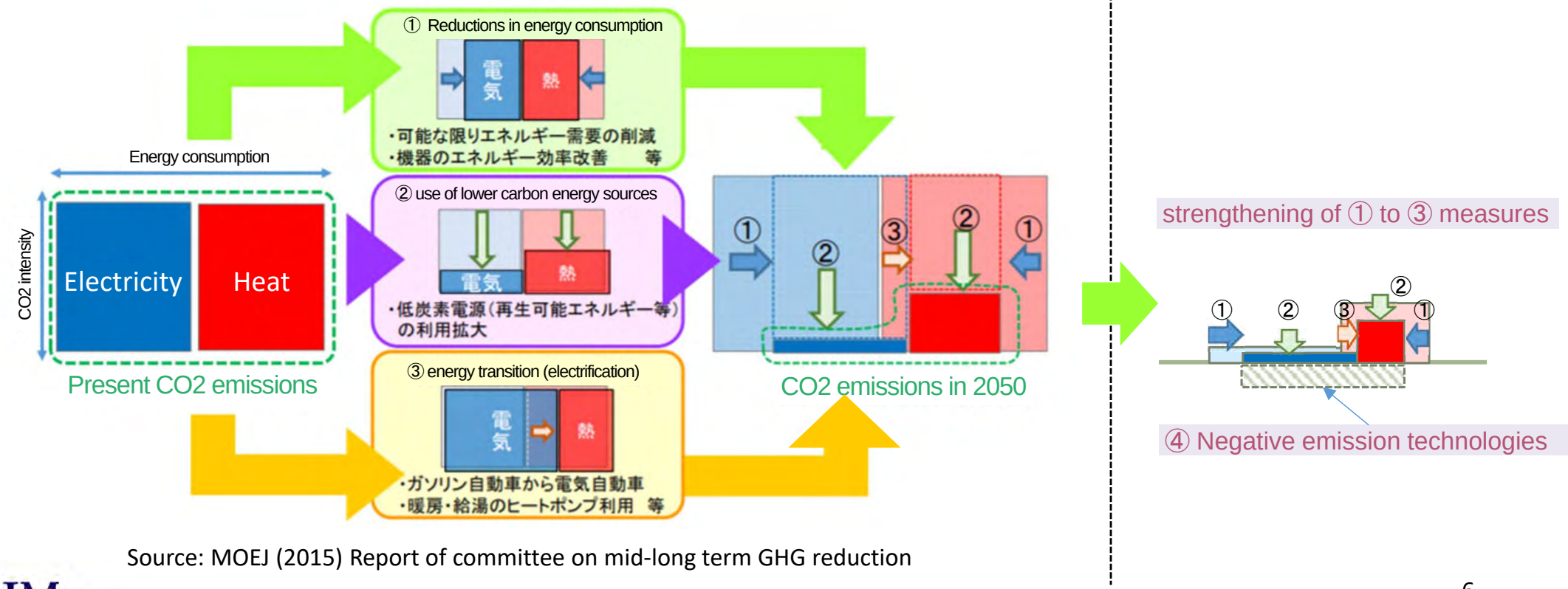
Revised GHG mitigation target of Japan to achieve carbon neutrality



Source:
Historical data: Greenhouse Gas Inventory Office of Japan, Japan's National Greenhouse Gas Emissions
Target: Japan's Nationally Determined Contribution (NDC)

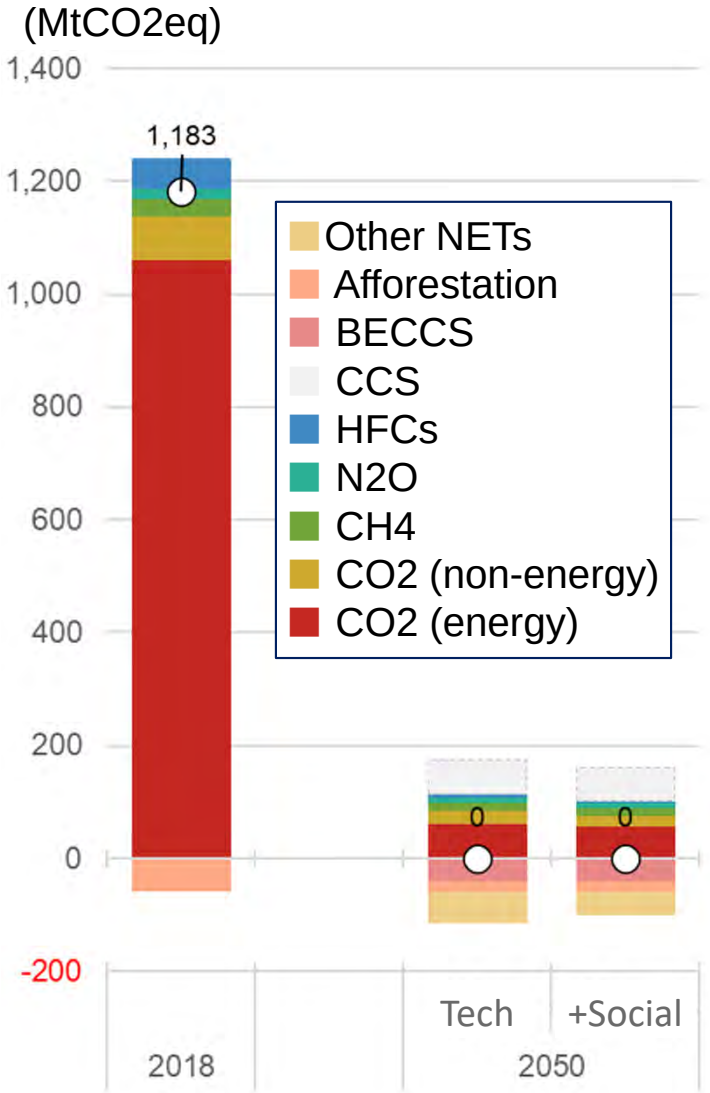
Necessary actions to achieve a carbon neutral society

