Implications of different mitigation portfolios based on stakeholder preferences

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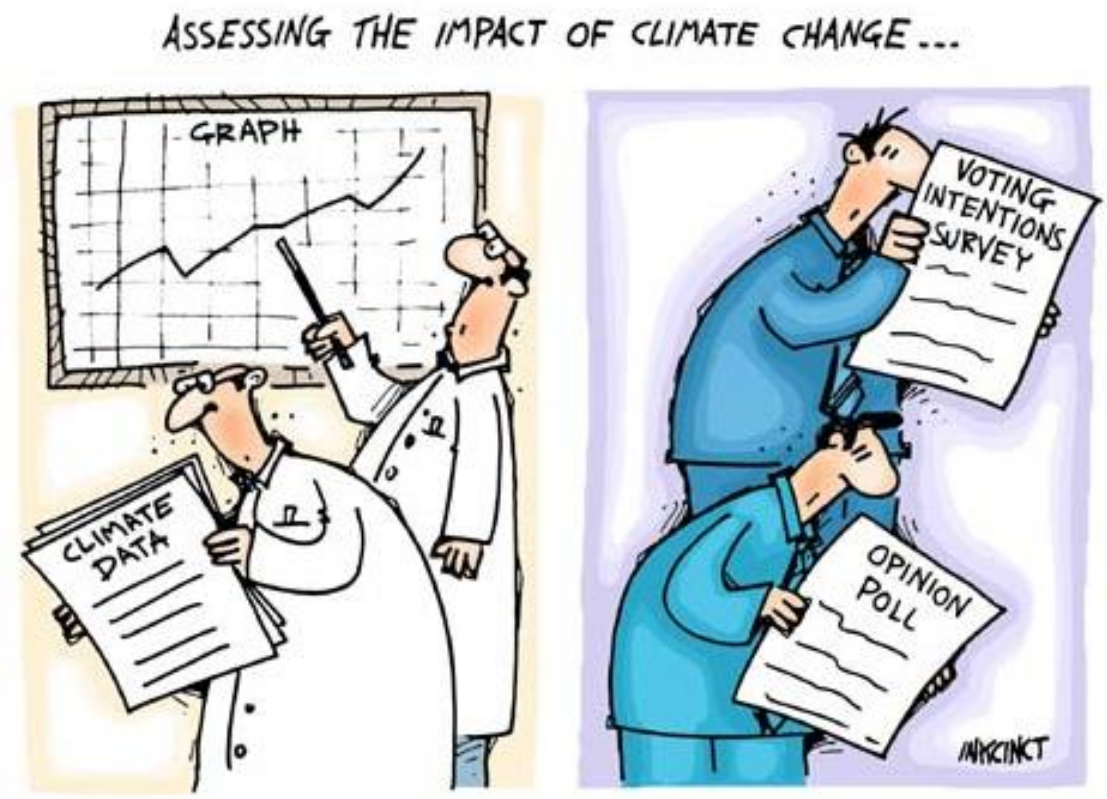
MODELERS AND STAKEHOLDERS ARE CONCERNED ABOUT DATA, BUT ON DIFFERENT WAYS…



MODELERS ⟷ **STAKEHOLDERS**

Outline

1. Introduction
2. Methodology
3. Results
4. Conclusions and further research

INTRODUCTION: OVERVIEW

- Scenario-based **model** projections play an important role in evaluating different mitigation options.

    - Scenarios are commonly used to facilitate short and long-term decisions associated with climate change, given the ***uncertainty*** in the underlying environmental, social, political, economic and technological factors.

    - However, results arising from model simulations could be attractive from a theoretical standpoint, but unfeasible from a more practical angle.

- The role of **stakeholders** is to provide information to adjust the likely scenarios for policy analysis and make them more realistic.

INTRODUCTION: RESEARCH GOALS

The purpose of this analysis is:

1. To explore how **stakeholder engagement** can support scenario development and pathway design for a low-emission and climate resilient future.

