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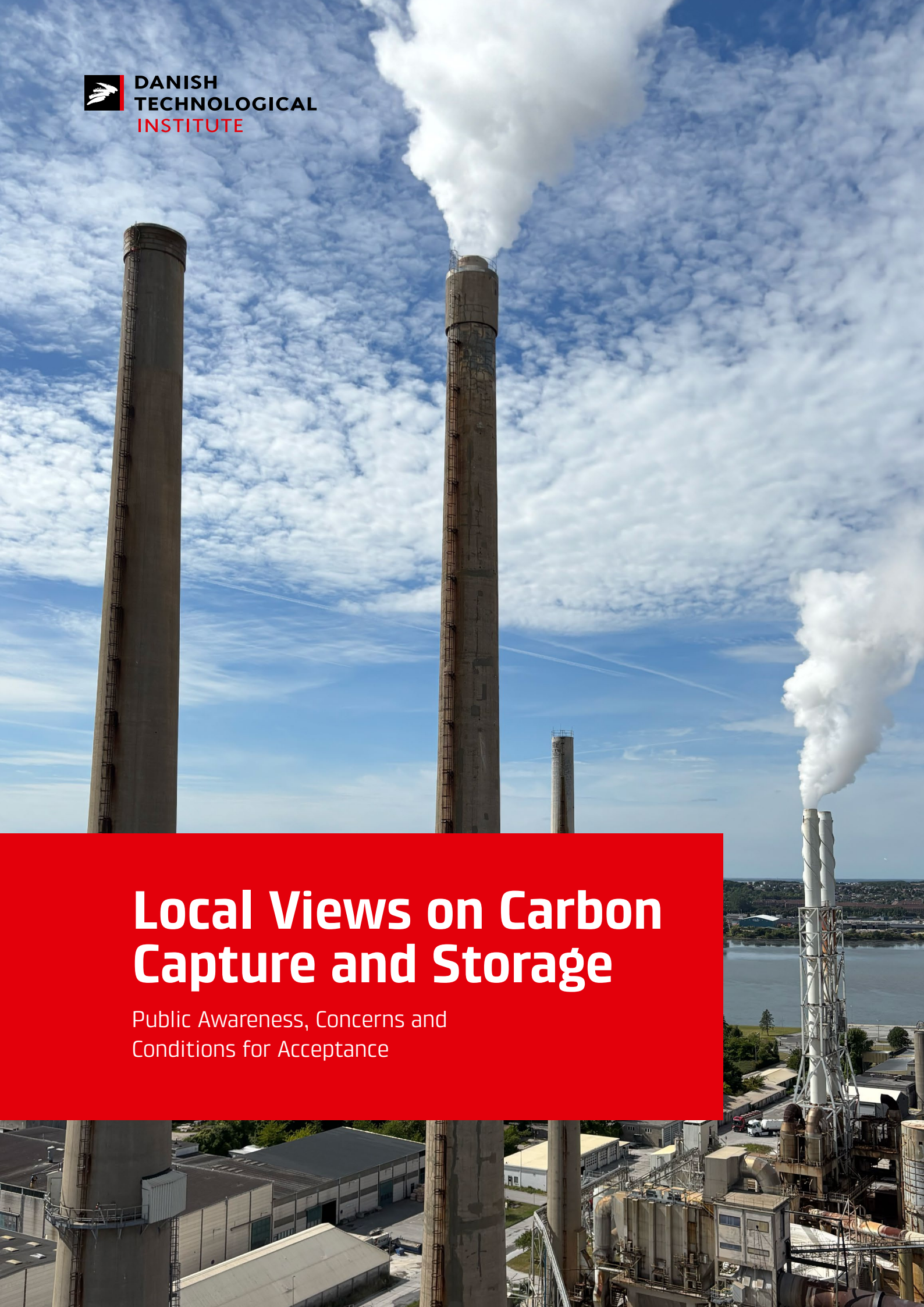

Local Views on Carbon Capture and Storage

Public Awareness, Concerns and Conditions for Acceptance

About this publication

This report is the deliverable for the Social System Analysis conducted as part of the CASPER (Cement cArbon Storage Pilot for Emission Reduction) project. The project is funded through the INNO-CCUS partnership, one of four state-initiated mission-driven green research and innovation partnerships supported by Innovation Fund Denmark.

The partners in the CASPER project are the Danish Technological Institute, Evida, Gas Storage Denmark, Pentair Union Engineering, the Technical University of Denmark, and Aalborg Portland.

The Social System Analysis was conducted by the Danish Technological Institute in collaboration with work package partner Aalborg Portland, who financed the study's phone survey. Juanita Gallego Dávila, Sustainability Senior Specialist at the company, provided feedback on the design of the phone survey questionnaire and interview guide for the focus groups. She also gave feedback on the first draft of this report.

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Photos

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Executive summary

Carbon capture and storage (CCS) is expected to play an increasingly important role in Danish climate policy, particularly for hard-to-abate industrial sectors such as cement production. This report presents a social study conducted as part of the CASPER (Cement cArbon Storage Pilot for Emission Reduction) project, funded through the INNO-CCUS partnership. While CASPER has a strong technological focus on testing CO_2 capture from flue gas at Aalborg Portland, this report addresses the societal dimension of CCS deployment: public awareness, perception and acceptance among citizens living near different elements of an emerging Danish CCS value chain.

The study examines three local areas representing different positions within this value chain: the area around Aalborg Portland, where a CO_2 capture pilot plant has been operating, and the Gassum and Thorning areas, which have been investigated for their potential to host geological CO_2 storage following the award of exploration licences to commercial operators. The analysis draws on three empirical components: a phone survey of 1,005 citizens conducted in December 2025; six focus groups (two in each area) conducted in May–June 2026; and interviews with two key stakeholders – the Head of Division CCS at the Danish Energy Agency (DEA) and the Head of Corporate Affairs at the private exploration licence holder Harbour Energy.

Survey findings

The phone survey shows that public awareness of CCS remains moderate and unevenly distributed. Over half of respondents (54%) had heard of CCS before the survey, while awareness of concrete local activities was considerably lower (36%). Awareness is consistently higher among men and older age groups, and lower among women and younger respondents. Notably, awareness is lower in Aalborg, where carbon capture was piloted, compared with the potential storage areas of Gassum and Thorning, suggesting that geographic proximity alone may not drive awareness. Among the possible explanations for the observed differences in local awareness levels is that the public discourse surrounding potential onshore geological storage in Gassum and Thorning may have generated more local attention and general awareness than the technological trials in Aalborg.

Across all three areas, respondents perceive CCS as more beneficial for Denmark than for their own local areas, revealing a consistent 'local-national benefit gap' that is most pronounced in the storage areas. Expected advantages centre on climate-related, environmental and innovation-related benefits, whereas more local economic benefits (employment, investment, municipal revenue) are recognised by a smaller share of respondents. Perceptions of safety are mixed: 43% consider CCS safe, 28% consider it unsafe, and 29% remain uncertain. These perceptions are closely linked to prior awareness and perceived benefits. Expected disadvantages extend beyond technical risk to include concerns about transparency, citizen involvement, traffic disruption, property values, and distrust of responsible actors — concerns notably more prominent in Gassum and Thorning than in Aalborg.

Overall attitudes are characterised by ambivalence rather than clear support or opposition: the largest group of respondents see benefits and disadvantages as roughly balanced, and

when asked about a hypothetical nearby storage site, the most common response (43%) is neither to support nor oppose it. Aalborg consistently emerges as the most positive case, while Thorning is the most sceptical, underlining an important distinction in public perceptions of capture and storage activities.

Focus group findings

The six focus groups provide deeper insight into the reasoning underlying these survey patterns. Awareness of CCS and local activities varies considerably, even among well-informed participants and those with relevant professional backgrounds, and does not correlate consistently with geographic proximity. Spontaneous associations frequently include scepticism about CCS as a potential 'sleeping pillow' (a source of complacency) that might delay more fundamental emission reductions – a concern raised independently across all three areas.

