

Citizen perspectives on CCS and international CO₂ transportation and storage

**Making CCU and CCS happen – Nordic Energy Research
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NFR CLIMIT projects: PerCCSeptions: 2019-2022, and CCSMARKET: 2021-2025

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Challenges facing research on attitudes to new technologies

- People may not have an attitude
- High share of «don't know» or «neither/nor»
- Need to explain what we're asking about, affecting responses
- One remedy: Qualitative interviews.
 - Expensive, hard to interview 100+, hard to generalize from data

Technique #1: Experimental design in opinion surveys

- Make different versions of a question
- Identical except one or a few words
- Variation in wording is an experimental treatment
- Randomize respondents into groups – each gets only one question
- Measure the effect of wording variation by comparing responses across groups

Group 1	Group 2
Description of a CCS project where CO₂ from Norway is stored in Norway	Description of a CCS project where CO₂ from Germany is stored in Norway
Description and question wording identical except in where CO ₂ comes from.	

Technique #2: Open-ended questions

- We describe the technologies/topics and participants answer using their own words
- Associations given typically in 1-3 sentences
- Can give information about how people think, what's important to them
- Analyze quantitative and/or qualitatively and combine with numeric/categorical opinion measures or background variables
- Fairly easy to analyze large amounts of data (N>2,000)
- Statements of typical responses and differences across groups
- Gives emphasis/aspects but not necessarily opinion

Main findings: CCS attitudes in Norway and Germany

- **Norwegians are significantly more positive to CCS than are Germans**
- The share of positive/very positive depends on question wording:
 - Norway: 42 – 81 % (typically ~ 65-70%)
 - Germany: 45 – 60 % (typically ~ 50%)
- **Norwegians are more familiar with CCS than are Germans**
 - Norway: **15%** say they have never heard about CCS
 - Germany: **63%** say they have never heard about CCS



Analysis of open-ended question on CCS (NOR)

- What dimensions are associated with CCS?
- Do different population groups think about different aspects of CCS?

Main groups and what they mention

1. Unconditionally positive (20 %)
 - CCS is good for the environment
 - CCS is good for the economy & tech development
2. **Conditionally positive (50 %)**
3. **Negative (15 %)**
4. **Undecided, with opinions (10 %)**
5. Confused and in doubt (5 %)
 - Want more information
 - CCS hard to understand (science-fiction)

Typical factors mentioned:

- Positive if overall positive environmental effect
- Worried that CCS will slow energy transition
- Worried about leakages from storage and transportation
- Could get expensive («moon landing» effect)



Analysis: Effect of CO₂ import/export

Survey experiment

- Common description of CCS
- Variation:
 - CO₂ country of origin
 - CO₂ country of storage

Share of respondents that evaluated the project *somewhat positive or very positive*



Germany (N=2500)

	storage			
source	not spec.	EU	NOR	domestic
not spec.	53%	54%	48%	51%
EU	45%	49%	48%	51%
NOR†				
domestic	57%	50%	51%	54%

Norway (N=2665)

	storage			
source	not spec.	EU	GER†	domestic
not spec.	77%	73%		64%
EU	67%	70%		56%
GER	68%	68%		42%
domestic	76%	70%		81%

†not part of the experimental design

 lowest share of positive answers
 highest share of positive answers

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Does the nationality of CO₂ matter? Public perceptions of a Northern European market for CO₂ storage (CCSMARKET)

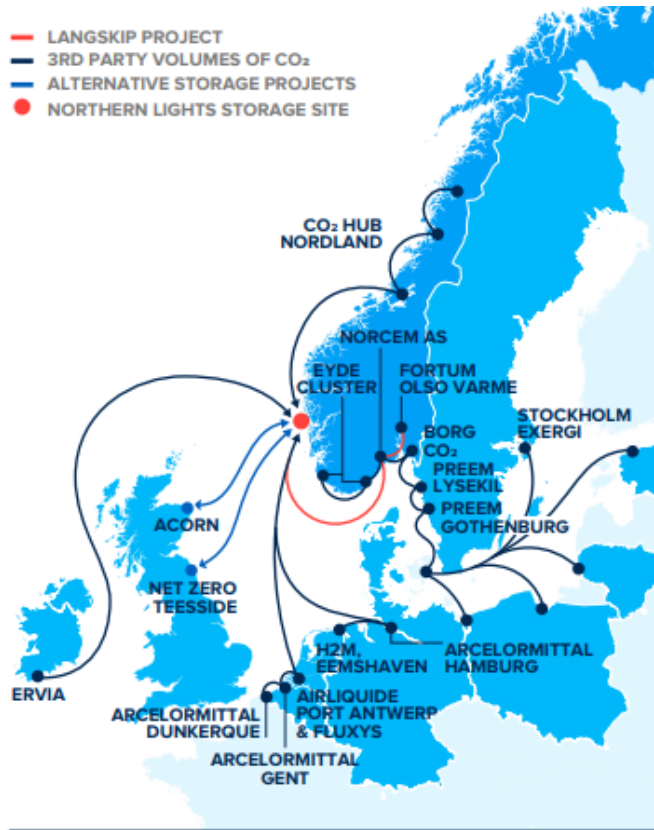


FIGURE 8 NORTHERN LIGHTS PROJECT – POTENTIAL SOURCES OF CO₂^h

- Financed by RCN Climit
- 2022 - 2025
- Expanded experiment in 5 countries: GBR, NLD, DNK, DEU, NOR
- Aims:
 - Look for corresponding patterns
 - Understand mechanisms better
 - Include questions related to international fairness and burden sharing in climate policy

Implications for science communication

- **Inform citizens of the potential role of CCS** in reducing emissions and limiting global warming
- **Germany:** In public discussion, clarify that it is not a tool for extending coal power but cement and waste
- **Norway:** Communicate that investments in CCS presuppose import of CO₂ from other countries.
- Explain role of CCS in **short run** (emission reduction) and **long run** (negative emission technologies).
- Policy and communication: Emphasize minimization of **environmental consequences**.
- Particular need for information about what happens to **CO₂ in storage**, and probabilities/consequences of leaks from storage/transportation.



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