2. To quantify the **trade-offs** between positive and negative impacts of these mitigation portfolios informed by the stakeholders

3. To observe if initial **preferences change** when stakeholders are provided with more information on the trade-offs in the different scenarios (*ongoing*)

The key feature of this approach is the involvement of stakeholders throughout the decision making process

METHODOLOGY: OVERVIEW

Step 1: Analysis of stakeholder initial preferences

Tools –
- First online survey

→

Interim results –
- Initial stakeholder preferences for pathways (mitigation options)

Step 2: Simulations of stakeholder preferences

Tools –
- Model: Scenario implementation in GCAM-BC3 based on initial stakeholder preferences

→

Interim results –
- Model output: Trade-offs of different mitigation options based on initial stakeholder preferences

Step 3: Analysis of changes in stakeholder preferences

Tools –
- Second online survey, based on the model output

→

Interim results –
- New stakeholder preferences for pathways (mitigation options) based on the model output

Step 4: Synthesis of the results

Final output –
- Did stakeholder preferences change as a result of the information provided by the model?

METHODOLOGY: STAKEHOLDER ENGAGEMENT

First Survey

- Stating initial preferences:
  - Aimed at collecting information on how stakeholders perceive and assess the risks related to a changing climate and which low emission pathways they prefer to mitigate these risks
- *11 Questions*
- 161 invitations, 38 responses

Second Survey

- Observing changes in preferences:
  - Aimed at observing whether stakeholders changed their initial preferences about mitigation technology options after they were provided with additional information about costs and implications of their initial preferences
- *11 Questions* + 3 Statements + 4 Control Questions
- 9 responses (yet!)

Stakeholders: policy makers, private and public sector industries, scientists, researchers, international associations, NGOs and finance community

METHODOLOGY: THE SURVEY

TEMPERATURE (Q1)

- What is the optimal temperature target that we should aim for to limit global warming? (3ºC, 2ºC and 1.5ºC)

MITIGATION VS. ADAPTATION (Q2-3)

- Which combination of mitigation and adaptation measures would you choose? (100%, 50%-50%, 25%-75%?)
- Should economic growth prevail over climate change mitigation/ adaptation measures?

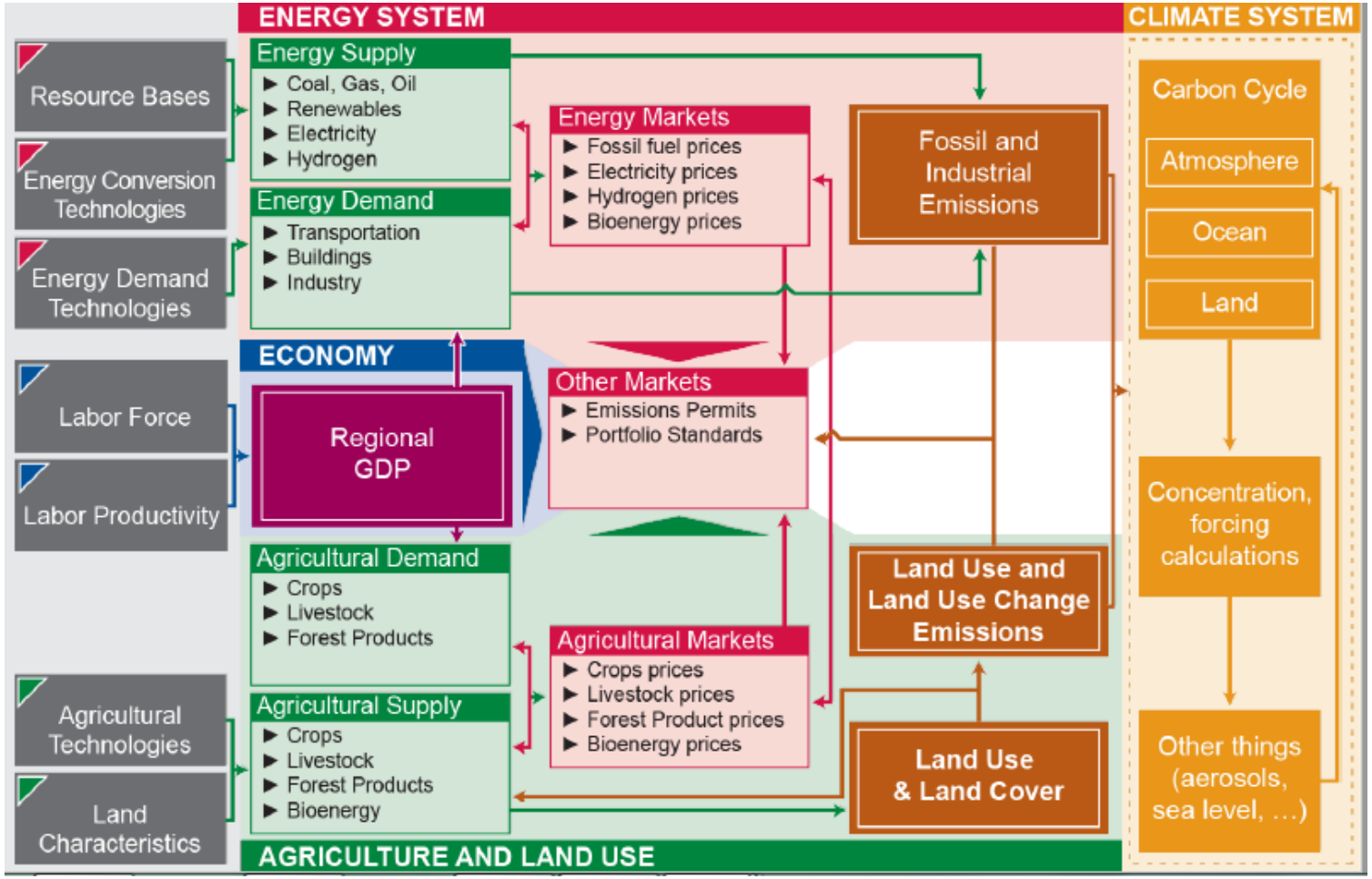
TECHNOLOGY (Q4-11)

