National scenario proposal

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A framework for national scenarios with varying emission reductions

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Background

- **National circumstances**
  - ✓ Many countries pledged carbon neutrality goals towards mid-century (or equivalent one)
  - ✓ Nations are supposed to update and revise the policy targets periodically under the globalstocktake

- **Scenarios circumstances**
  - ✓ Model-based scenarios are pivotal instruments for guiding national policy directions and policy making
  - ✓ Global scenarios are well compiled in IPCC databases (AR5, SR1.5 …)
  - ✓ MIPs (model inter-comparison projects)
    - ➢ Get robust insights
    - ➢ Foster community levels

National scenarios circumstances?

- National scenarios have widely contributed to national policy making (some countries)

- MIPs also exist for national scales
  - ✓ Multi-national models:
    - ➢ USA, EU, China, India and Japan
  - ✓ Multi-global models + one national model:
    - ➢ CD-LINKS (Brazil, China, India, Russia, Japan)
  - ✓ Cross-country comparisons:
    - ➢ AME (Asia), LAMP (Latin America)
    - ➢ COMMIT, DDPP (Large emitting countries across the world)

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Current scenario situation national v.s. global

|	Global scenarios	National scenarios
Producers	Integrated Assessment Models	National energy/Integrated Assessment Models
Main users of the research outcomes	IPCC, UNEP, UNFCCC, international and national policymakers	National policymakers, private companies, stakeholders and IPCC
Main study target	Global climate goals and associated implications for climate, energy, economy and land-use etc.	Individual national climate goals/targets and their implications for energy, economy, land-use, etc.
Scenario implementation	Individual studies or standardized modeling protocols implemented by multiple models	Some standardization in projects, but mostly specific and varied
Community organization	Well established as Integrated Assessment Modeling Consortium (IAMC)	Partially organized in different communities, often as part of a modeling framework (e.g., The Energy Technology Systems Analysis Program (ETSAP)), but also to an extent in IAMC

Complexity in determining national targets

- Many determinants for the specification of national emissions pathways
  - ✓ Global climate targets in the context of international commitments
  - ✓ How to select global pathways in line with global long-term goals (e.g. multi-IAMs uncertainty and physical climate science uncertainty)
  - ✓ Selection of effort sharing schemes
  - ✓ Economic development stages in individual countries
  - ✓ Other societal and development priorities that may be critical factors to determining the challenges of emissions reductions.

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Expected criteria for upcoming national scenarios