- Major directions toward low carbon society: **① Reductions in energy consumption**; **② use of lower carbon energy sources**; and **③ energy transition (electrification)**.
- To achieve carbon neutrality, in addition to ① – ③ measures, **④ negative emission technologies** will be needed.
- Moreover, role of **⑤ social transformation** will be important to realize carbon neutrality.



Source: MOEJ (2015) Report of committee on mid-long term GHG reduction

Assessment of net zero GHG emissions in Japan in 2050 based on AIM



GHG emissions in Japan

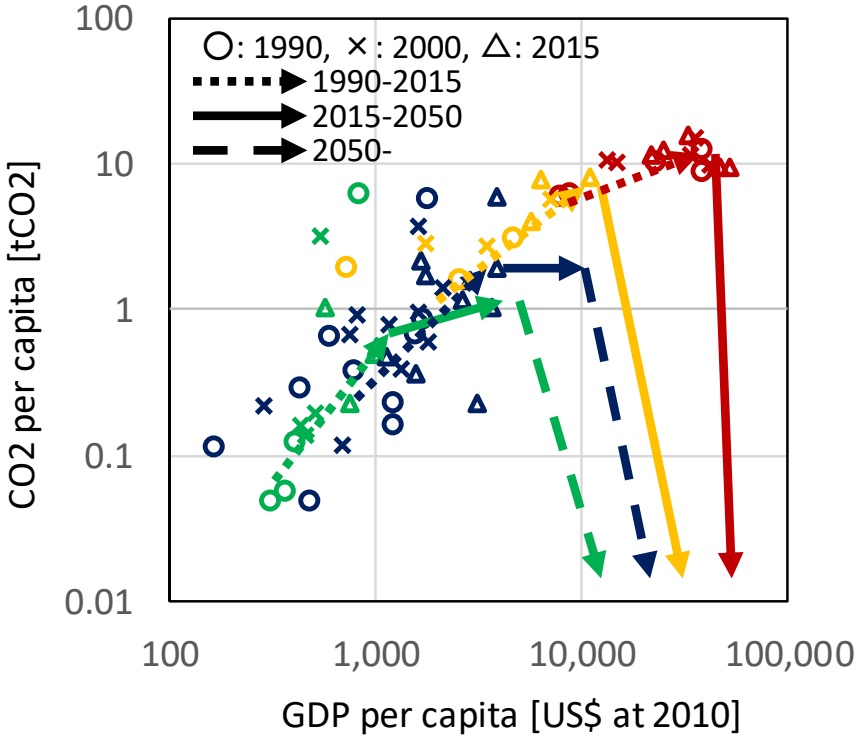
- In this assessment, hourly renewable electricity supply and demand is taken into account.
- We analyzed **"technology" scenario** in which net-zero emissions will be achieved through the diffusion of decarbonization technologies such as energy conservation, renewable energy, and electrification, and a **"technology + social transformation" scenario** in which the diffusion of decarbonization technologies is combined with progress of digitalization, circular economy, etc.
- Fossil fuels currently account for more than 80% of the total primary energy supply, but by 2050, renewable energy will account for about 70%, and energy self-sufficiency will have improved significantly from 15% (2018) to 70% (2050).
- A large proportion of energy-related CO2 emissions in 2050 will come from synthetic fuels, and since a certain amount of emissions will be inevitable even if decarbonization measures are promoted in 2050, negative emission technologies will be necessary to reduce GHG emissions to virtually zero.
- To achieve a decarbonized society, additional investment of 9-11 trillion yen per year will be needed for insulation of houses and buildings, renewable energy, etc. Net energy imports will drop from about 16 trillion yen (2018) to 4-5 trillion yen in 2050.

