Introduction of This Session and CGE analysis

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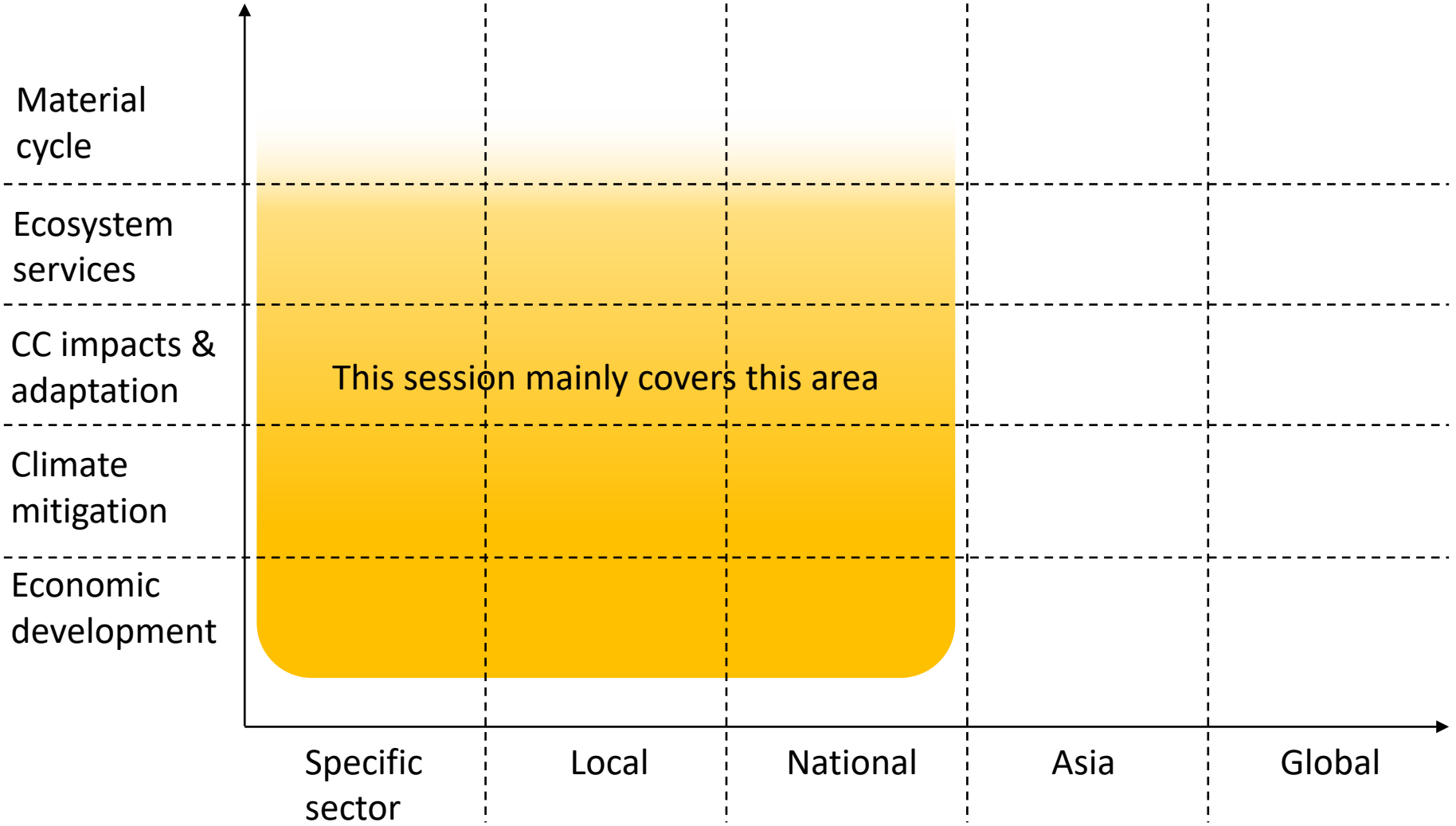
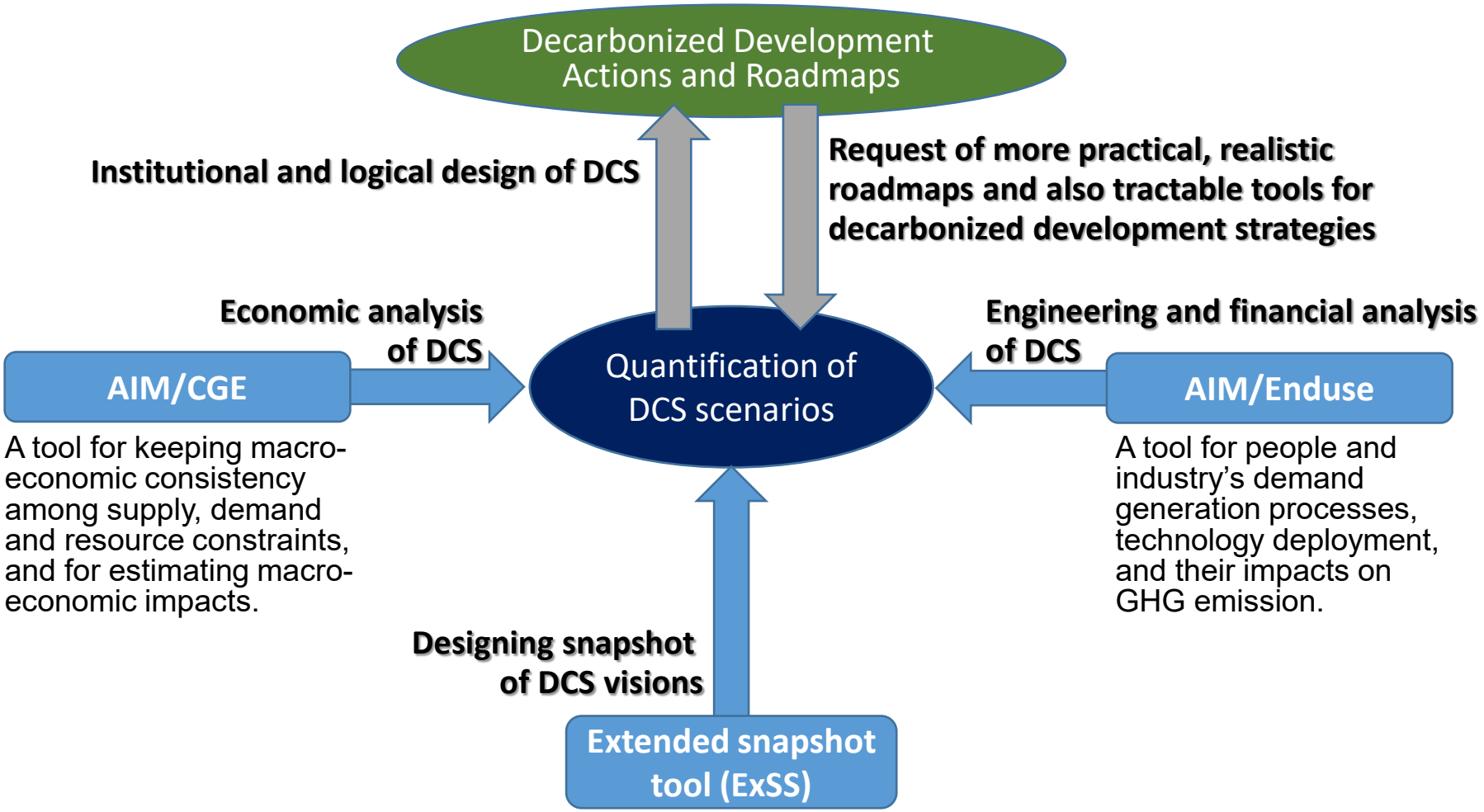
Modeling Area