- Which technologies will be most important in the next 50 years?
- Which should receive more public support?
- What is the future for each technology?

CCS, Nuclear, Renewable Energy, Fossil Fuels, Biomass, Others.

METHODOLOGY: THE MODEL

The Global Change Assessment Model (GCAM)

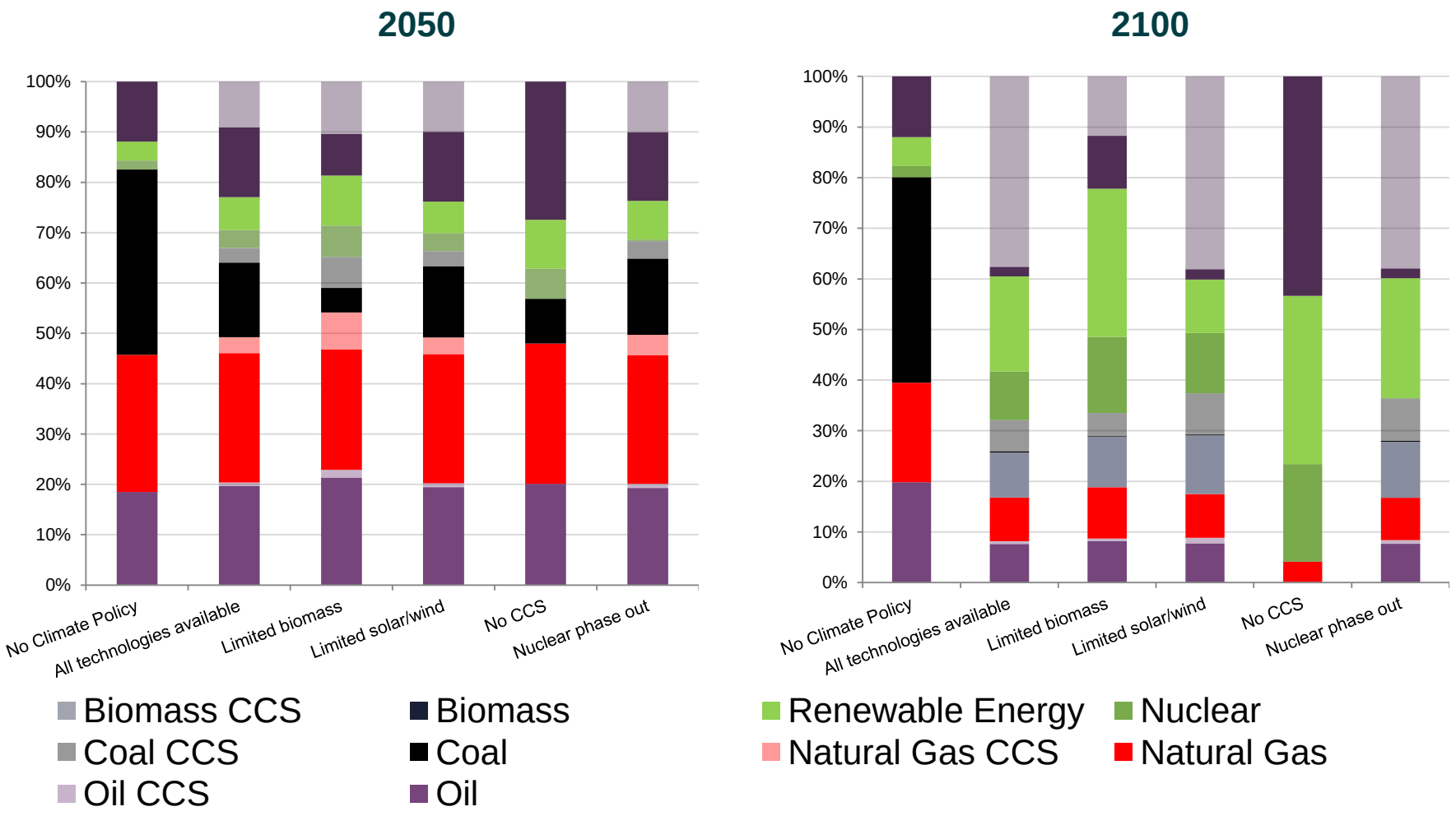


Source: Calvin et al. "Introduction to the Global Change Assessment Model (GCAM)". Joint GCAM Community Modeling Meeting and GTSP Technical Workshop. December 3, 2015.