AIM ASIA-PACIFIC INTEGRATED MODEL

Toward decarbonized Asia

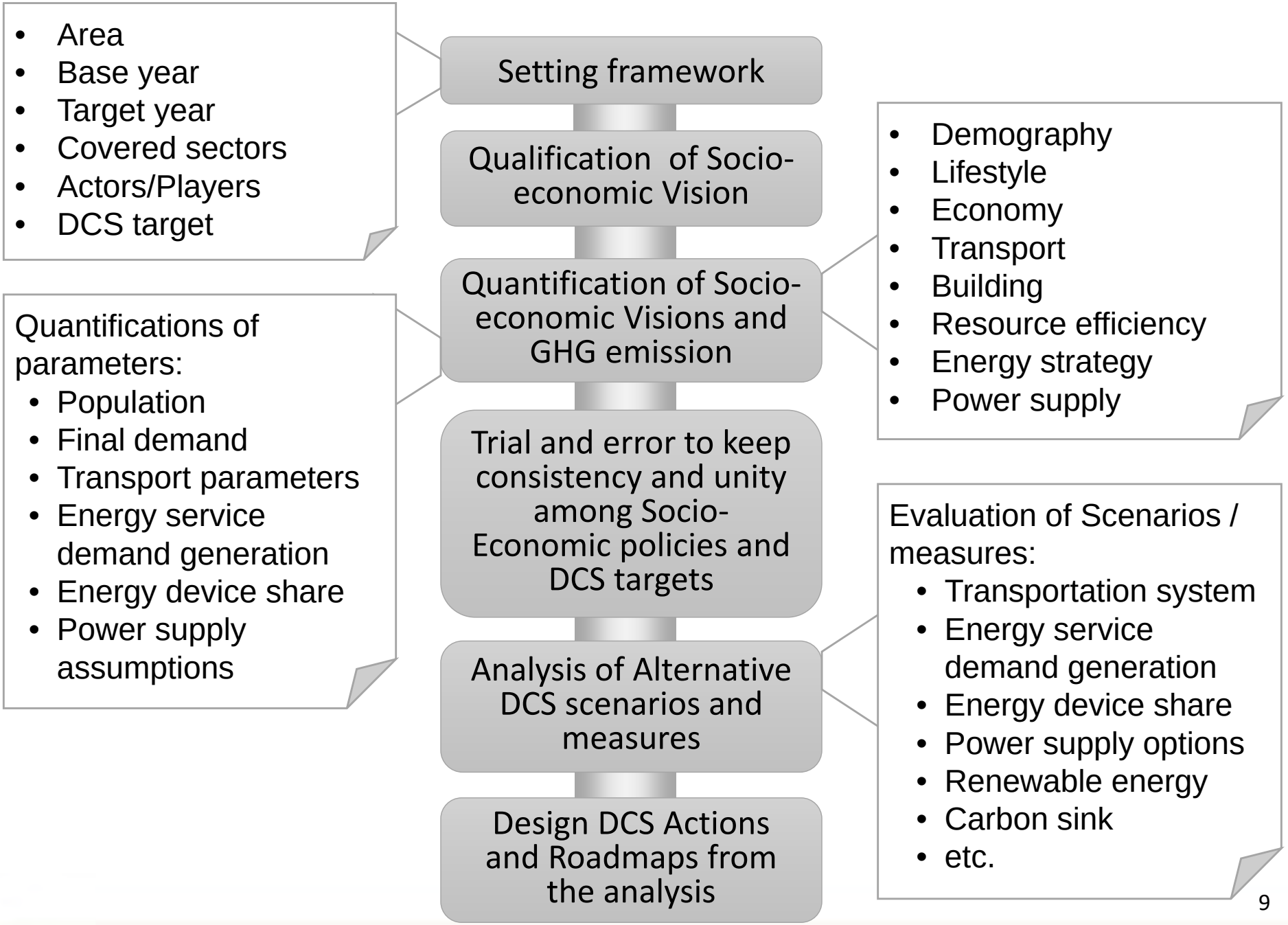
- Final goal is common among countries: sustainable decarbonized development
  - ✓ But process/strategy may be different among countries;
  - ✓ Viewpoint of economy and CO2
    - ➢ Japan, Korea: immediate drastic CO2 reduction
    - ➢ China, Thailand, Malaysia: strong decoupling between economic growth and CO2 reduction
    - ➢ Bhutan, India, Indonesia, Lao, Vietnam: economic growth with maintaining CO2 emissions
    - ➢ Cambodia, Nepal: economic growth

    In developing countries: correction of disparities between urban and rural
  - ✓ Other viewpoints
    - ➢ Resource endowment
    - ➢ Social conditions such as aging, available technology, etc

