

# Premises for Bioenergy with Carbon Capture and Storage in the Global Response to Climate Change

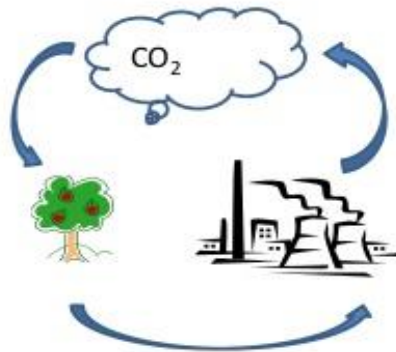
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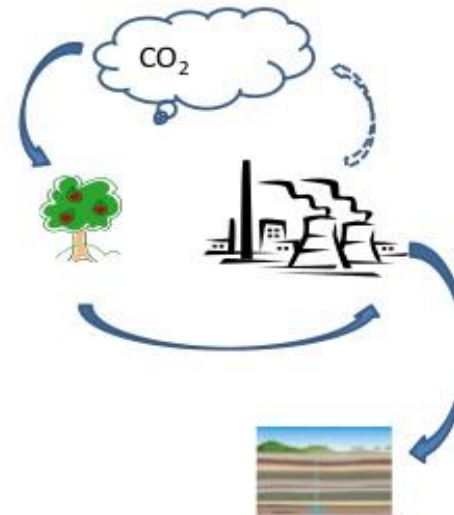
# Background

## Bioenergy and CCS (BECCS)

“Neutral” emissions



“Negative” emissions

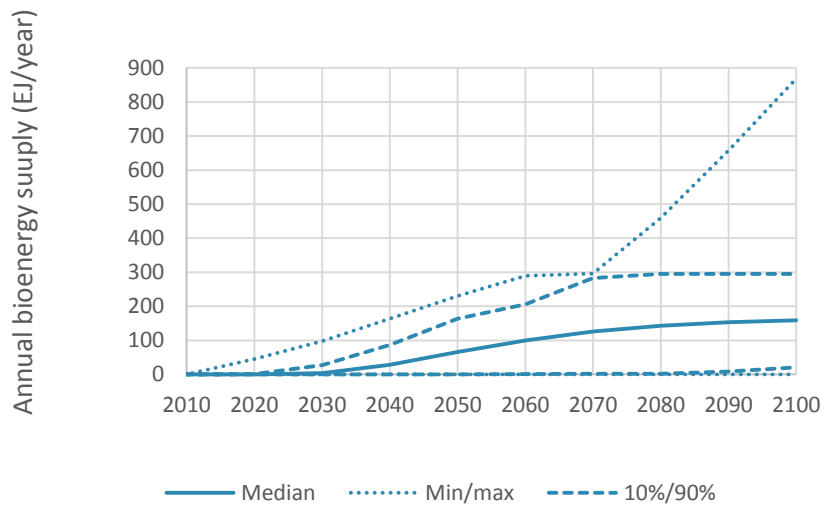


# Background

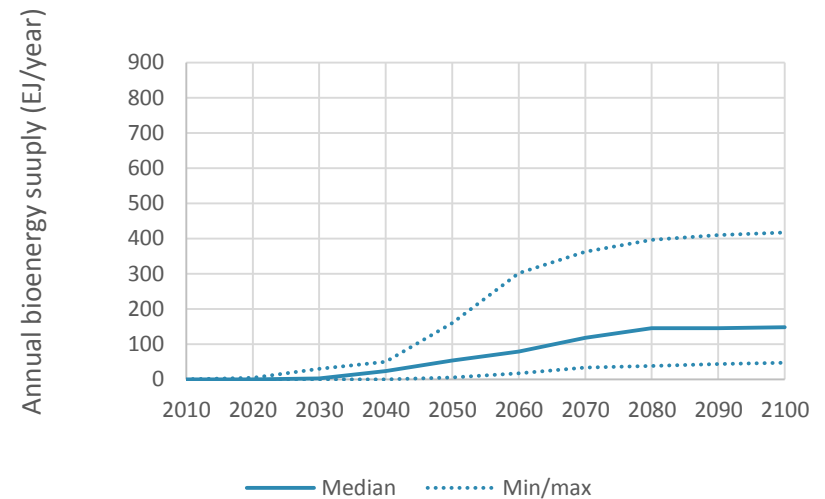
- Keeping global warming below 2°C requires rapid reduction of green house gas emissions.
- That implies rapid change in energy system and land use practices.
- Employing Bioenergy with Carbon Capture and Storage (BECCS) has been put forward as an important mitigation option by majority of global climate scenarios.