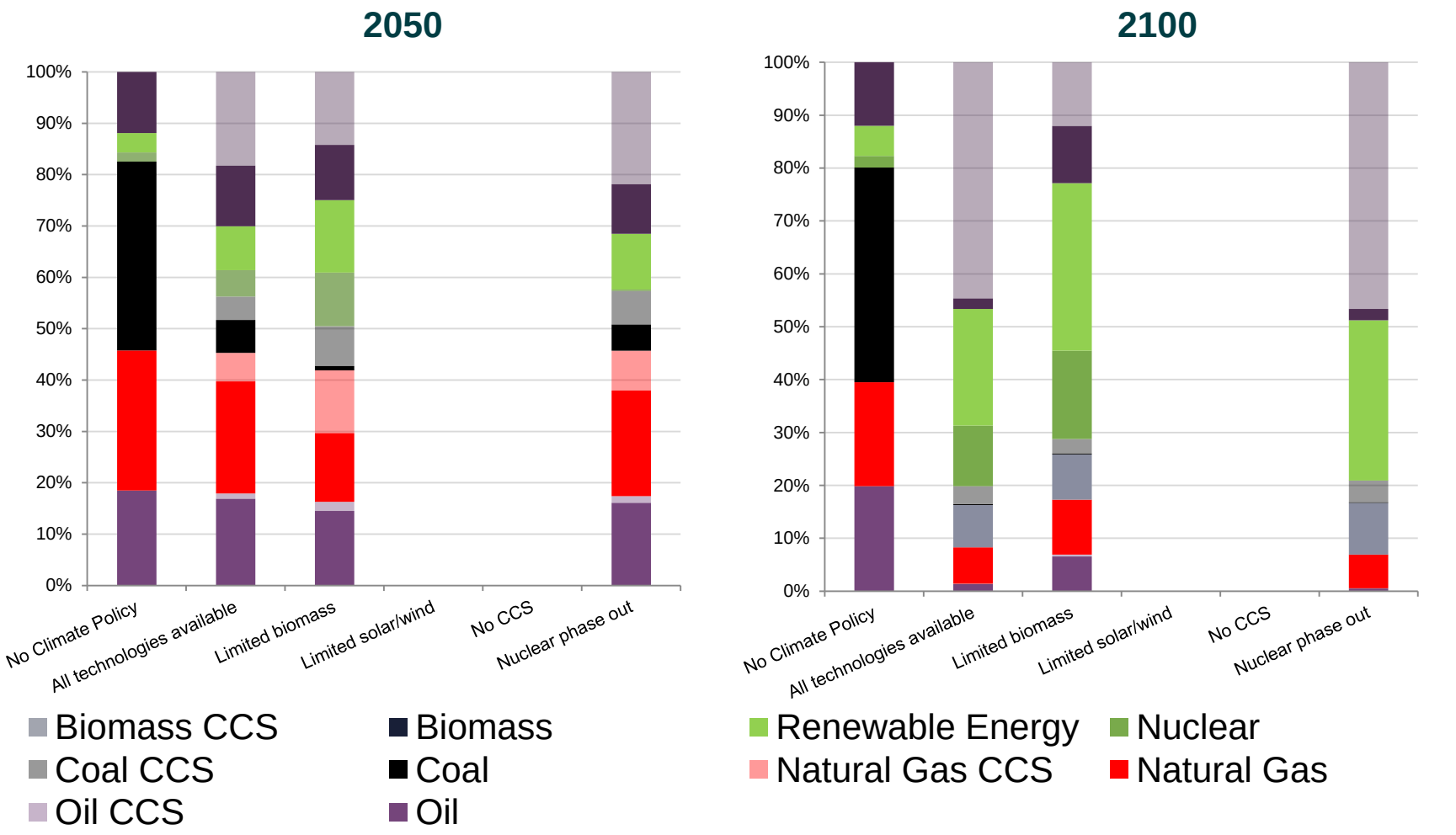
METHODOLOGY: SCENARIOS

Technology options	Characteristics
No climate policy	All technologies available in GCAM are included.
All technologies available	All technologies available in GCAM are included. CCS is available from 2030 onwards.
No CCS	All technologies available except for CCS, which is unavailable in the whole century.
Nuclear phase-out	All technologies available but assuming a nuclear energy phase out consisting of no addition of new nuclear plants beyond those under construction and existing plants operating until the end of their lifetime.
Limited solar/wind	All technologies available except for solar/wind, which are limited to a maximum of annual global electricity generation.
Limited biomass	All technologies available except for biomass, which is limited to a maximum of 100 EJ per year.