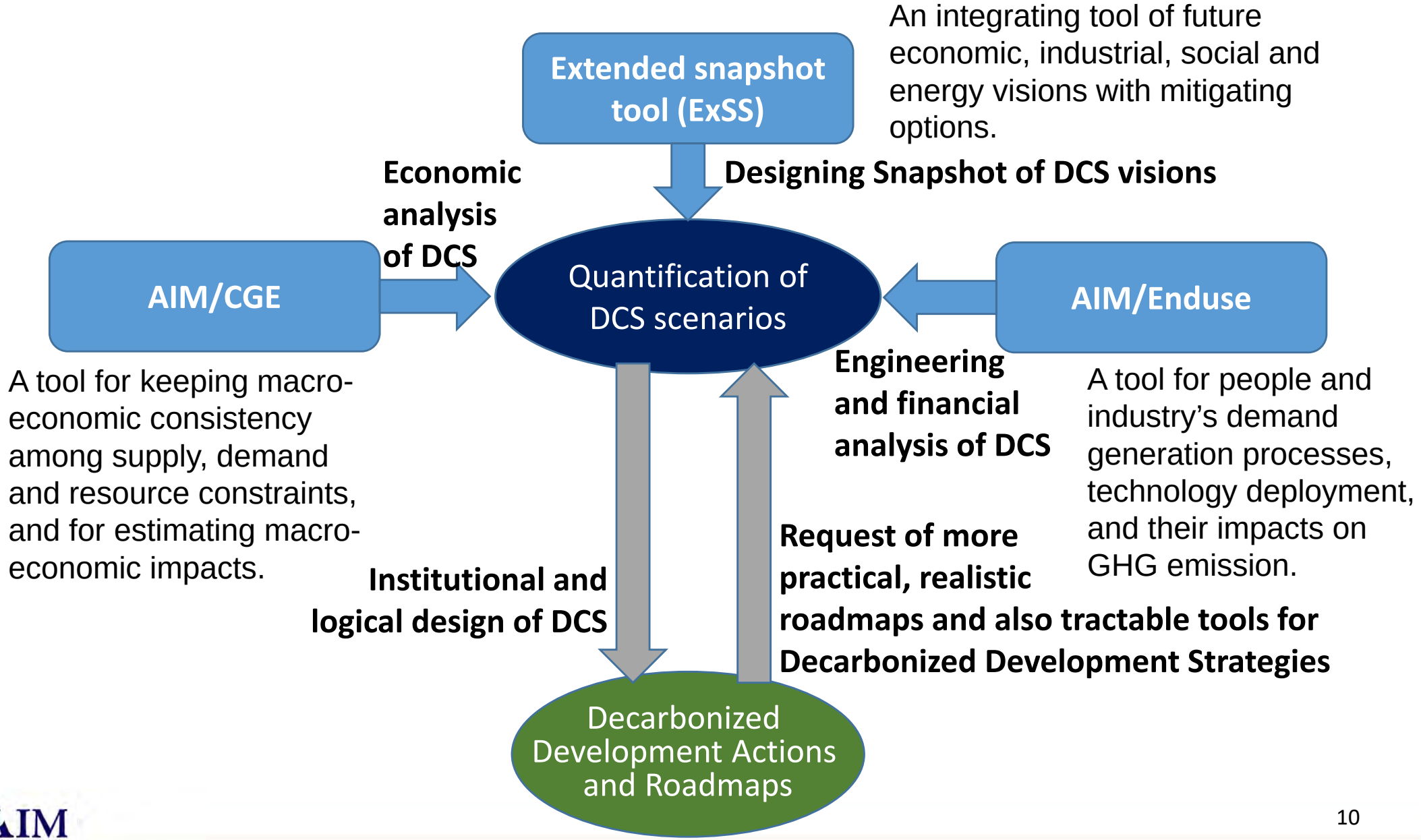


- Quantitative assessment based on AIM, which is customized to each country, is needed to show future scenarios and roadmaps toward the decarbonized society.

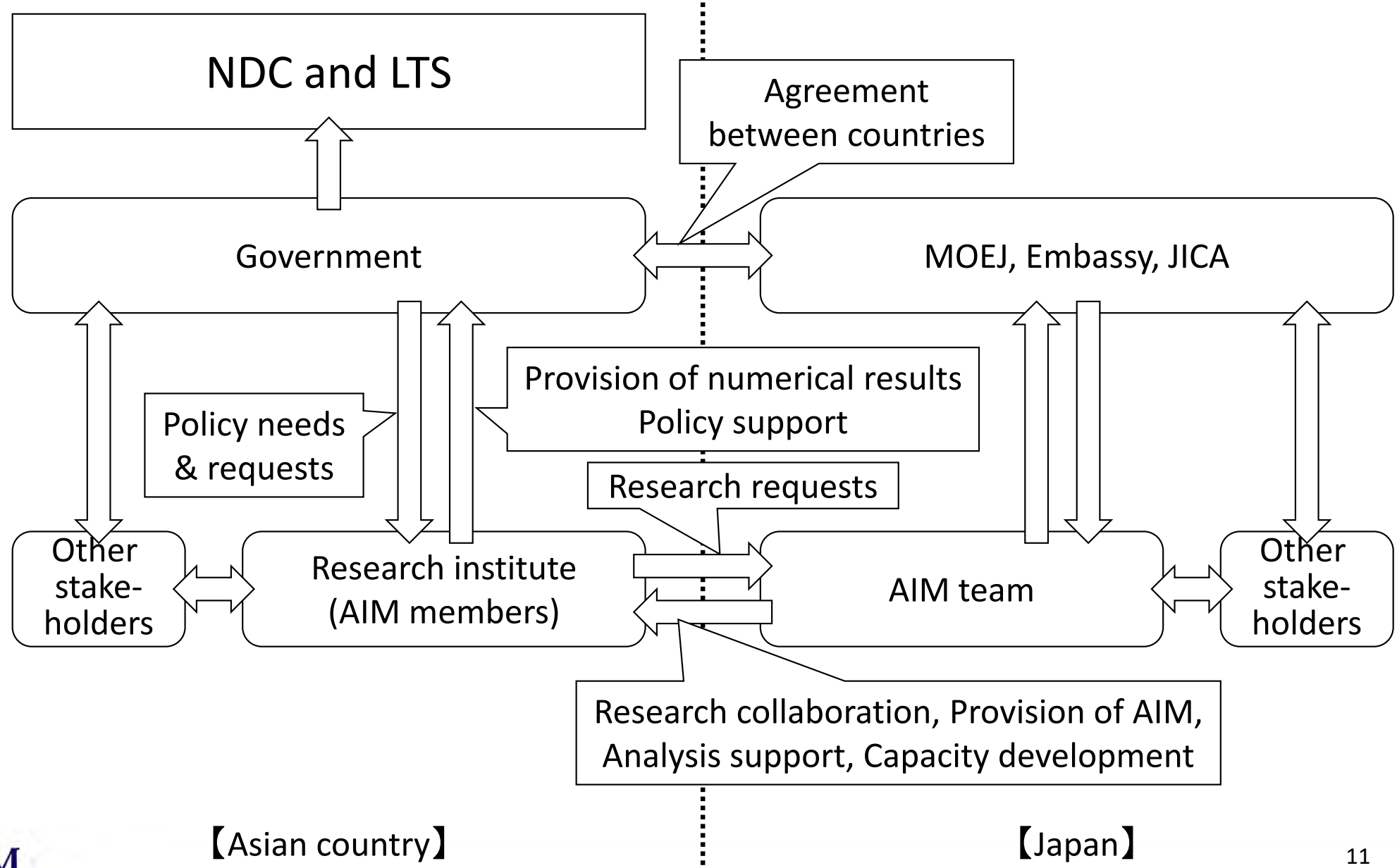
Overall research procedure of our decarbonized society scenario development