Participants' assessments of CCS's advantages and disadvantages are highly conditional. Advantages linked to research, innovation, and the need to address otherwise unavoidable industrial emissions are readily accepted, while broader claims about climate contribution, cleaner air, or competitiveness are often dismissed as marketing or greenwashing. Expected disadvantages centre on CO_2 leakage and long-term geochemical uncertainty, but also include concerns about transport, cost, property values, and, distinctively, the intergenerational transfer of risk and responsibility.

Trust, responsibility, and fairness emerge as closely interlinked themes that shape the conditions for local acceptance. Participants consistently prefer independent, arm's length oversight over oversight by the state or industry alone. They are sceptical of models that concentrate benefits with a single landowner or company while spreading risks more widely, drawing on their experiences with wind and solar siting. Local co-ownership, clear liability arrangements, and early, honest and accessible communication are identified as key precon-

ditions for acceptance. Existing information channels, such as e-Boks notices[1] and conventional public hearings, are frequently viewed as inadequate, whereas more dialogue-based, in-person formats are received considerably more favourably.

Stakeholder perspectives

The interviews with Henrik Sulsbrück,[2] Head of Division CCS at DEA, and Regitze Reeh, Head of Corporate Affairs at Harbour Energy, reveal two structurally different engagement approaches. According to Sulsbrück, the DEA – as an impartial public authority operating under resource constraints – adopts a comparatively reactive role once exploration licences are granted, delegating primary responsibility for citizen engagement to licence holders while carefully avoiding role confusion with commercial actors. Harbour Energy, by contrast, operating from a position of low initial credibility as a foreign commercial actor, has invested heavily in sustained local presence, direct landowner dialogue, tailored formats, and third-party endorsement to build trust over time. In the two conducted stakeholder interviews, both Sulsbrück and Reeh converge on the insight that public trust in CCS cannot be built quickly through information campaigns alone, but requires sustained local visibility, credible independent verification, and considerable time.

Overall conclusions

Altogether, the findings point to several key lessons for future CCS deployment, communication and engagement in Denmark. First, efforts to raise awareness should be proactive and targeted, rather than relying on geographic proximity. Second, communication should be tailored to each segment of the value chain, reflecting the distinct public concerns associated with capture and storage activities respectively. Third, engagement should move beyond one-off, plenary-style formats towards more dialogic, localised and continuous communication. Fourth, independent oversight and a demonstrably fair distribution of costs and benefits should be regarded as core preconditions for public legitimacy, rather than secondary considerations. Finally, building local trust requires time and sustained presence. Engagement should begin early – even amid project uncertainty – to avoid citizens feeling that decisions are made without their involvement.

> **Building local trust requires time and sustained presence. Engagement should begin early – even amid project uncertainty.**

1. Introduction

Carbon capture and storage (CCS) is expected to play an increasingly important role in Danish climate policy. While the long-term transition to a low-carbon society depends on a range of green initiatives – including reducing emissions at source, expanding renewable energy, and changing production and consumption patterns – some emissions will be difficult to eliminate in the short and medium term. This is particularly the case for certain industrial processes, including cement production, in which a large proportion of emissions arises from the production process itself rather than from energy use alone. In this context, CCS is increasingly presented as a supplementary technology for handling unavoidable emissions from hard-to-abate sectors.

CCS refers to a technological value chain in which carbon dioxide (CO_2) is captured from large point sources, such as industrial plants, waste incineration facilities or power plants. The captured CO_2 is then conditioned, transported by pipeline, ship or road, and injected into suitable geological formations on land, near shore or offshore for long-term storage. The related term CCUS (carbon capture, utilisation and storage) is used when captured CO_2 is not only stored but also used as an input in other processes or products.

This report presents the results of the Social System Analysis conducted as part of the CASPER – Cement cArbon Storage Pilot for Emission Reduction – project. CASPER is funded under the INNO-CCUS partnership, one of four state-initiated mission-driven green research and innovation partnerships supported by Innovation Fund Denmark. The project tested the capture and liquefaction of CO_2 from Aalborg Portland's flue gas, evaluated CO_2 quality and its implications for transport and storage, and generated knowledge on technical, infrastructure, and societal considerations relevant to future CCS deployment in the cement industry.

Although CASPER focused largely on the technical demonstration and evaluation of CCS technologies and infrastructure, the implementation of CCS is also shaped by societal factors. Onshore capture sites, transport routes and potential storage locations are situated in or near local communities, where citizens may have questions about safety, environmental impacts, local benefits, property values, industrial responsibility and democratic involvement. Understanding these perspectives is therefore essential to assessing the broader feasibility and legitimacy of CCS deployment.

The Social System Analysis in CASPER focuses on public awareness and acceptance of CCS among citizens living near key elements of the emerging CCS value chain. The study examines three local contexts in Denmark: the area around Aalborg Portland, where CO_2 capture has been tested, and the Gassum and Thorning areas, where the potential for onshore CO_2 storage has been explored since 2024 (Gassum) and 2025 (Thorning).[3] The three areas represent different positions in the CCS value chain and possibly different public concerns. The findings of this study offer valuable, evidence-based insights for public authorities, companies, and other key stakeholders seeking to foster constructive public dialogue, design effective engagement strategies, and communicate transparently about CCS deployment.

Carbon Capture Lab, DTI. © Danish Technological Institute.

Methodology and reading guide

The report draws on three empirical components. First, a phone survey, conducted among 1,005 citizens across the three areas, provides a quantitative overview of public awareness, perceptions, and acceptance. Second, six focus groups – two in each of the three case areas – provide qualitative insights into how citizens understand and assess CCS, and under which conditions they might consider CCS activities acceptable. Third, interviews with Henrik Sulsbrück,[4] Head of Division CCS at the Danish Energy Agency (DEA), and Regitze Reeh, Head of Corporate Affairs at the private exploration licence holder Harbour Energy offer key stakeholder perspectives on public engagement work in relation to CCS. All data collection was conducted in Danish.

Citizens' views on CCS are shaped by a range of factors, including their knowledge and attitudes regarding the technology's necessity, safety, and fairness. By examining these issues, the report contributes to a more nuanced understanding of the social conditions under which CCS is being implemented in Denmark.

Chapter 2 of the report contains the phone survey analysis. It examines citizens' awareness of CCS, their perceptions of benefits and risks, their level of trust and perceived safety, and their overall acceptance of CCS across the three local areas. Chapter 3 presents the focus group analysis, exploring how citizens reason about CCS in greater depth. Chapter 4 contains the perspectives of two key stakeholders and their views on how to work with public outreach to address the concerns and information needs expressed by citizens. Finally, the report ends with a conclusion highlighting key results from the study and reflecting on lessons for future CCS deployment, communication and public engagement in Denmark.

2. Survey findings on public awareness and acceptance

To gain broader insight into local citizens' awareness and perception of CCS, Danish Technological Institute designed a targeted phone survey. It was financed by CASPER consortium partner Aalborg Portland[5] and conducted by the market research and analytics institute Voxmeter from 9 to 21 December 2025. The survey contained nine closed questions along with additional questions for recruitment of subsequent focus groups.

Once data collection was complete, Voxmeter compared the survey sample to official population data from Statistics Denmark, looking at gender, age and the three examined geographical areas. Because some groups were over- or under-represented in the sample (see Section 2.1), individual responses were then given different weights – essentially adjusting their influence on the results – so that the final data more accurately reflected the real population in each area. The final weights were subsequently checked by Voxmeter to ensure that no single response ended up counting too much or too little in the overall results.

Except for background information on the survey respondents, all reported results have been calculated based on the weighted data. Survey results can also be explored interactively via an online dashboard available at: www.tinyurl.com/bdecx588.

2.1 About the respondents

The survey includes 1,005 respondents aged 18 or older, distributed almost equally across the three case areas: 336 respondents from the Aalborg area, 334 from the Gassum area and 335 from the Thorning area.