Model Results: Energy mix, 2°C target

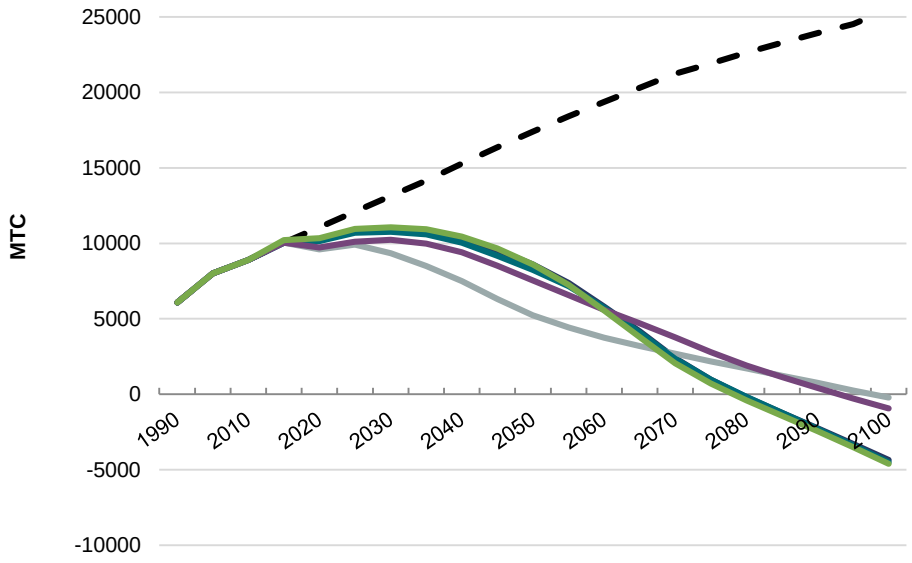


Model Results: Energy mix, 1.5°C target

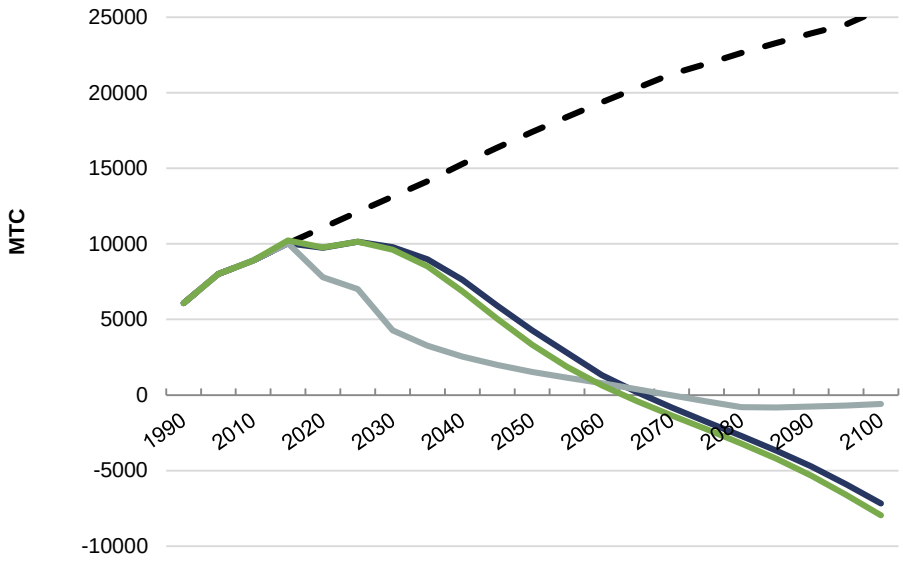


Model Results: CO_2 Emissions