- Cross-national comparability

- Compatibility and cohesion with global climate goals

- Policy relevance

- Ability to address critical national target uncertainties

- Simple implementation without ambiguities in the interpretation of the modeling protocol
  - ✓ Enhance participations by new-comers
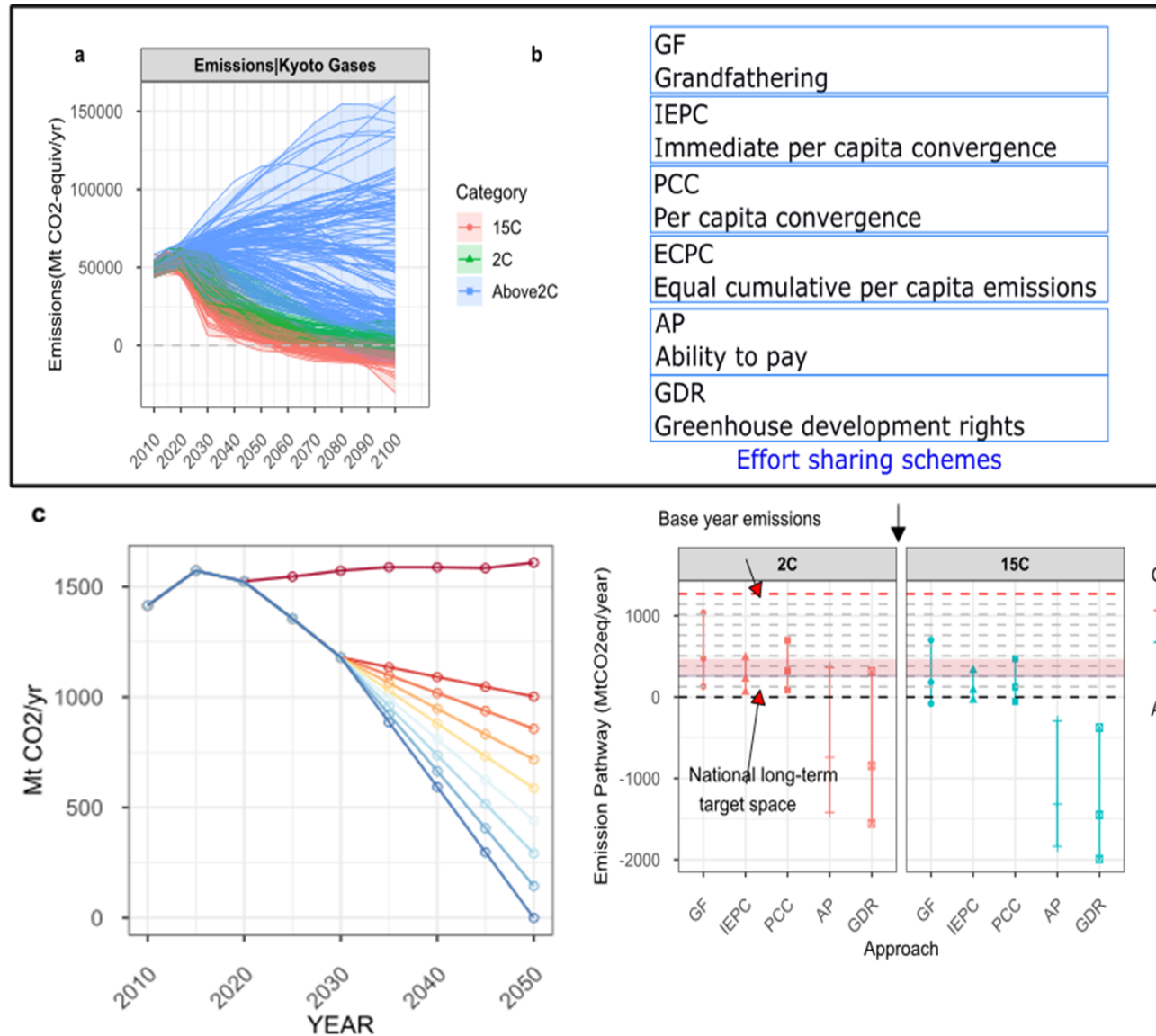
National scenarios in this study

- NDC in 2030, and 0-100% reduction in 2050 relative to the 2010 level of National inventory. Linear interpolation between 2030 and 2050.
  - ✓ Flexible to mainly upper side. Baseline in some developing countries may be much larger than -30% which would need scenarios filling the space between baseline to -30%.
  - ✓ Flexible to more detailed percentage changes in particular deep reduction area (e.g. 85, 95%)

- Basically emission target coverage is energy related CO_2 emissions
  - ✓ Flexible to gas and sector coverage (e.g. CO_2 total, full Kyoto gases etc.)