# Background

BECCS in IPCC AR5 scenario DB,  
450ppm CO<sub>2</sub> or lower by 2100



BECCS in SSP scenario DB,  
2.6 W/m<sup>2</sup>



# Background

- At the same time transformation through transition management requires both that the technology is socially acceptable and prioritized politically.
- Socio-political pre-conditions for BECCS deployment have thus far received only limited attention.

# The Project:

## Premises for Bioenergy with Carbon Capture and Storage in the Global Response to Climate Change

- Involved parties:
  - The Centre for Climate Science and Policy Research, Linköping University
  - The Division of Physical Resource Theory, Chalmers University of Technology
  - Institute for Science Innovation and Society, University of Oxford

## Aims of the project:

- Mapping prioritisation of BECCS
  - Among key actors
  - In NDCs and national strategies
- Exploring factors that may influence preferences
- Assessing how models can approximate BECCS' socio-political dimension

# Methods used in the project:

- Surveys at COP meetings
- Text analysis - NDCs and other national strategy documents
- Review of existing literature on BECCS with focus on representation in (global) model scenarios
- Scenario development



# What we have done so far:

# Analysis of survey data and literature:

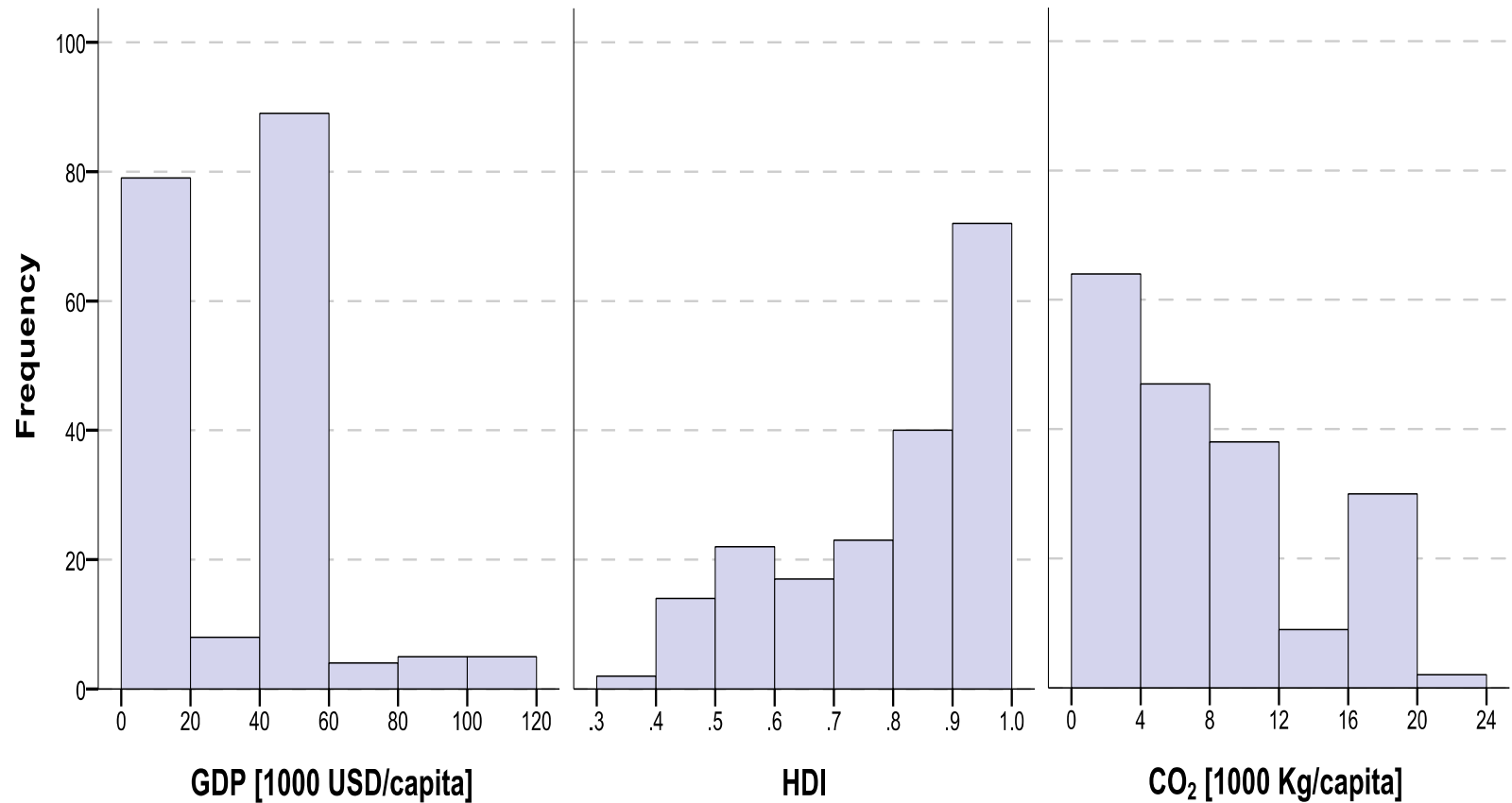
To explore :