How to combine the tools in order to keep consistency and unity among socio-economic policies and DCS actions



Expected structure to support climate policy in Asian country



Prof. Bundit Limmeechokchai
(Sirindhorn International Institute of Technology, Thammasat University)

Thailand

Third National Communication

https://unfccc.int/documents/181765

CHAPTER 3: MITIGATION MEASURES

3.2.1 NAMAs roadmap

Thailand's NAMAs aims at voluntarily reducing greenhouse gas emissions in the energy and transportation sectors by 7% by 2020 from the Business as Usual (BAU) levels. With sufficient international support, Thailand's NAMAs aims to lower the carbon trajectory up to 20% below the BAU level by 2020. The key mitigation actions committed and implemented in the Thailand's NAMA roadmap include:

- Development of renewable energy and alternative energy sources;
- Energy efficiency improvements in power generation, industries, buildings, and transportation;
- Substitution of bio-fuels for fossil fuels in the transport sector; and
- Thailand's Transport Infrastructure Development Plan.

3.2.2 Thailand's NDC

Thailand submitted its INDC and relevant information to the UNFCCC in 2015 to restate that GHG emissions can be reduced by 20% from the BAU levels by 2030, and up to 25% if the required support is received from international organizations. In addition to this progress, the NCCC established the Subcommittee on Climate Change Policy and Planning Integration, which is tasked with preparing and proposing mitigation mechanisms and measures that encompass the legal, economic, fiscal and social instruments that are required to translate the measures into the policies, strategies, and work plans to meet the medium-term and long-term mitigation targets. Since the submission of its first Biennial Update Report and ratification of the Paris Agreement in 2015, several climate change mitigation policies and measures have been put in place at the national level to fulfil Thailand's drive toward a low carbon and resilient society. In 2017, Thailand launched its NDC Roadmap to reduce 115.6 $MtCO_2eq$, which will account for a 20.8% reduction by 2030 when compared to the BAU level.

As mentioned, both Thailand's NAMAs and Thailand's NDC were developed on the basis of BAU (Figure 3-1). The BAU scenario was created by using the Asia-Pacific Integrated Assessment Model (AIM). The AIM model was developed in collaboration between the National Institute for Environmental Studies (NIES) Japan, Kyoto University, the Mizuho Information & Research Institute, and other Asian researchers including Thailand. The AIM model focuses on relevant policies to support low-carbon pathways.

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Prof. Bundit Limmeechokchai
(Sirindhorn International Institute of Technology, Thammasat University)

Thailand

Mid-century, Long-term Low Greenhouse Gas Emission Development Strategy

Mid-century, Long-term Low Greenhouse Gas Emission Development Strategy

THAILAND

Submitted under the Paris Agreement

October 2021

3.1 Methodology for the Development of Long-term Low Greenhouse Gas Emission Pathways

3.1.1 Model for Low Greenhouse Gas Emission Pathways

Thailand's mid-century, long-term low greenhouse gas emission development strategy was developed based on the scenario of net-zero greenhouse gas emissions in the second half of this century, in line with science and the Paris Agreement. The BAU scenario was developed using input information of the current country's circumstances and status provided by related ministerial agencies into the Asia-Pacific Integrated Assessment Model (AIM) (Figure 3-2).