In terms of respondent age, the actual composition of respondents – before data weighting – shows that younger respondents, aged 18-34, are particularly underrepresented, while older age groups (35+) are overrepresented. This imbalance is even more pronounced among female respondents in the youngest group (18-34), meaning that their responses have been weighted by at least a factor of two across the three examined areas. Figure 1 shows the unweighted age distribution by area.[6]

The unweighted gender distribution across the three areas shows a slight underrepresentation of women, who account for 47% of respondents compared with 53% of men. This imbalance stems almost entirely from Aalborg, where 56% of respondents are male and 44% female.

Awareness of CCS

To map the baseline awareness among local populations, the survey first asked whether respondents had heard of CCS prior to the interview, and subsequently, whether they were aware of the specific local activities in their respective areas (the testing of CO_2 capture at Aalborg Portland or the exploration of potential onshore geological storage sites in Gassum and Thorning).

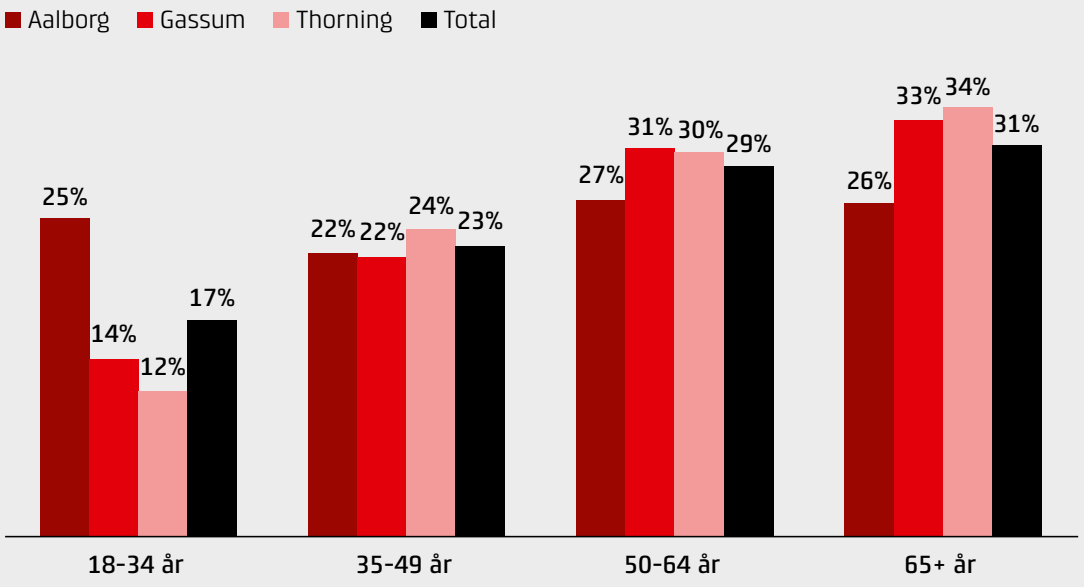
The survey results reveal that general awareness of CCS as a concept is moderate among respondents, with over half (54%) reporting having heard of CCS previously. (Note that all

respondents, regardless of prior awareness, completed the same survey.)

However, beneath this overall average lies a highly unequal distribution of knowledge across demographic groups, particularly when looking at gender and age. Men exhibit a significantly higher level of prior knowledge than women – with 63% of male respondents having heard about the technology compared with 44% of female respondents. At the same time, young citizens have the lowest level of awareness. In the youngest cohort (age 18–34), only 36% had heard of CCS, meaning that nearly two-thirds were unfamiliar with the technology. In contrast, awareness peaks among respondents aged 50–64 at 67% and remains relatively high among the group aged 65+ at 61%.

There are also significant differences across the three case areas. In the Aalborg area, respondents are significantly less likely to have heard of CCS in general, with 45% answering 'yes' and the remaining 55% answering 'no'. Awareness is notably higher in the potential storage areas: 57% of respondents in Gassum

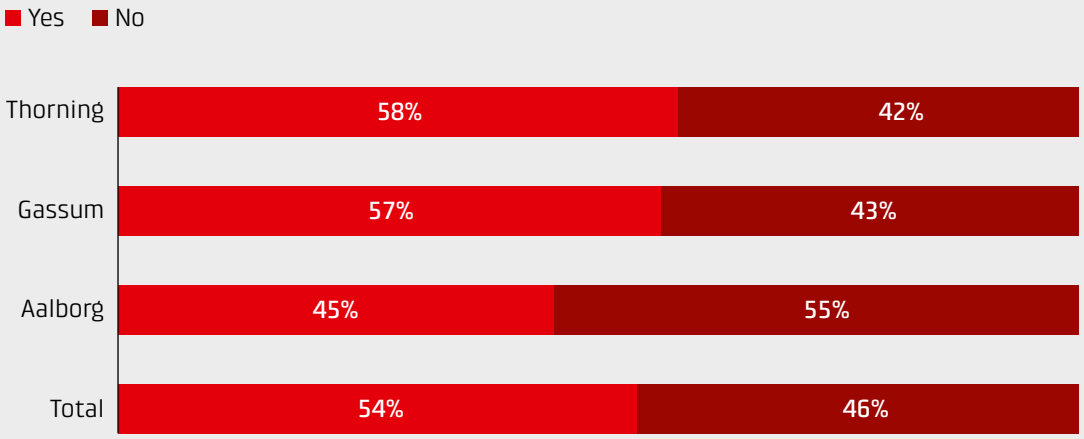
Figure 1. Unweigthed age distribution by area



Phone survey among citizens in the Aalborg (n=336), Gassum (n=334), and Thorning (n=335) areas.

Figure 2. CCS awareness

Question: Have you heard of carbon capture and storage (CCS) before today?



Source: Phone survey among citizens in the Aalborg (n=336), Gassum (n=334) and Thorning (n=335) areas. The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

and 58% in Thorning had prior knowledge of CCS (see Figure 2).

his difference suggests that the public discourse surrounding potential onshore geological storage in Gassum and Thorning may have generated more local attention and general awareness than the technological trials in Aalborg.

Awareness of local initiatives

Awareness of local initiatives linked to the CCS value chain – either the carbon capture activities at Aalborg Portland (for Aalborg respondents) or the onshore storage explorations (for Gassum and Thorning respondents) – is arguably low. Overall, 36% reported having knowledge of local CCS activities.

The demographic patterns in awareness of these activities mirror those observed for general knowledge of CCS:

- Men are more aware of local CCS activities (41%) than women (31%).
- Among the 18–34-year-olds, 23% had heard of local CCS activities, compared with 45% in the age groups 50–64 and 65 or over, respectively.
- While local awareness is slightly higher in the potential storage areas (Thorning, 39%; Gassum, 36%) than in the capture area of Aalborg (33%), these variations are less pronounced than those seen in relation to general CCS awareness.

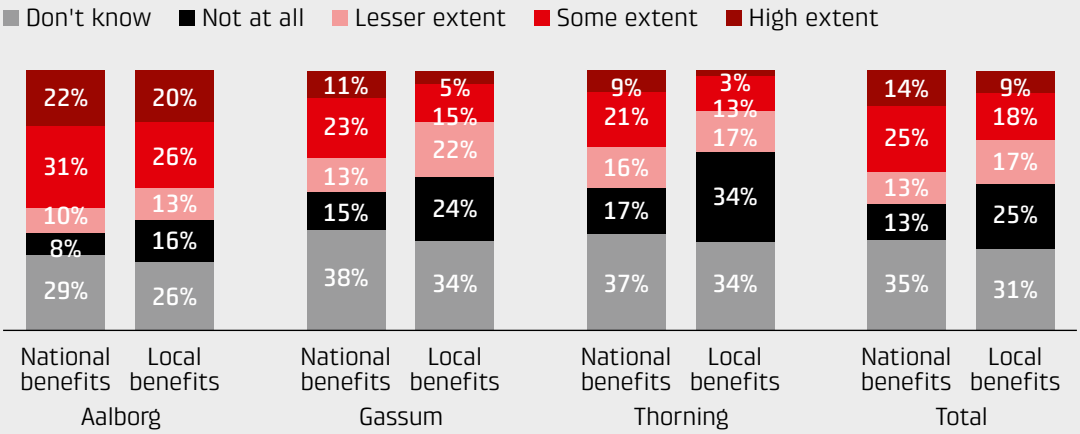
2.2 National benefits are clearer than local benefits

Respondents were also asked to what extent they believe that local CCS activities will benefit Denmark and their local communities, respectively. Across the three examined areas, respondents generally see greater potential benefits for Denmark than for their local area (see Figure 3).