- preferences for investing in BECCS
- the views of BECCS as mitigation technology globally and domestically
- possible domestic barriers to BECCS deployment
- compatibility of results with scenarios from AR5 and SSP databases

# Method

- Surveys distributed on UNFCCC meetings:
  - 42<sup>nd</sup> Subsidiary Bodies meeting in Bonn (June 2015),
  - the 21<sup>st</sup> COP in Paris (December 2015)
  - the 22<sup>nd</sup> COP in Marrakech (November 2016).
- 1603 respondents for investment preferences
- 289 respondents for more BECCS focused questions
- We use non-parametric statistical analysis to evaluate the responses.

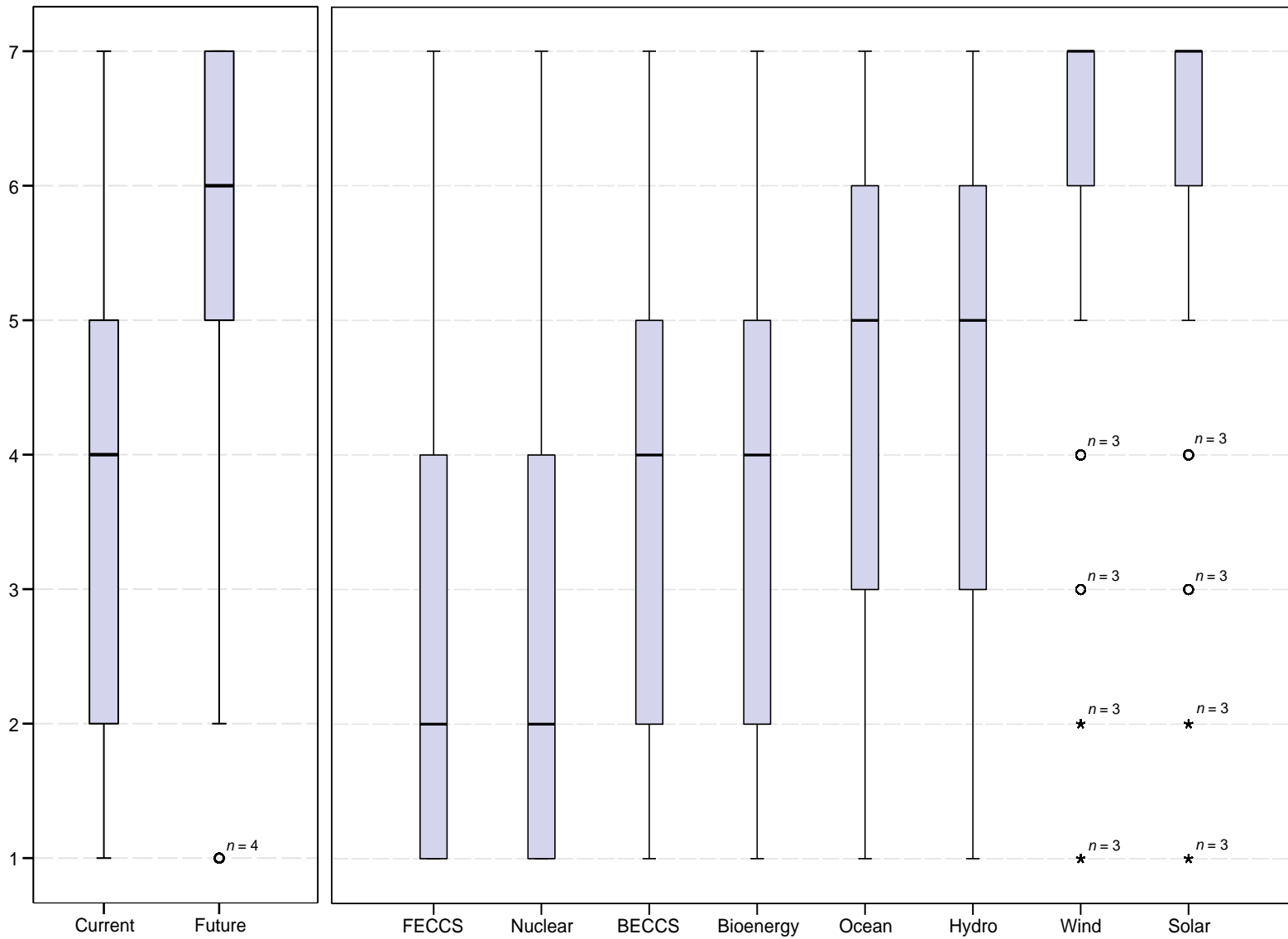
# Method



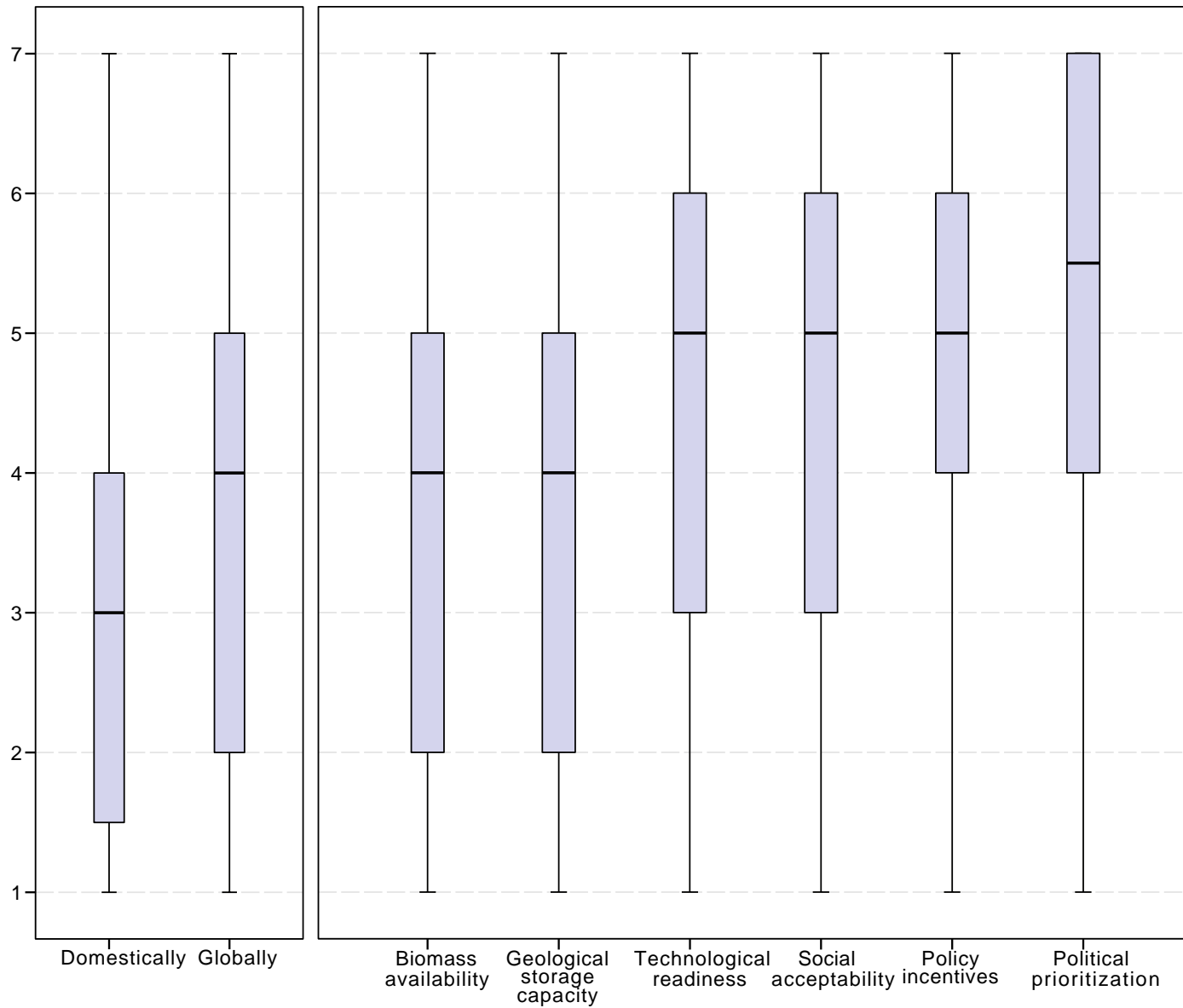
# Example of the survey questions

	<i>Disagree</i>			<i>Agree</i>			
	1	2	3	4	5	6	7
<i>6. In my country of residence, the electricity generation system:</i>							
Is, at present, low-carbon	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Requires investments to be low-carbon in the long-term (25–50 years)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 <i>7. In my country of residence, investments in a long-term (25–50 years) transition to low-carbon electricity generation should be directed towards:</i>							
	1	2	3	4	5	6	7