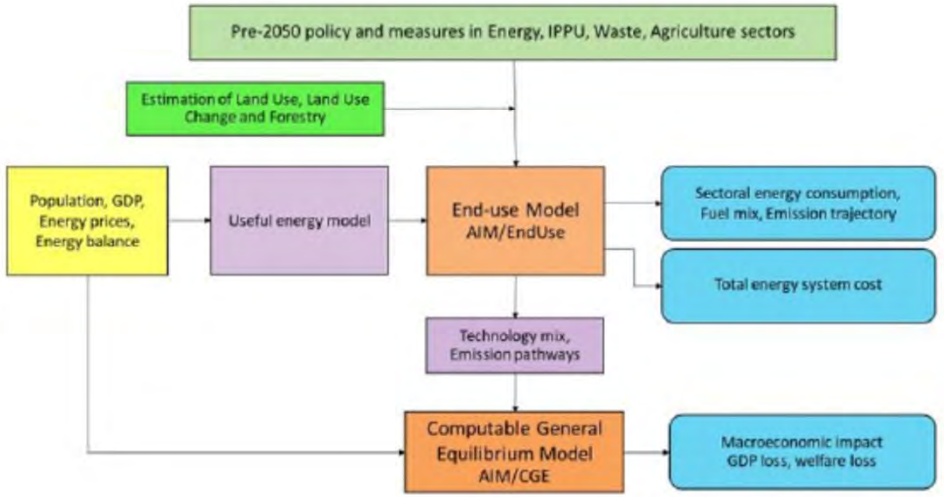


Figure 3-2: Framework of Thailand's LEDS Development

https://unfccc.int/sites/default/files/resource/Thailand_LTS1.pdf

Indonesia

Long-term strategy for Low Carbon and Climate Resilience 2050

Prof. Rizaldi Boer
(Bogor Agricultural University)
Prof. Retno Gumilang Dewi and
Dr. Ucok WR. Siagian
(Bandung Institute of Technology)

4.1. Scenario Development

4.1.1. Models for Mitigation Pathways

Indonesia used a set of models in developing the emission pathways with two stages of analysis. In the first stage, separate models were developed for modelling agriculture, forestry and other land uses (AFOLU), and energy. The AFOLU sector used AFOLU Dashboard (a spreadsheet model), meanwhile energy sector used AIM-EndUse and the AIM-ExSS (Extended Snapshoot). In both models, economic and population growth are the key drivers for changes in food and energy demand. In the second stage, the economic and economic impact of both AFOLU and energy sector mitigation are analysed by utilizing the Asia Pacific Integrated Model/Computable General Equilibrium (AIM/CGE)-Indonesia (see Figure 3).

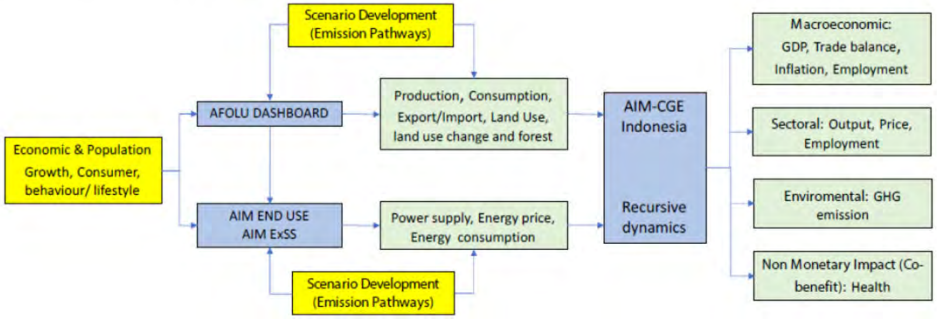
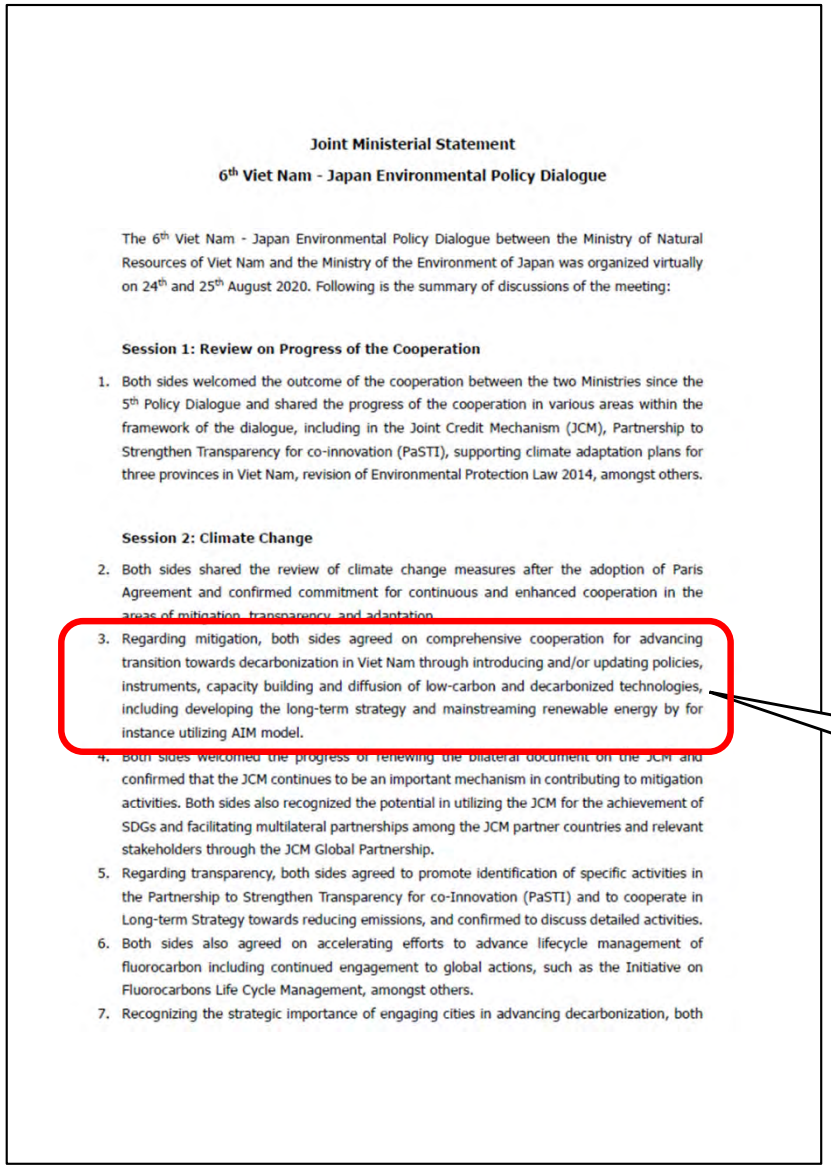