Baseline

NDC

-30%

-60%
-70%
-80%
-90%
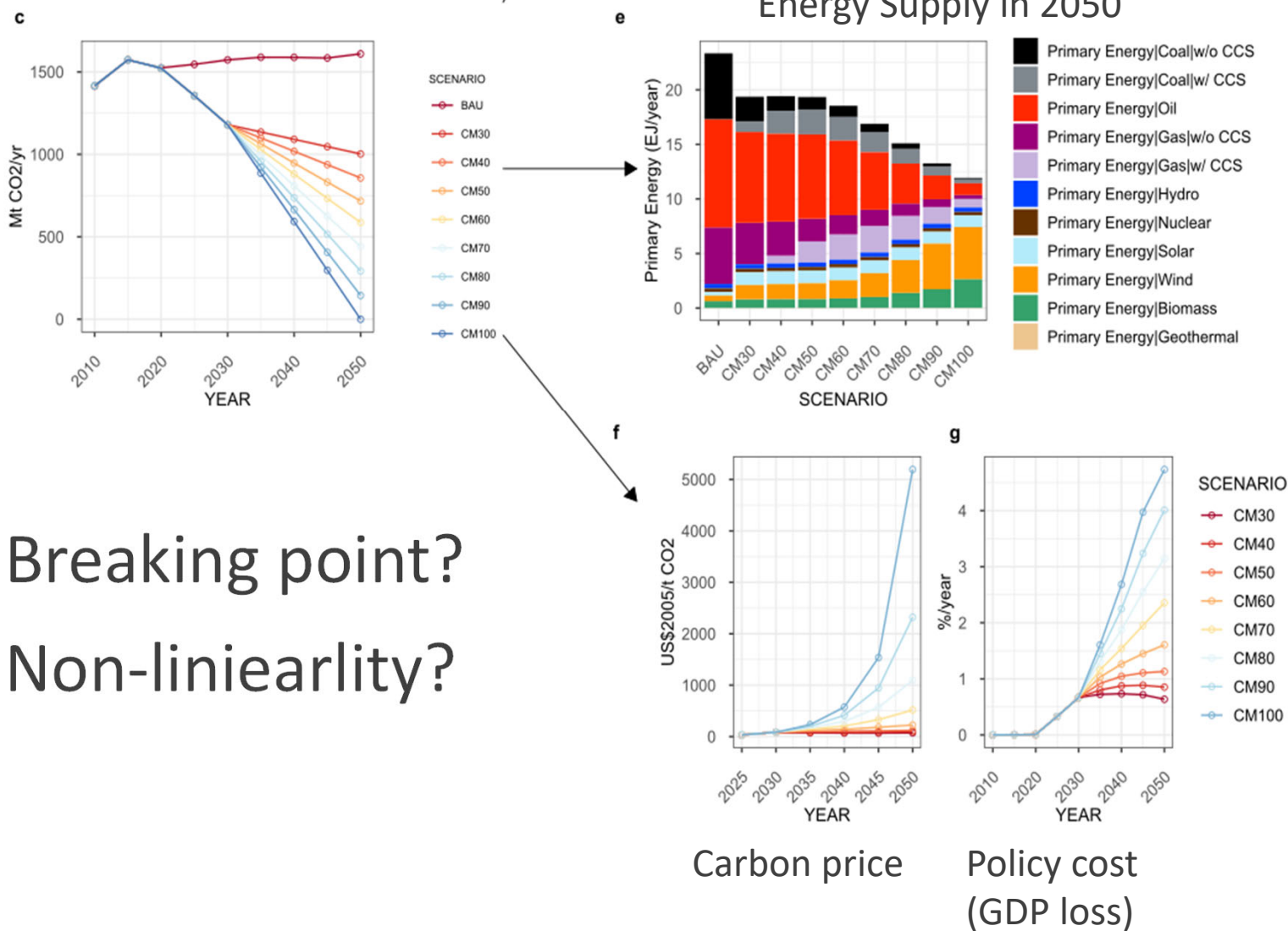-100%

2010   2030   2050
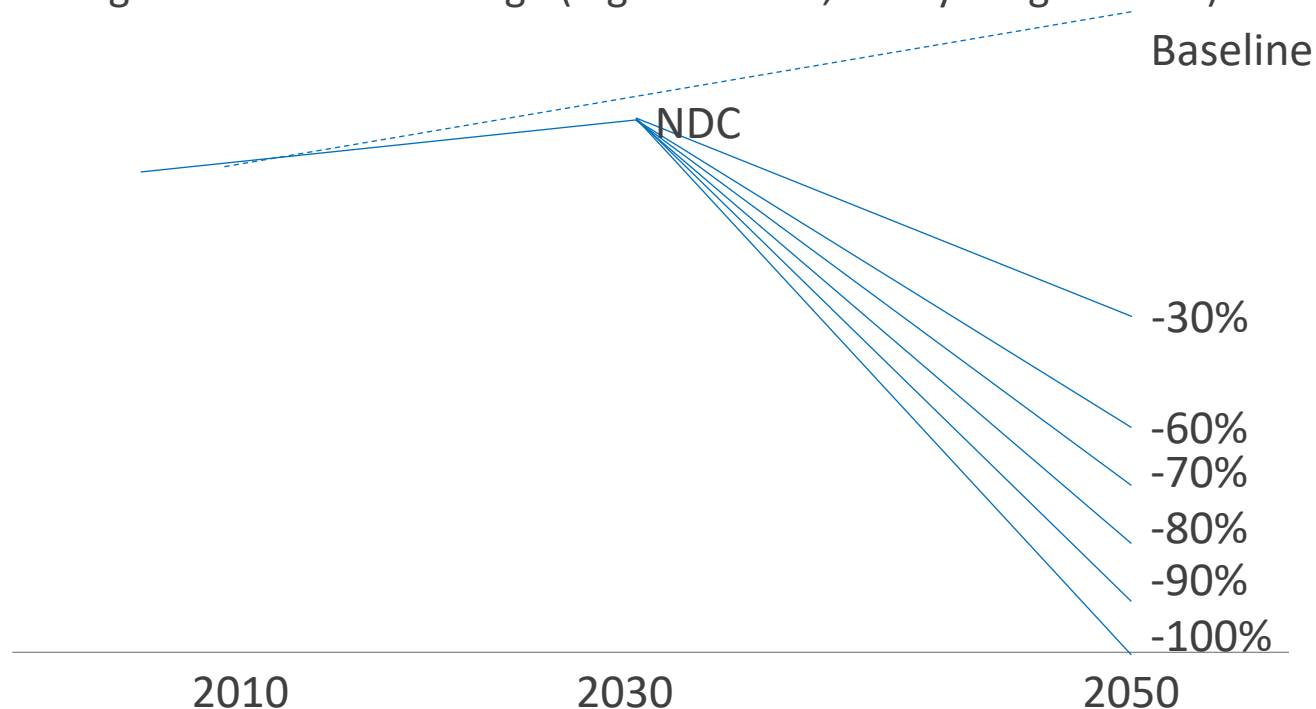
Asian implementation

| Country	Members
Japan	Diego Silva (NIES) , Shinichiro Fujimori (Kyoto Univ.)
Korea	Chan Park (Seoul University)
China	Zhao Shiya (Kyoto Univ.)
India	Shivika Mittal (Imperial College London), Priyadarshi R. Shukla (Ahmedabad Univ.)
Thailand	Bundit Lim (Thammasat Univ.)
Vietnam	Tran Thanh Tu (Vietnam National Univ.)

Japan example (1)

Japan example (2)

Energy Supply in 2050

- Breaking point?
- Non-liniearlity?

Carbon price

Policy cost
(GDP loss)