When asked whether CO_2 capture at Aalborg Portland or CO_2 storage near Gassum or Thorn-

Figure 3. National and local benefits of CCS

Question: To what extent do you believe CO_2 capture at Aalborg Portland / CO_2 storage near Gassum or Thorning will benefit Danmark and your local area?



Source: Phone survey among citizens in the Aalborg (n=336), Gassum (n=334) and Thorning (n=335) areas. The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

ing would benefit Denmark, the most positive responses came from the Aalborg area. Here, 53% of respondents said that the activity would benefit Denmark either to some or a high extent. In comparison, this was the case for 34% of respondents in Gassum and 30% in Thorning.

The share of respondents who believe that the activity will not benefit Denmark at all is also lowest in Aalborg at 8%, compared with 15% in Gassum and 17% in Thorning.

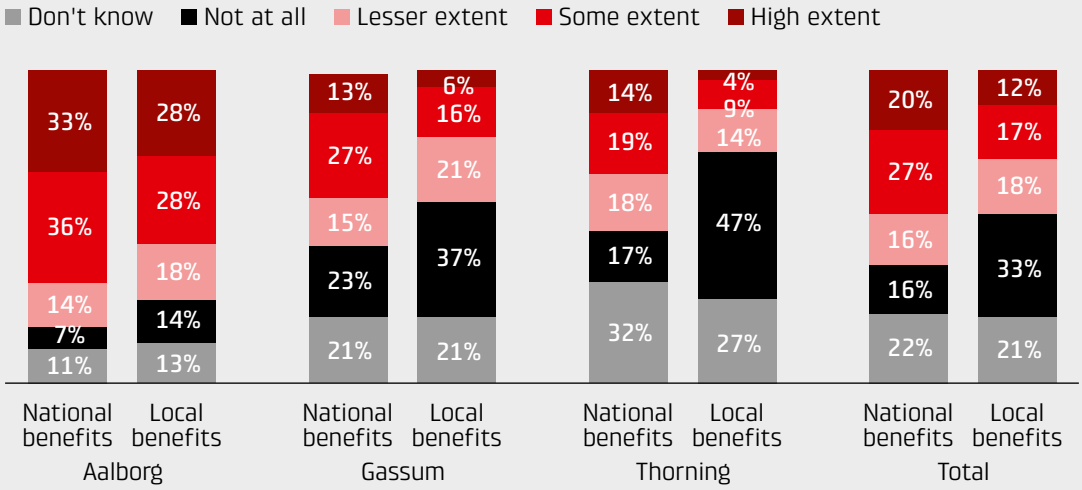
At the same time, uncertainty is high. In Aalborg, 29% answered 'don't know' or declined to answer when asked whether the activity would benefit Denmark. This share is even higher in the two potential storage areas (Gassum, 38%; Thorning, 37%). However, these results are not surprising, given the moderate level of general awareness of CCS.

The pattern described above becomes more pronounced when respondents are asked about benefits to their own local area. In all three areas, perceived local benefit is lower than perceived national benefit. Again, Aalborg stands out as the most positive case with 46% believing that CO_2 capture at Aalborg Portland will benefit the local area to some or a high extent. By contrast, the corresponding shares are 20% in Gassum and 16% in Thorning. One possible explanation could be that the benefits of CO_2 capture may be easier to connect with the local community than those of CO_2 storage. In Aalborg, respondents may associate capture at Aalborg Portland with a local contribution to climate mitigation – as the company is the largest single emitter in the region as well as in Denmark – and with support for more sustainable cement production. CO_2 storage near Gassum and Thorning may be harder to perceive as locally beneficial. Instead, it may evoke more negative associations, such as concerns about environmental and health risks (as focus group results show – see Section 3.5).

In line with this argument, the share of respondents who see no local benefit at all is

Figure 4. National and local benefits of CCS - only respondents with prior awareness

Question: To what extent do you believe CO_2 capture at Aalborg Portland / CO_2 storage near Gassum or Thorning will benefit Danmark and your local area? – Only respondents with prior CCS awareness



Source: Phone survey among citizens in the Aalborg (n=123), Gassum (n=126) and Thorning (n=139) areas. The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

high in the potential storage areas (Gassum, 24%; Thorning, 34% – compared with 16% in Aalborg). Thorning stands out as the area where expectations of local benefit are the weakest, with only 3% believing that local CO_2 storage would benefit the local area to a high extent.

Considering only respondents who had heard about the local CCS activities before the survey, the same overall pattern emerges. Within this group, perceived benefits remain substantially higher in Aalborg than in the two potential storage areas, as shown in Figure 4. In Aalborg, 69% believe that CO_2 capture will benefit Denmark to some or a high extent, while 56% believe that it will benefit the local area. In Gassum, the corresponding shares are 40% for Denmark and 22% for the local area. In Thorning, they are 33% and just 13%, respectively.

The share of respondents with prior CCS awareness who see no local benefits at all is also considerably higher in the storage areas (Gassum, 37%; Thorning, 47% - compared with 14% in Aalborg). In total, 47% of respondents who had previously heard about CCS see some or high benefits for Denmark, while 29% see some or high benefits for their local area (see Figure 4). This indicates that limited awareness of CCS in general does not, on its own, explain scepticism or uncertainty about local CCS activities.

The discussed survey results clearly show a local-national benefit gap. The gap is present in all three areas but is most pronounced in the potential storage areas. Here, citizens are more likely to view CCS as potentially beneficial to Denmark than to the communities expected to host storage infrastructure.

2.3 Expected advantages centre on climate, environment and innovation

As part of the phone survey, respondents – except those who expect no benefits of local CCS activities at all[7] – were asked to specify what local advantages they relate to CO_2 capture at Aalborg Portland or CO_2 storage near Gassum or Thorning. Answers were then thematically classified by the interviewer based on a pre-defined list of categories.

Overall, the expected local advantages are mainly related to climate, environment and innovation. The most frequently cited advantages are that CCS may contribute to CO_2 reduction and progress towards climate goals (45%), cleaner air or less pollution (45%), and potentially strengthen research and innovation (45%). In addition, 40% mention increased industrial competitiveness, for instance through more sustainable cement production, and 39% point to the protection of nature and ecosystems.

More locally oriented or economic advantages are mentioned less frequently. Around one third of respondents expect benefits related to district heating and the energy system (33%), local employment (33%), attraction of investments or companies (32%) and municipal revenues (31%). Advantages linked to improvements of local infrastructure are mentioned less often, by 23% of respondents. Meanwhile, 9% say that they expect no advantages, and 21% say that they 'don't know'.

These results show that the perceived benefits of CCS are primarily found in broader climate, environmental and technological terms. While local economic benefits are recognised by around one in three respondents, they are not perceived as the most prominent.

There are, however, clear differences between the three case areas. Respondents in Aalborg are more likely than respondents in Gassum and Thorning to expect advantages from CCS. This is particularly visible for environmental and climate-related benefits. In Aalborg,

58% expect cleaner air or less pollution, and 54% expect CO_2 reduction or contributions to climate goals. The corresponding figures are lower in Gassum, at 41% and 47%, and lowest in Thorning, at 33% and 32%.

Furthermore, 48% in the Aalborg area expect CCS to strengthen research and innovation, and 45% associate it with increased industrial competitiveness. Particularly in Thorning, these shares are lower (38% and 31%, respectively). Thorning also has the highest share of respondents who answer 'don't know' when asked about expected advantages (29%, compared with 19% in Gassum and 17% in Aalborg). This is in line with findings in the previous section on perceived local benefits (see figures 3 and 4).

Table 1 below provides an overview of the expected local advantages across the examined areas.