Figure 3. Models for developing emission pathways in Indonesia

https://unfccc.int/sites/default/files/resource/Indonesia_LTS-LCCR_2021.pdf

Vietnam

Joint Ministerial Statement: 6thViet Nam - Japan Environmental Policy Dialogue (August 25, 2020)



Joint Ministerial Statement

6th Viet Nam - Japan Environmental Policy Dialogue

The 6th Viet Nam - Japan Environmental Policy Dialogue between the Ministry of Natural Resources of Viet Nam and the Ministry of the Environment of Japan was organized virtually on 24th and 25th August 2020. Following is the summary of discussions of the meeting:

Session 1: Review on Progress of the Cooperation

1. Both sides welcomed the outcome of the cooperation between the two Ministries since the 5th Policy Dialogue and shared the progress of the cooperation in various areas within the framework of the dialogue, including in the Joint Credit Mechanism (JCM), Partnership to Strengthen Transparency for co-innovation (PaSTI), supporting climate adaptation plans for three provinces in Viet Nam, revision of Environmental Protection Law 2014, amongst others.

Session 2: Climate Change

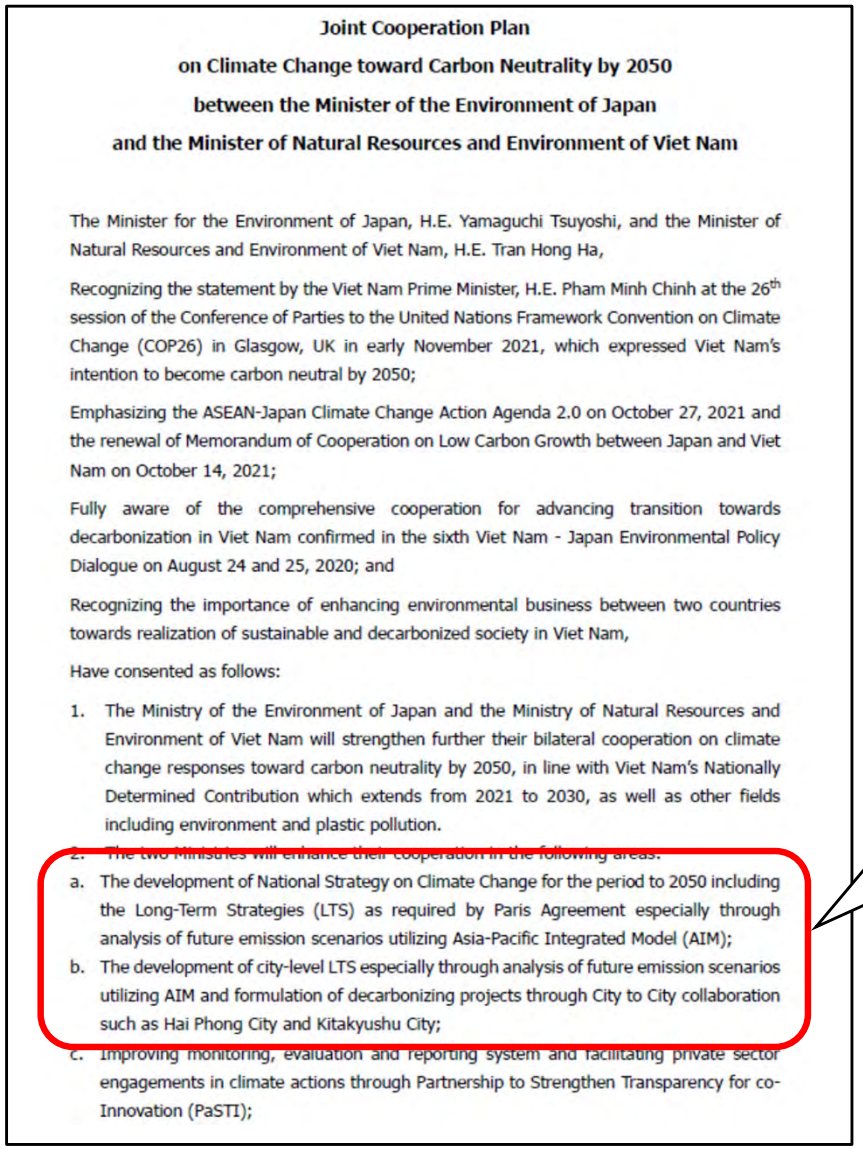
2. Both sides shared the review of climate change measures after the adoption of Paris Agreement and confirmed commitment for continuous and enhanced cooperation in the areas of mitigation, transparency, and adaptation.
3. Regarding mitigation, both sides agreed on comprehensive cooperation for advancing transition towards decarbonization in Viet Nam through introducing and/or updating policies, instruments, capacity building and diffusion of low-carbon and decarbonized technologies, including developing the long-term strategy and mainstreaming renewable energy by for instance utilizing AIM model.
4. Both sides welcomed the progress of renewing the bilateral document on the JCM and confirmed that the JCM continues to be an important mechanism in contributing to mitigation activities. Both sides also recognized the potential in utilizing the JCM for the achievement of SDGs and facilitating multilateral partnerships among the JCM partner countries and relevant stakeholders through the JCM Global Partnership.
5. Regarding transparency, both sides agreed to promote identification of specific activities in the Partnership to Strengthen Transparency for co-Innovation (PaSTI) and to cooperate in Long-term Strategy towards reducing emissions, and confirmed to discuss detailed activities.
6. Both sides also agreed on accelerating efforts to advance lifecycle management of fluorocarbon including continued engagement to global actions, such as the Initiative on Fluorocarbons Life Cycle Management, amongst others.
7. Recognizing the strategic importance of engaging cities in advancing decarbonization, both