Cross-national comparison
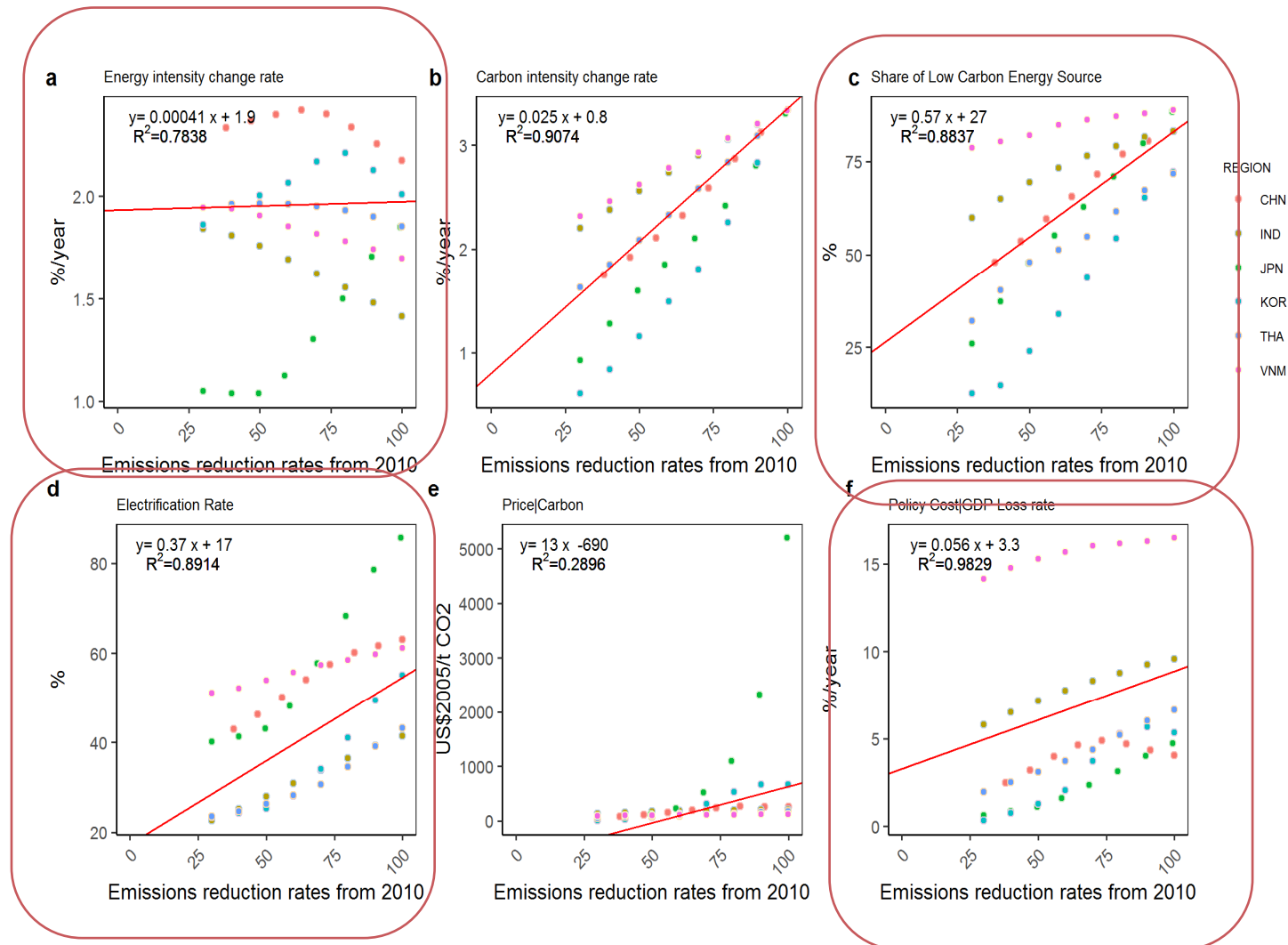
Caveats to the proposal and discussion

- Policy relevance
  - ✓ This scenario set with its incremental 10% reduction levels might not exactly match the forthcoming LTS. There will still be uncertainty in the inventory of the base year and coverage of GHGs.

- Number of scenarios might be large
  - ✓ If models can systematically deal with implementation of scenarios and standardized model output, it would be OK though…

- This proposal as a default core standard set, to which supplementary scenarios can be added, such as using varying technological availability taking into account individual countries' circumstances

- Needs to reflect NDC and LTS updates

- Possible interaction with rest of the world

Community and capacity development

- There are also many countries still missing national energy or integrated assessment models.

- Even if national models exist, a certain portion of models need to improve
  - ✓ Systematic model output reporting
  - ✓ Model validation
  - ✓ State-of-the-art modeling representation.

- This proposed standardized scenario exercise can be a more meaningful and practical catalyst for enhancing capacity building activities

Conclusions

- Propose a new systematic and standardized scenario framework for long-term national scenarios

- Discuss its rationale, the advantages, and possible disadvantages

- This proposal is valid and useful for policymaking and building a research community

- National countermeasures are now a necessity for combatting climate change and modeling community would need to support.

- This research community should, therefore, devote much more attention and resources to national scenarios that guide or enhance the actual societal transformative movement.