There are also gender differences. Men are generally more likely than women to identify advantages related to innovation, climate mitigation and economic development. For example, 51% of men mention strengthened research and innovation, compared with 39% of women. Similarly, 49% of men cite CO_2 reduction and contribution to climate goals, compared with 42% of women, while 45% identify increased industrial competitiveness as a benefit, compared with 36% of women. Women are somewhat more likely to answer 'don't know' when asked about expected advantages (24%, compared with 18% of men).

Table 1. Expected advantages from implementing CCS

Question: What advantages do you expect for your local area from CO_2 capture at Aalborg Portland / CO_2 storage near Gassum or Thorning?

Advantages*	Aalborg	Gassum	Thorning	Total
Cleaner air/less pollution	58%	41%	33%	45%
CO_2 reduction/contribution to climate goals	54%	47%	32%	45%
Strengthening of research and innovation	48%	47%	38%	45%
Increased industry competitiveness (greener cement production)	45%	42%	31%	40%
Nature and ecosystem protection	45%	39%	31%	39%
District heating/energy benefits (e.g. using surplus heat for district heating)	36%	35%	26%	33%
Strengthening local employment	36%	32%	28%	33%
Attracting investments/companies	38%	30%	28%	32%
Municipal revenues (taxes, etc.)	32%	34%	25%	31%
Local infrastructure improvements (e.g. access roads)	20%	27%	21%	23%
No expected advantages	8%	9%	11%	9%
Don't know	17%	19%	29%	21%

*Respondents answered freely, with the interviewer matching answers to pre-defined categories.
Source: Phone survey among citizens in the Aalborg (n=287), Gassum (n=249) and Thorning (n=218) areas. The question was not given to the 251 respondents who answered 'not at all' to the question: "To what extent do you believe CO_2 capture at Aalborg Portland/ CO_2 storage near Gassum or Thorning will benefit your local area?" The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

Age differences are less uniform, but still relevant. Respondents aged 50–64 are generally the most likely to identify specific benefits. In this age group, 53% mention CO_2 reduction and contribution to climate goals as benefits, while 54% mention strengthened research and innovation. By contrast, the youngest respondents are more uncertain about the benefits. Among those aged 18–34, 27% answer 'don't know', compared with just 14% of respondents aged 50–64. This pattern is consistent with the earlier finding that younger respondents generally have lower awareness of CCS.

In general, respondents who had heard of CCS before participating in the survey were less likely to answer 'don't know' and more likely to identify concrete advantages. Among those who had heard of CCS, only 13% answered 'don't know', compared with 29% among those who had not previously heard of the technology. Prior awareness is especially associated with stronger expectations of innovation, climate and industrial benefits. For example, 50% of respondents with prior awareness of CCS mention strengthened research and innovation, compared with 40% among those without prior awareness. Similarly, 49% of those who had heard of CCS mentioned CO_2 reduction and contribution to climate goals, compared with 41% among those who had not. Expectations of industrial competitiveness are also higher among respondents with prior CCS awareness (45% compared with 35%).

Perceived advantages are also closely linked to respondents' broader assessment of whether CCS will benefit Denmark or their local area. Among respondents who believe that CCS will benefit Denmark to some or a high extent, 54% mention cleaner air or less pollution, 53% identify CO_2 reduction and contribution to climate goals, and 50% mention strengthened research and innovation. Among those who believe that CCS will benefit their local area to some or a high extent, 69% identify cleaner air or less pollution, 61% mention CO_2 reduction and contribution to climate goals, and 57% mention the protection of nature and ecosystems.

The question about expected advantages was only given to respondents, who, at least to a 'lesser extent', expected that local CCS activities would benefit their local area. Therefore, the results exclusively show the perceived advantages among respondents who did not outright reject the possibility of local benefit.[8] Within this group, citizens can identify a range of potential advantages of CCS, especially when linked to climate goals, environmental improvements, research and industrial development. At the same time, the advantages are not equally visible across the three areas. They are clearest in Aalborg and weakest in Thorning. This reinforces the importance of distinguishing between capture and storage in public communication.

2.4 Perceived safety is mixed and strongly linked to awareness

When asked how safe the use of CCS is considered to be, respondents gave mixed responses. More respondents feel safe than unsafe, but the uncertainty remains high. Overall, 43% feel either completely or mostly safe about the use of CCS, while 28% feel either mostly or completely unsafe. At the same time, 29% answer 'don't know'. This suggests that CCS is not predominantly perceived as unsafe. A large group of respondents, however, are unsure or have not yet formed a clear opinion.

There are clear differences between the three case areas. Respondents in Aalborg are the most likely to perceive CCS as safe, with 51% feeling completely or mostly safe, compared with 40% in Gassum and 37% in Thorning. Conversely, the share who feel mostly or completely unsafe is lowest in Aalborg (19% compared with 33% in Gassum and 34% in Thorning).

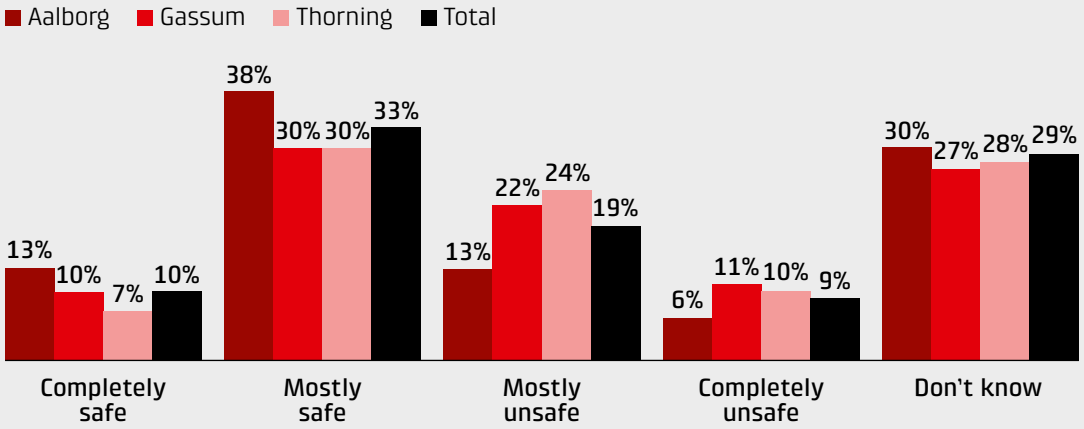
This pattern is consistent with previous findings showing more positive assessments in the Aalborg area than in the potential storage areas. However, the share answering 'don't know' is almost identical across the three areas, around 27–30%, indicating that uncertainty about safety is not limited to the storage areas (see Figure 5).

Gender differences are also evident in relation to feelings of safety. Men are more likely than women to perceive CCS as safe. Among men, 52% feel completely or mostly safe, compared with 34% of women. Women are both more likely to feel unsafe and more likely to be uncertain: 33% of women feel mostly or completely unsafe, compared with 25% of men, while 31% of women answer 'don't know' compared with 24% of men.

Age differences are less straightforward. The youngest respondents are relatively likely to feel safe, with 46% aged 18–34 reporting they feel completely or mostly safe. At the same time, this group has the highest share of 'don't know' responses (33%). Respondents aged 50–64 are less unsure, with 24% answering 'don't know', but they are also somewhat more likely to express insecurity. This shows that

Figure 5. Safety of CCS

Question: How safe do you think the use of carbon capture and storage is?



Source: Phone survey among citizens in the Aalborg (n=336), Gassum (n=334) and Thorning (n=335) areas. The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

younger respondents may be more open or less concerned, but also less informed, while older respondents are more definite in their assessments, in both a positive and negative direction.

Prior awareness plays a particularly important role. Among respondents who had heard of CCS before the survey, 50% feel completely or mostly safe, compared with 35% among those without prior CCS awareness. The difference is especially clear in the share of 'don't know' responses. Only 19% of respondents with prior CCS awareness answer 'don't know', compared with 39% among respondents who had not previously heard of the technology.

A similar pattern appears among respondents who had heard about the local CCS activities. Among those aware of the local test or exploration activities, 52% feel completely or mostly safe, compared with 38% among those who had no knowledge about them. However, awareness does not only lead to more positive views. Respondents who had heard about local activities were also somewhat more likely to express insecurity than those who had not (32% responding 'mostly unsafe'/'completely unsafe' vs 26%). This indicates that awareness, while reducing uncertainty, may lead to more formed opinions, both positive and critical.