https://www.env.go.jp/press/files/jp/114598.pdf

Regarding mitigation, both sides agreed on comprehensive cooperation for advancing transition towards decarbonization in Viet Nam through introducing and/or updating policies, instruments, capacity building and diffusion of low-carbon and decarbonized technologies, including developing the long-term strategy and mainstreaming renewable energy by for instance utilizing AIM model.

Vietnam

Joint Cooperation Plan on Climate Change toward Carbon Neutrality by 2050 between the MOEJ and the MONRE of Viet Nam (November 24, 2021)



Joint Cooperation Plan

on Climate Change toward Carbon Neutrality by 2050

between the Minister of the Environment of Japan

and the Minister of Natural Resources and Environment of Viet Nam

The Minister for the Environment of Japan, H.E. Yamaguchi Tsuyoshi, and the Minister of Natural Resources and Environment of Viet Nam, H.E. Tran Hong Ha,

Recognizing the statement by the Viet Nam Prime Minister, H.E. Pham Minh Chinh at the 26th session of the Conference of Parties to the United Nations Framework Convention on Climate Change (COP26) in Glasgow, UK in early November 2021, which expressed Viet Nam's intention to become carbon neutral by 2050;

Emphasizing the ASEAN-Japan Climate Change Action Agenda 2.0 on October 27, 2021 and the renewal of Memorandum of Cooperation on Low Carbon Growth between Japan and Viet Nam on October 14, 2021;

Fully aware of the comprehensive cooperation for advancing transition towards decarbonization in Viet Nam confirmed in the sixth Viet Nam - Japan Environmental Policy Dialogue on August 24 and 25, 2020; and

Recognizing the importance of enhancing environmental business between two countries towards realization of sustainable and decarbonized society in Viet Nam,

Have consented as follows:

1. The Ministry of the Environment of Japan and the Ministry of Natural Resources and Environment of Viet Nam will strengthen further their bilateral cooperation on climate change responses toward carbon neutrality by 2050, in line with Viet Nam's Nationally Determined Contribution which extends from 2021 to 2030, as well as other fields including environment and plastic pollution.
2. The two Ministries will enhance their cooperation in the following areas:

a. The development of National Strategy on Climate Change for the period to 2050 including the Long-Term Strategies (LTS) as required by Paris Agreement especially through analysis of future emission scenarios utilizing Asia-Pacific Integrated Model (AIM);

b. The development of city-level LTS especially through analysis of future emission scenarios utilizing AIM and formulation of decarbonizing projects through City to City collaboration such as Hai Phong City and Kitakyushu City;

c. Improving monitoring, evaluation and reporting system and facilitating private sector engagements in climate actions through Partnership to Strengthen Transparency for co-Innovation (PaSTI);

a. The development of National Strategy on Climate Change for the period to 2050 including the Long-Term Strategies (LTS) as required by Paris Agreement especially through analysis of future emission scenarios utilizing Asia-Pacific Integrated Model (AIM);

b. The development of city-level LTS especially through analysis of future emission scenarios utilizing AIM and formulation of decarbonizing projects through City to City collaboration such as Hai Phong City and Kitakyushu City;

https://www.env.go.jp/press/files/jp/117125.pdf

Findings from our activities

- "Plan for Global Warming Countermeasures" in Japan mentions that the AIM will be utilized to support climate policies and capacity development toward the decarbonized society development in developing countries.
  - Good collaboration between policy makers and researchers in both Japan and partner countries is important to develop effective carbon neutral scenarios and roadmaps.
  - Our goal is that developing countries will develop and realize their own decarbonization scenarios and roadmaps reflecting specific their circumstances. In order to realize this goal, long-term collaboration based on AIM including capacity development is essential.
  - Local researchers will directly support decarbonization scenarios and roadmaps in each country. AIM will strongly support this activity.
  - Collaboration among Asian countries through application of AIM will also be important in promoting decarbonisation of Asia.