Bottom-up (National/Sub-national) analyses

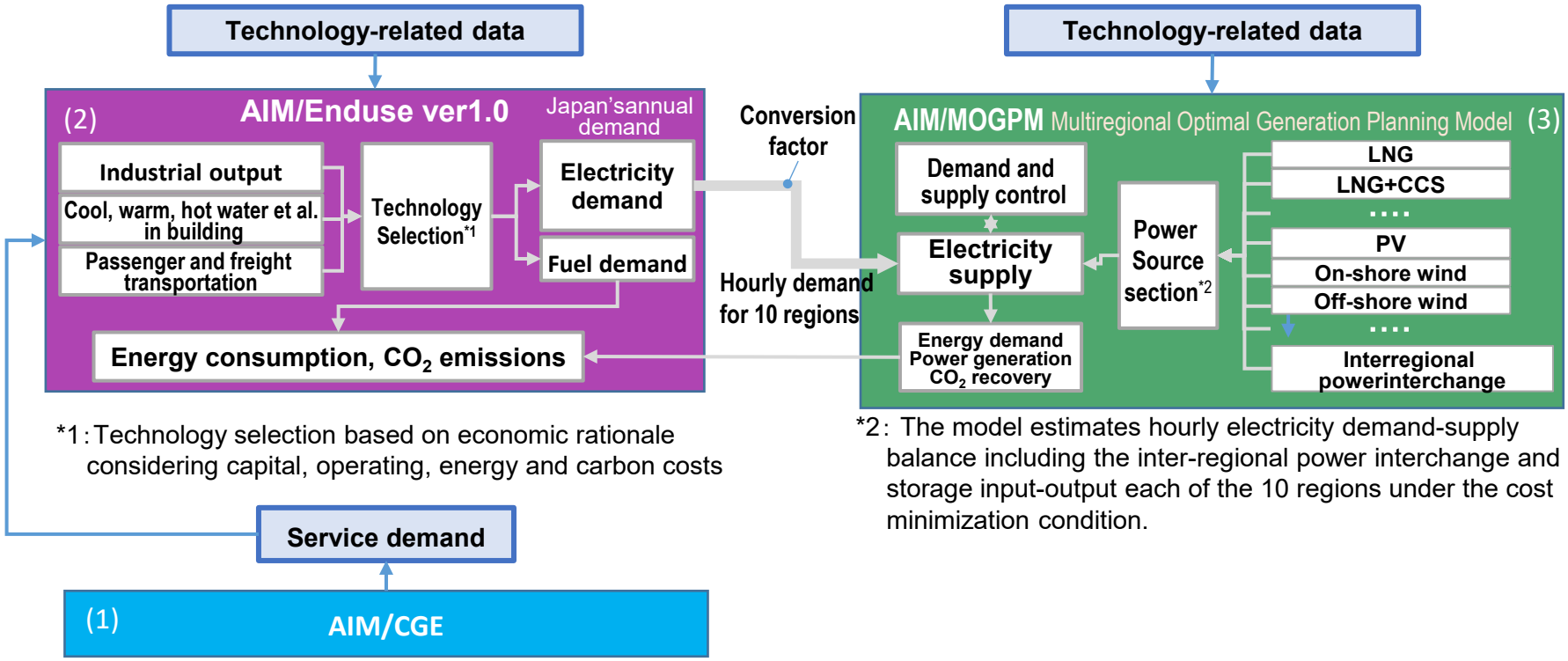
- Submission of new NDC is required by February 2025.
- In Japan, joint committee meeting organized by both MOEJ and METI is now discussing new NDC.
- METI is now discussing new energy plan.

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



Modeling framework to assess detailed NZ roadmap in Japan

An applied general equilibrium model is used to establish a macro-frame for the future, given the economic growth rate and population assumptions (1). Next, future energy demand is estimated using an energy demand model (2). The annual electricity demand estimated in (2) is expanded to hourly demand by region, and the generation facility configuration and supply configuration are estimated using a cost-optimized power supply model that can take into account coincidence constraints and inter-regional interconnection line constraints (3). The results are fed back into the energy demand model to calculate Japan's overall energy supply and demand and CO_2 emissions.



*1 : Technology selection based on economic rationale considering capital, operating, energy and carbon costs

*2 : The model estimates hourly electricity demand-supply balance including the inter-regional power interchange and storage input-output each of the 10 regions under the cost minimization condition.

Progress of CGE Model

- National model
  - ✓ Assessment of carbon tax in Japan
    - ➢ Different tax rate: 1289, 3289, 5289, 10289 JPY/tCO2
    - ➢ Different Payback period: 3, 10 years
    - ➢ Tax revenue use: increase of gov. final consumption, subsidy to reduce cost energy-saving device
  - ✓ Assessment of ecosystem service in Japan
    - ➢ Collaboration with Biodiversity Division in NIES
  - ✓ Assessment of climate change impact in Japan
    - ➢ Collaboration with Center for Climate Change Adaptation in Japan
- Inter-regional model
  - ✓ Disaggregation of Japan into 9 regions
- Prefecture model

Assessment of carbon tax in Japan

GHG emissions

① GHG emissions will gradually decrease. Energy related CO2 emissions also show the same trend.