Perceived safety is also closely linked to broader assessments of CCS benefits. Among respondents who believe that CCS will benefit Denmark to some or a high extent, 65% feel completely or mostly safe, while only 19% feel mostly or completely unsafe. Among respondents with a more neutral or negative assessment of national benefits, only 34% feel completely or mostly safe, while 46% feel mostly or completely unsafe and another 18% answer 'don't know'.

The relationship is even stronger when looking at perceived local benefits. Among respondents who believe that CCS will benefit their local area to some or a high extent, 72% feel completely or mostly safe, and only 13% feel mostly or completely unsafe. Among respondents with a more neutral or negative view of local benefits, only 36% feel mostly or completely safe, while 42% feel mostly or completely unsafe and 19% replied 'don't know'.

2.5 Expected disadvantages concern local impacts and governance

As part of the phone survey, respondents were also asked about any expected disadvantages from local CCS activities. As with the question on expected advantages, all responses were matched with predefined categories by the interviewer. Please note that the question was not given to the 102 respondents who considered CO_2 capture 'completely safe' as per the previous question.

Across the full sample of respondents asked this question, the most frequently mentioned concern is CO_2 leakage, mentioned by around four in ten respondents. Other common concerns include a lack of transparency or citizen involvement (36%), increased traffic, congestion or construction nuisances (36%), negative impacts on property values (35%), and adverse effects on nature, groundwater or agricultural land (34%). Concerns about costs for taxpayers or municipalities and distrust of responsible companies or authorities are also relatively widespread (32% and 30%, respectively).

This shows that perceived disadvantages of CCS are multidimensional. Citizens are concerned not only about technical safety, but also about how projects are governed, who is accountable, how local communities are involved, and whether local areas may experience economic or environmental consequences.

There are clear differences between the three case areas. In Aalborg, expected disadvantages are generally mentioned less frequently than in the two potential storage areas. The most frequently mentioned disadvantages in Aalborg are CO_2 leaks (36%) and lack of transparency or citizen involvement (33%), followed by taxpayer or municipal costs (30%) and increased traffic or construction nuisances (28%). Concerns about property values are considerably lower in Aalborg (21%) than in Gassum and Thorning (see Table 2). It is also interesting to note that a greater share of respondents from Gassum and Thorning mention unfair distribution of benefits and risks as a disadvantage (28% and 27%, respectively) than in Aalborg (17%). This possible imbalance between CO_2 capture and storage areas is further discussed in focus group analysis (see Section 3.6 in particular).

In Gassum, the most prominent concerns relate more directly to local and economic impacts. Nearly half of respondents in the area identified potential negative effects on property values (46%), while 41% cited increased traffic, congestion or construction-related disturbance. The risk of CO_2 leaks (41%) and a lack of transparency or citizen involvement (40%) were also frequently mentioned. Gassum also has the highest share of respondents mentioning distrust of responsible companies or authorities (36%). This distrust is likely fuelled by the recent Nordic Waste scandal in Ølst, a town south of Randers approximately 25 km from Gassum. Here, a private company avoided environmental and financial liability for a major landslide involving contaminated soil by declaring bankruptcy. Randers Municipality was criticised for failing to publish mandatory inspection reports, leaving residents feeling both environmentally at risk and inadequately informed by local authorities.[9]

In Thorning, environmental and safety-related concerns are particularly prominent. The most frequently mentioned disadvantage is the potential adverse impacts on nature, groundwater or agricultural land (42%), followed closely by CO_2 leaks (41%). Concerns about property values (39%) and traffic and construction nuisances (38%) are also common, as shown in Table 2.

Gender differences are also visible in relation to expected disadvantages. Women are somewhat more likely than men to mention environmental and safety-related concerns. For example, 38% of women report negative impacts on nature, groundwater or agricultural land, compared with 29% of men. Health risks are also mentioned more often by women (30%) than by men (21%), as are explosions and other emergencies (19% compared with 12%). Men, on the other hand, are somewhat more likely to mention resource diversion from better climate solutions (26% vs 18%) and unfair distribution of benefits and risks (27% vs 21%). Finally, women are more likely to answer 'don't know' when asked about expected disadvantages (26% compared with 16% of men).

Respondents in the middle age groups, particularly those aged 35–49 and 50–64, seem more likely to identify concrete disadvantages. Among respondents aged 35–49, concerns about traffic and construction nuisances (45%), nature and groundwater (44%), CO_2 leaks (43%), lack of transparency or citizen involvement (42%) and property values (42%) are all relatively prominent. The age group 50-64, in a similar manner emphasise concerns about traffic and construction nuisances (44%), CO_2 leaks (41%), and lack of transparency or citizen involvement (40%) as the three main disadvantages. While the youngest respondents aged 18-34 are equally worried about CO_2 leaks (41%), they mention other disadvantages less frequently than their older cohorts – except for explosions and other emergency situations (17%). As was the case for expected advantages (see Section 2.3), they are also more uncertain about the disadvantages. 28% of

Table 2. Expected disadvantages from implementing CCS

Question: What disadvantages do you expect for your local area from CO_2 capture at Aalborg Portland / CO_2 storage near Gassum or Thorning?

Disadvantages*	Aalborg	Gassum	Thorning	Total
CO2 leaks	36%	41%	41%	39%
Lack of transparency or citizen engagement	33%	40%	35%	36%
Increased traffic, congestion, disruption caused by construction work	28%	41%	38%	36%
Negative impact on property values	21%	46%	39%	35%
Adverse effects on the natural environment, groundwater or agricultural land	25%	34%	42%	34%
Costs to taxpayers/the municipality	30%	35%	31%	32%
Lack of trust in responsible companies or authorities	23%	36%	32%	30%
Increased air pollution, dust, noise or odours	23%	30%	25%	26%
Health risks to residents or workers	22%	26%	28%	25%
Unfair distribution of benefits and risks	17%	28%	27%	24%
Diverting resources away from better climate solutions (e.g. renewable energy)	22%	25%	20%	22%
Explosions and other emergencies	14%	18%	13%	15%
No expected disadvantages	12%	8%	9%	10%
Don't know	26%	17%	21%	21%

* Respondents answered freely, with the interviewer matching answers to predefined categories.
Source: Phone survey among citizens in the Aalborg (n=292), Gassum (n=301) and Thorning (n=310) areas. The question was not given to the 102 respondents who answered 'completely safe' to the question: "How safe do you think the use of carbon capture and storage is?" The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

respondents aged 18–34 answer 'don't know', compared with 18% of those aged 35-49 and 14% of respondents aged 50–64.

Prior awareness of CCS is again associated with more clearly defined opinions. Respondents who had heard of CCS previously are less likely to answer 'don't know' when asked about expected disadvantages. Among those with prior awareness, 10% reply 'don't know', compared with 27% among those who had not previously heard of CCS. At the same time, prior awareness does not simply reduce concern. Respondents with prior awareness are more likely to mention several disadvantages, including increased traffic or construction nuisances (43% vs 32%), negative impact on property values (40% vs 33%) and adverse effects on nature, groundwater and agricultural land (38% vs 32%). This is consistent with other findings showing that awareness tends to reduce uncertainty and lead to more clearly articulated criticism.

Given the results presented in this section, public communication and engagement should not focus solely on explaining the technical safety of CCS. It should also address governance, local impacts, responsibility, monitoring, compensation and the perceived fairness of placing CCS infrastructure in specific local communities.