2ºC



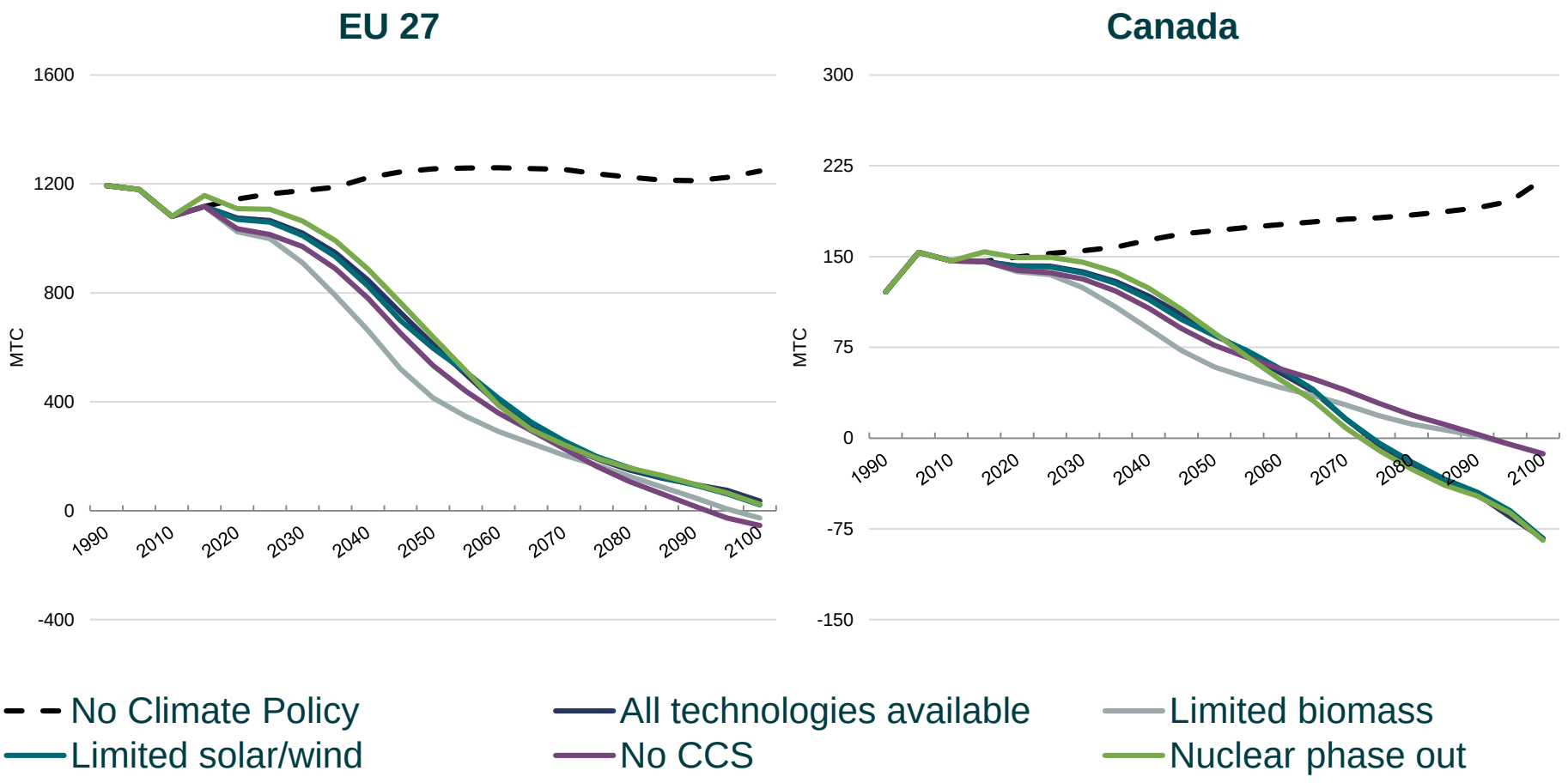
1.5ºC



- No Climate Policy
- Limited solar/wind
- All technologies available
- No CCS
- Limited biomass
- Nuclear phase out