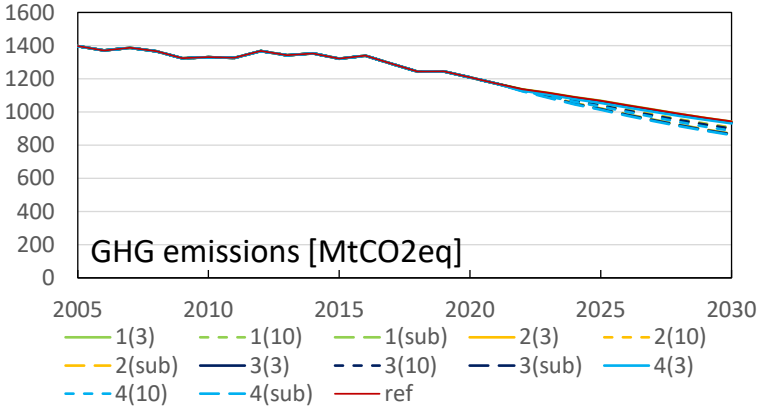
② In the case of 3-year of a payback period (3), GHG emissions in 2030 will be reduced by 0.2-1% (2-10 MtCO2eq) compared to those in the reference case.

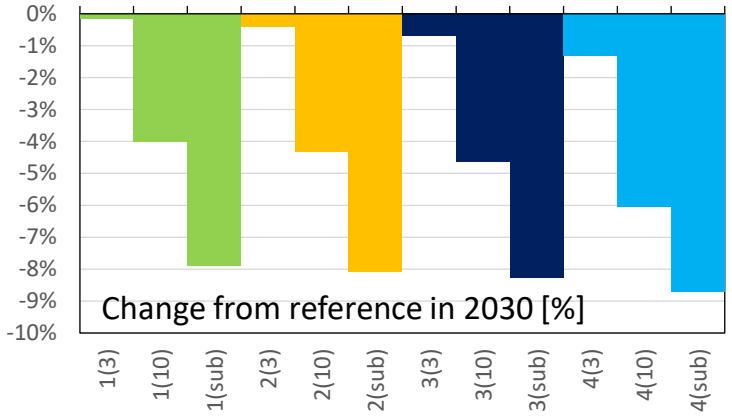
③ With 10-year of a payback period (10), GHG emissions in 2030 will be reduced by 4-6% (40-60 MtCO2eq) compared to those in the reference case through the widespread use of energy-saving devices.

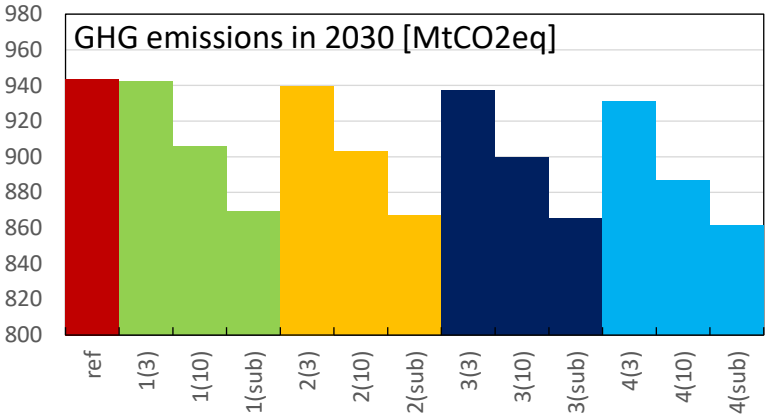
④ If carbon tax revenues are used to subsidize additional investment in energy-saving devices, the diffusion of such technologies will be accelerated and GHG emissions in 2030 will be reduced by 8-9% (70-80 MtCO2eq) compared to those in the reference case.

1 : 1289 yen/tCO2
2 : 3289 yen/tCO2
3 : 5289 yen/tCO2
4 : 10289 yen/tCO2

(3) : 3-year payback period
(10) : 10-year payback period
(sub) : energy-saving device subsidy
ref : reference case







Assessment of carbon tax in Japan

Real GDP

① With a payback period of 3-year (3), GDP in 2030 will decrease by 0.09-0.9% (0.6-6 trillion yen) compared to that of reference case. The higher the tax rate, the larger the decrease in household consumption, and thus the larger the impact on GDP, but economic growth will be maintained.

② If the CP is used as an opportunity to take action considering the long-term (payback period of 10-year (10)), energy-saving and energy conversion technologies will be selected and activities will shift to those with lower CO2 emissions, and GDP in 2030 will recover by about 0.3% (2 trillion yen) compared to the payback period of 3-year (3).

③ If the additional investment is subsidized (sub) by tax revenue, GDP will recover by another 0.6% (4 trillion yen), as production investment is maintained and energy-saving devices are further introduced. As a result, in the case of 5289 yen/tCO2 or lower of carbon tax rate, GDP in 2030 will be larger than that of reference case, and GDP in 2030 in the 10289 yen/tCO2 case will be the same level as that of reference case.

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