Legitimacy of model applications in policy context

Dimensions of Legitimacy

- Realism

- Relevance

- Fairness

- Transparency

- Robustness

Realism

- Reproduce current state of and trends in energy system / land system
  - Do stakeholders recognize the energy/land-use/emissions data?
  - If not, do they understand why data is different from e.g. national inventories or other national and international sources?

- Represent country/region-specific structures where necessary
  - Energy system: resources, cross-border interconnected power system or not
  - Land system: staple and cash crops, trade, protected areas
  - Industry: resources, economic openness, trade
  - Adaptation: key vulnerabilities and risks, sub-national/income-group granularity
  - Etc.

Relevance

- Results should directly speak to future (political) concerns
  - Mitigation goals must be clear and timely (e.g. well below 2°C and limited to 1.5°C, zero emissions, minimizing climate-change damages through mitigation and adaptation)
  - Assess controversial or desirable mitigation on supply-side (e.g. nuclear energy, biomass, CCS, afforestation/reforestation, electricity storage, hydrogen)
  - Assess controversial or desirable mitigation on demand-side (e.g. diets, transport modes)
  - Be explicit regarding costs, (co-)benefits, investment needs, returns on investment
  - Assess impacts, damages and adaptation (capacity, barriers & limits)
  - Assess synergies and trade-offs with other policy areas (e.g. just transition, SDGs)
- Results should directly speak to current (political) concerns
  - Mitigation trajectories should also solve present-day problems of immediate political and social concern (e.g. energy access, energy security, air pollution)
  - Assessment of climate-change impacts and damages should indicate both overlaps and differences with present-day impacts and hazards

Fairness

- How are costs and benefits distributed between countries? Between income groups (incl. within countries)?

- Fairness of mitigation action
  - Assess distribution of economic costs and investments
  - Assess distribution of other costs (e.g. jobs lost/gained, life style)
  - Assess distribution of co-benefits (e.g. energy access, air pollution)

- Fairness of impacts and adaptation needs
  - Assess distribution of climate-change risks and damages (economic and not)
  - Assess distribution of adaptive capacity

Transparency

- Clear communication of assumptions:
  - Which technologies are available?
  - At which costs, potentials, side-effects?
  - Limitations – which technologies are not available?
  - →Important tool: sensitivity analysis
- Model documentation, open source, open access
- Clear communication of uncertainties:
  - social-economics → SSPs
  - future costs, potentials/availability
  - remaining carbon budgets
  - → Important tool: scenarios

Robustness

- **Scientific basis of models**:
  Do models include the necessary technologies, policies, granularity, etc.? Are models and methodologies embedded in solid scientific literature? Are they peer-reviewed? IPCC?

- **Understanding of models and results**:
  Understanding of differences between and robust patterns across models, and the mechanisms behind → Model intercomparisons
  Understand differences between bottom-up and top-down models

- **Which types of results are robust**?
  E.g. Pattern and structures like „availabilty of nuclear has little influence on mitigation costs" are more robust; specific numbers for a certain technology, region, time step, are much less robust

What do models need in order to be legitimate tools to inform climate policy? BOG discussion

- What other dimensions of Legitimacy should NAVIGATE consider?

- Which dimensions and aspects are most important and "disqualify" some models or results if missing?

- How the dimensions of Legitimacy are weighted and prioritized may depend on the purpose and perspective of stakeholders and may vary for different countries and stakeholders – which stakeholder perspectives should NAVIGATE account for?

- What are these perspectives and what does that imply for dimensions/aspects of Legitimacy that can guide NAVIGATE work?