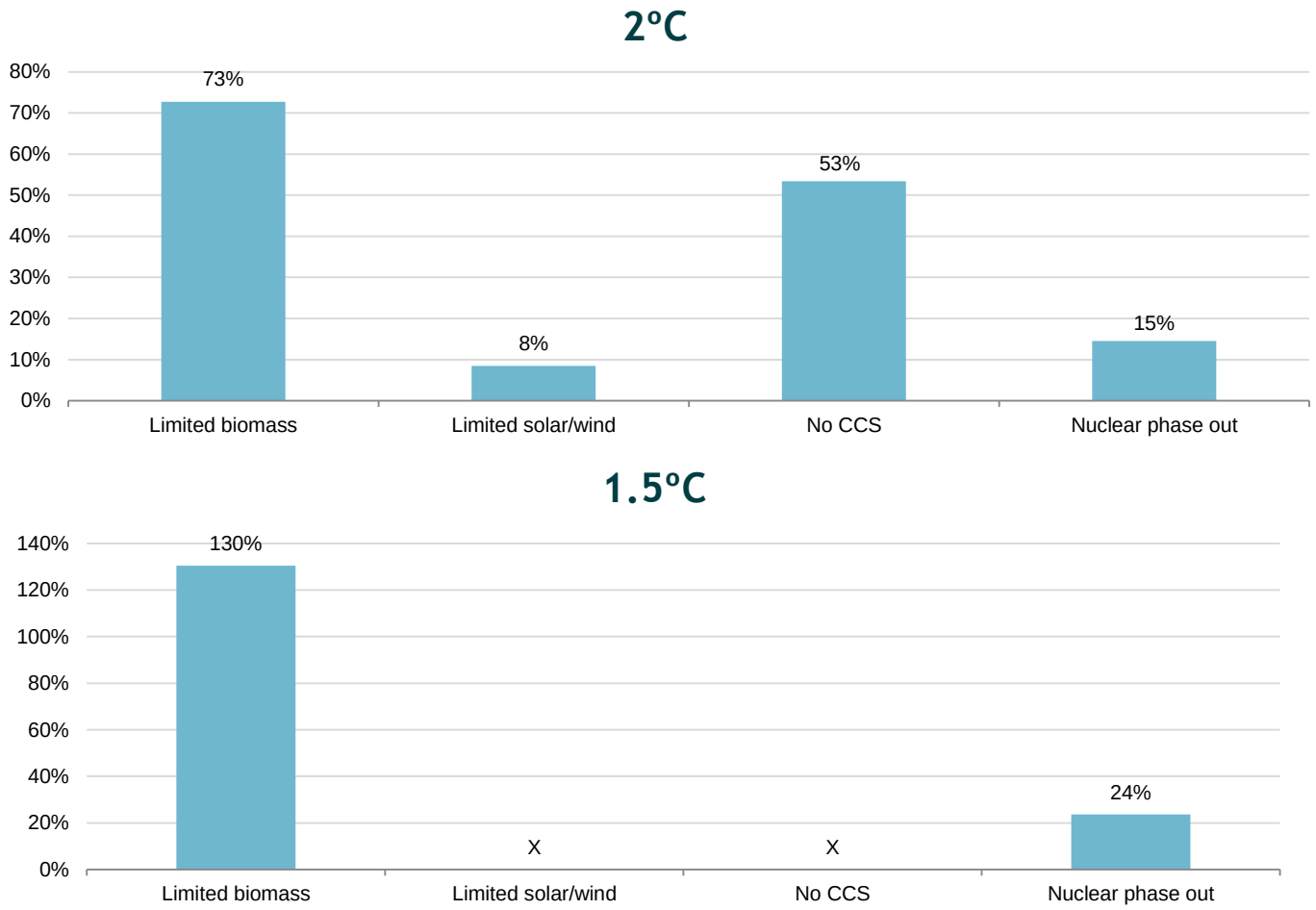
Model Results: CO_2 Emissions by region

Climate Policy 2°C



Model Results: Mitigation costs

Limited scenarios compared to all technologies available



Model Results: Mitigation costs over GDP

Technology options	GDP share in 2100	
	2ºC	1.5ºC
All technologies available	3%	6%
Limited biomass	5%	14%
Limited solar/wind	3%	-
No CCS	5%	-
Nuclear phase-out	4%	7%

RESULTS: CHANGE IN PREFERENCES
TEMPERATURE/MITIGATION VS. ADAPTATION

Temperature target

- First Round: 71% chooses 1.5ºC.
- Second Round: 14% chooses 1.5ºC.

Mitigation vs. Adaptation

- Both Rounds: 57-63% chooses 50%-50%.

RESULTS: CHANGE IN PREFERENCES

TECHNOLOGY OPTIONS

PRELIMINARY	Most important (1st-2nd)	Public support (1st-2nd)
CCS		14%
Nuclear		
Renewables	86%	86%
Bioenergy	0%-14%	0%-43%
Efficiency	86%-100%	71%-57%
Natural gas	14%-0%	
Coal	14%-0%	
Oil		
Storage		14%-0%

CONCLUSIONS AND FURTHER RESEARCH

1. It is possible to achieve the below 2ºC temperature target even if some technologies are limited or not available.
   - Important effect on mitigation costs
   - Solar/Wind and CCS are essential to limit global temperature to 1.5ºC.

2. The technology portfolio determines the timing and speed of the emissions reductions.
   - Abatement should start earlier if technologies such as CCS/Biomass are not available/limited.
   - The later the mitigation efforts start, the faster the emissions reductions should be.

3. Stakeholders found the information provided in the survey useful.
   - Switch from 1.5ºC to 2ºC in the second survey.
   - Improved opinions towards the future development of CCS and Biomass.

We are increasing the number of surveys!

TRANSrisk
TRANSITION PATHWAYS AND RISK ANALYSIS FOR CLIMATE CHANGE POLICIES

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