Bioenergy without Carbon Capture and Storage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Bioenergy with Carbon Capture and Storage (BECCS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fossil fuel with Carbon Capture and Storage (CCS)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hydropower	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nuclear power	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ocean power (e.g. wave and tidal power)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Solar power	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wind power	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, please specify:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 <i>8. i). With regard to Bioenergy with Carbon Capture and Storage (BECCS)</i>							
	1	2	3	4	5	6	7
I am acquainted with BECCS	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Globally, BECCS is likely to contribute substantially to meeting the well below 2°C goal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
In my country of residence, BECCS is likely to contribute substantially to mitigation actions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
 <i>ii). In my country of residence, the use of BECCS is likely to be constrained by low levels of:</i>							
	1	2	3	4	5	6	7
Biomass resources	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Geological or other storage capacity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Policy incentives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Political prioritisation	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social acceptability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Technological readiness	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other, please specify:	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# Results: Investment preferences



# Results: Barriers



# Conclusions

- BECCS is not strongly prioritised for investments
- Level of knowledge about BECCS does not influence the attitude towards investments in BECCS
- But high knowledge makes it more likely that BECCS is seen to contribute on the global scale, no effect on domestic role.



# Conclusions

- Governmental respondents have significantly more positive attitudes towards BECCS
- Main perceived barrier is insufficient political prioritization
- Aspects currently not captured in global energy system models tend to be perceived as more important barriers

# Further work

- Analysis of NDCs and other national strategies
- Comparing preferences in different countries to:
  - biomass availability
  - storage capacity
  - share of bioenergy in the energy mix
  - R&D expenditure
  - GDP
  - organisational stability etc.
- Scenario development taking into account previous findings

Thank you!

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