2.6 Overall attitudes are characterised by ambivalence and local variation

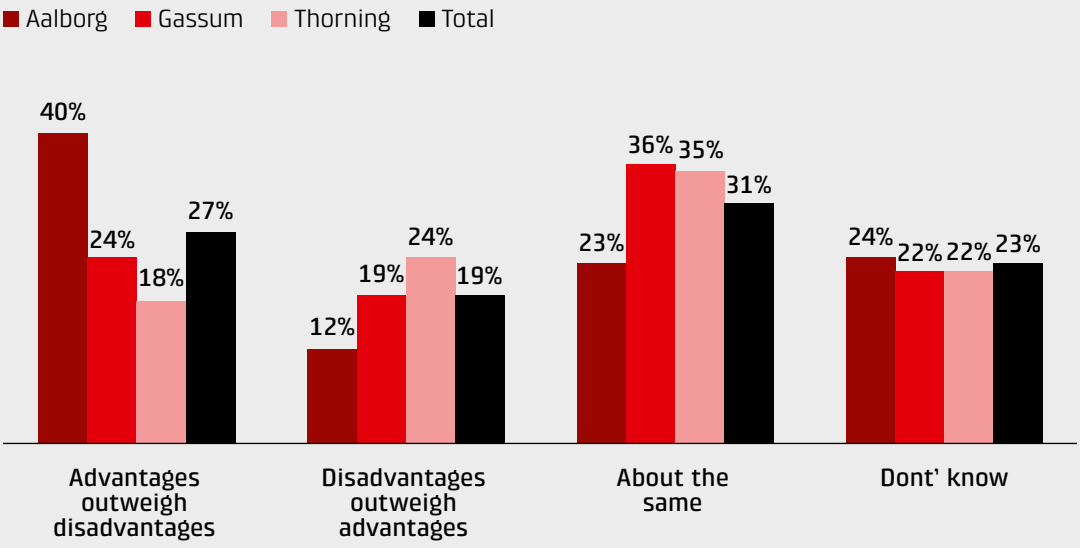
To capture respondents' overall assessment of the local CCS activities, the survey asked whether they believe that the benefits outweigh the disadvantages, that the two are roughly the same, or that the disadvantages outweigh the benefits. Overall, the results point to a mixed, though not predominantly negative picture. Across all three case areas, 27% of respondents believe that the benefits outweigh the disadvantages, while 19% believe that the disadvantages outweigh the benefits. The largest group (31%), however, see benefits and disadvantages as roughly balanced, while 23% answer 'don't know'. This shows that many respondents appear to hold a more ambivalent position, in which CCS is neither clearly endorsed nor clearly rejected.

In terms of geographical differences, Aalborg stands out as the most positive case. Here, 40% of respondents believe that the benefits outweigh the disadvantages, while only 12% believe the opposite and 23% see the two as balanced. In Gassum, the picture is more balanced: 24% believe that the benefits outweigh the disadvantages, 36% see them as roughly equal, and 19% believe that the disadvantages outweigh the benefits. Thorning is the most sceptical area. Here, only 18% believe that the benefits outweigh the disadvantages, while 24% believe that the disadvantages outweigh the benefits; 35% believe that they are evenly balanced (see Figure 6). These results underline once again that carbon capture is viewed more positively than potential onshore storage in a local area.

Some significant differences also appear across other respondent segments. Men are more

Figure 6. Overall view on CCS

Question: What is your overall view on CO_2 capture at Aalborg Portland? / CO_2 storage near Gassum or Thorning?



Source: Phone survey among citizens in the Aalborg (n=336), Gassum (n=334) and Thorning (n=335) areas. The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

likely than women to state that the advantages outweigh the disadvantages (31% vs 24%), and women are more likely to answer 'don't know' (29% vs 17%). Again, respondents with prior awareness of CCS and local CCS activities are more likely to hold clearly defined views. Hence, respondents who had heard of CCS in general or the local CCS activities were less likely to answer 'don't know' and more likely to place themselves at either the positive or the negative end of the spectrum. This again suggests that awareness tends to reduce uncertainty and promote clearer attitudes.

The relationship between overall attitudes and perceived benefits is strong. Exactly half of the respondents, who believe that CCS will benefit Denmark to some or a high extent, state that the benefits outweigh the disadvantages, while only 8% believe the disadvantages outweigh the benefits. A similar pattern appears regarding perceived local benefits: among respondents who believe that CCS will benefit their local area to some or a high extent, 54% state that the benefits outweigh the disadvantages, while only 5% take the opposite view.

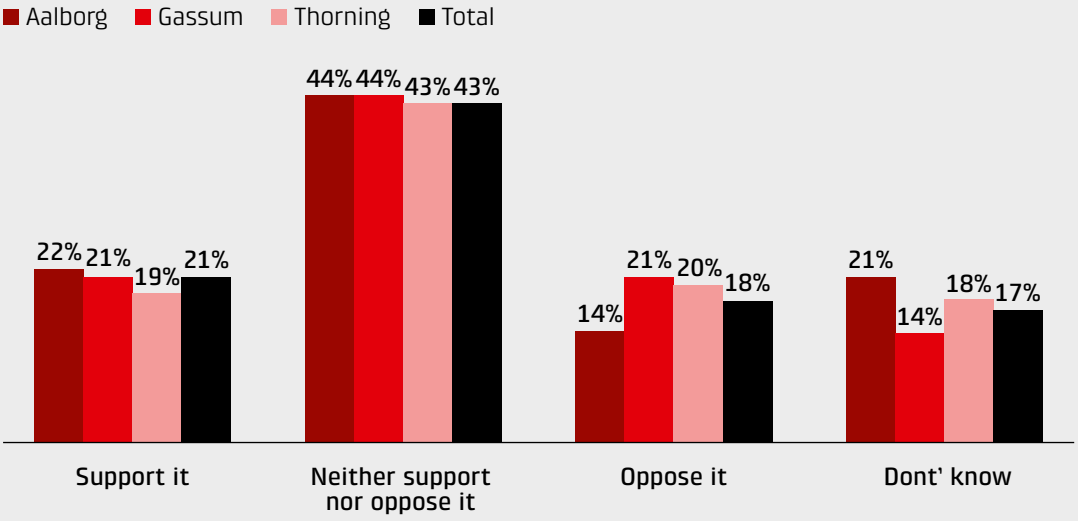
2.7 Respondents are cautious regarding nearby onshore CO_2 storage

The final survey question on CCS confronted respondents with a scenario and asked what they would do if an onshore CO_2 storage site was brought into use within 10–20 kilometres of their home.

Overall, the most common response is neither support nor opposition. Across all three areas, 43% of respondents state that they would neither support nor oppose a nearby onshore CO_2

Figure 7. Reactions to nearby CO_2 storage site

Question: What would you do if an onshore CO_2 storage site were to be commissioned within 10–20 km of your home?



Source: Phone survey among citizens in the Aalborg (n=336), Gassum (n=334) and Thorning (n=335) areas. The dataset was weighted by gender, age and geographical area, based on figures from Statistics Denmark.

storage site. In comparison, 21% would support it and 18% would oppose it, while 17% answer 'don't know'. These results suggest that public attitudes towards a nearby onshore storage site are largely neutral and, for many respondents, not yet firmly established.

Interestingly, there are no significant geographic differences in terms of support for a local CO_2 storage site. Support levels are broadly similar across the three areas, with 22% of respondents in Aalborg expressing support, compared to 21% in Gassum and 19% in Thorning. However, opposition is less likely in Aalborg, where 14% state that they would oppose the activity, compared with 21% and 20% in Gassum and Thorning, respectively. Between 43% and 44% of respondents in each of the three areas would neither support nor oppose a CO_2 storage site in relative proximity to home. Thus, a neutral position is more common than outright support or opposition (see Figure 7).

Some gender differences are visible. Men are more likely than women to support a nearby onshore storage site, with 24% of men expressing support compared with 17% of women. Women are less likely to choose the neutral option (40% vs 47% of male respondents) and more likely to oppose a relevant storage site (21% vs 16%). This contrasts with earlier examined patterns showing that women were more likely to take a cautious or uncertain position.

Age differences are somewhat less clear-cut, but older respondents stand out as the most supportive group. Among those aged 50–64, 27% say that they would support a nearby onshore storage site, while 20% would oppose. The corresponding shares are 24% and 16% for the age group 65 and older. In contrast, younger respondents aged 18-34 and 35-49 were less likely to indicate support (15% and 17%, respectively), while opposition is greatest among the latter age group. Almost one in four respondents aged 35-49 (24%) would oppose a nearby CO_2 storage site.

Prior awareness is associated with more positive and more definite views. Among

respondents who had previously heard of CCS, 27% say they would support a nearby storage site, compared with 13% among those who had not heard of CCS before the survey. Similarly, among respondents who had heard about the local test or exploration activities, 28% would support a nearby storage site, compared with 17% among those who had not. In both cases, awareness is associated not only with lower uncertainty, but also with greater willingness to support storage in principle.

As in the previous sections, perceived benefits are strongly linked to overall acceptance. Among respondents who believe that CCS will benefit Denmark to some or a high extent, 39% say they would support a nearby storage site, while only 8% would oppose it. The relationship is similar when local benefits are considered. Among respondents who believe that CCS will benefit their local area to some or a high extent, 41% say they would support a nearby storage site, while 8% would oppose it.

2.8 Interim conclusion

Overall, the phone survey shows that public awareness of CCS is moderate, unevenly distributed and shaped by local context. While a slight majority of respondents (54%) had heard of CCS before the survey, general CCS awareness varied considerably across gender, age groups, and geographical areas. Awareness of specific local CCS activities was more limited, with only 36% of respondents reporting prior knowledge of the carbon capture tests (Aalborg) or exploration of possible geological CO_2 storage (Gassum & Thorning) in their area.

Across the three case areas, respondents are generally more likely to perceive CCS as beneficial for Denmark than for their own local area. At the same time, the results point to clear geographical variation. Aalborg stands out as the most positive case, whereas attitudes in Gassum and, particularly, Thorning are more cautious and critical, especially in relation to local benefits, safety and potential disadvantages.

The survey further shows that citizens' views on CCS cannot be reduced to simple support or opposition. Rather, attitudes are characterised by ambivalence, uncertainty and conditional acceptance. While many respondents associate CCS with climate mitigation, environmental improvement and industrial development, concerns relate not only to technical risks, but also to transparency, local impacts, trust and citizen involvement. These findings highlight the importance of looking beyond survey distributions to better understand how citizens reason about CCS, what shapes their assessments, and under what conditions acceptance may develop. The following chapter addresses these questions through a focus group analysis.

3. Focus group results – citizens' perspectives on CCS

To gain a deeper understanding of how citizens reason about CCS, what considerations underlie their views, and under which conditions they might accept CCS in their local area, six focus groups were conducted; two in each of the three case areas.

3.1 About the focus groups

As focus group locations, the research team selected Aalborg (more specifically Aalborg East, which is close to the capture site at Aalborg Portland), Randers (representing the Gassum area) and Ikast (representing the Thorning area). The latter two cities were chosen to ensure easy attendance for participants travelling from across the wider local area, as they offer better transport links and infrastructure than more peripheral or rural locations.

The focus groups were held at the end of May and beginning of June 2026. This timing meant that participants from the Gassum area may have received information on or witnessed the seismic survey conducted by the project Greenstore[10] between January and March 2026. This involved the use of vibration trucks in the Gassum area to collect data on the different layers of subsoil there.[11] In other words, a visible CCS activity in the local area.

Each focus group session lasted approximately 1 hour and 45 minutes. The focus groups were held in meeting facilities at hotels in Ikast and Randers, and at a larger restaurant/social enterprise venue in Aalborg. In total, 31 citizens participated in the six focus groups, hereafter referred to as FG-A1 and FG-A2 (Aalborg), FG-I1 and FG-I2 (Ikast), and FG-R1 and FG-R2 (Randers).

Recruitment

Recruitment was originally planned to take place exclusively through the phone survey, in which respondents were asked whether they would be willing to be contacted by e-mail regarding participation in a focus group. Although 377 respondents agreed to be contacted (129 from Aalborg, 122 from Gassum, and 126 from Thorning), the response rate to subsequent mail invitations was low. This may be partly related to the time gap between the phone survey, conducted in late December 2025, and the invitation to participate in focus groups, sent in early May 2026. In total, 18 participants who ended up attending a focus group were recruited through this channel.

To secure enough participants across all three areas, the research team used a range of approaches, including displaying posters in public places, drawing on colleagues' social networks and handing out flyers in Ikast's main shopping street. While only four participants were recruited in this manner, another recruitment channel proved more effective. The research team joined local Facebook groups and posted invitations offering participants gift cards to local shopping associations as compensation.[12] This approach resulted in 9 additional participants.

Participants

The focus groups brought together participants of varied ages, genders, and occupational back-

Table 3. Overview of focus group participants

Location and group	Gender (no. of participants)		Age group (no. of participants)					
	Male	Female	18-25	26-35	36-45	46-55	56-65	65+
FG-A1	3	0	0	1	0	1	1	0
FG-A2	4	2	0	2	0	3	1	0
FG-I1	2	3	0	2	1	2	0	0
FG-I2	4	0	0	1	1	1	1	0
FG-R1	4	3	0	1	1	2	3	0
FG-R2	3	3	1	2	1	0	1	1

Source: Recruitment data and focus groups.

grounds, including students, apprentices and tradespeople, as well as engineers, consultants, teachers and retirees. Several participants had professional backgrounds relevant to industry, energy or environmental issues. Most participants, however, had no professional relation to CCS, energy or environmental issues prior to participating. Table 3 provides an overview of all focus group participants across the three areas.

As summarised in Table 3, some groups are notably over- or underrepresented. Men make up roughly two thirds of focus group participants (20 out of 31), meaning that male perspectives are somewhat overrepresented across the qualitative material, particularly in Aalborg and Ikast (focus group 2), which consisted exclusively or almost exclusively of men.

In terms of age, the youngest respondents (18–25) and the oldest respondents (65+) are markedly underrepresented, with only one participant in each age group across all six focus groups. Participants aged 26–35 and 46–55 are comparatively well represented, together accounting for more than half of all focus group participants.

3.2 First associations and awareness of local CCS activities

Each focus group (FG) began by asking participants what came to mind when they heard the term 'carbon capture and storage'. After this, the moderator introduced a definition of CCS. Likewise, the moderator asked participants early on whether they were familiar with local CCS activities. This approach was chosen to initially capture participants' spontaneous, unprompted associations and levels of awareness.

Considerable variation in baseline awareness

Awareness of CCS varied considerably, both between and within the six focus groups. In several groups, most participants reported at least some prior familiarity with the concept, while in others, a majority reported having never heard of it.

Awareness appeared particularly limited and polarised among the two Ikast groups, with several participants stating outright that they had no knowledge of the topic. By contrast, participants in the first focus groups in Aalborg and Randers demonstrated notably higher awareness and, in some cases, tech-

nical engagement from the outset. In FG-A1, a 33-year-old male participant contributed detailed knowledge of related Power-to-X technologies, while in FG-R1, a participant in his 40s (working professionally with environmental consultancy) noted that his awareness dated back more than a decade.

Mixed associations – with scepticism recurring across groups

When asked what came to mind upon hearing the term CCS, responses ranged from curiosity and cautious optimism to scepticism, indifference and outright distrust.

Curiosity and cautious optimism characterised several responses, for instance from a 58-year-old woman in FG-R1, who described the topic as *"fantastically exciting"* after researching it herself once she learned that CO_2 storage was being considered locally, and from a 60-year-old woman in the same group, who stated that she would consider it a good outcome if the technology succeeded.

Scepticism and cynicism were, however, strongly represented, particularly in FG-I1 and FG-A2. A 36-year-old woman in FG-I1 offered one of the most pointed statements of distrust:

> *"Yes, I've seen some videos like that on LinkedIn. I think they [...] make it seem like it's the biggest scam ever created. And so, we can just keep polluting the planet and destroying our livelihoods, because we can just capture it again and stuff it back into the ground."*

A comparable framing of CCS as a potential excuse to avoid deeper structural change, was voiced by a 64-year-old woman in FG-A2. She expressed scepticism towards large sums being spent on projects *"advertised aggressively as capable of anything"*, arguing that investments in renewable energy might achieve more. A 28-year-old woman in FG-A2 described the technology as a short-term fix masking a larger underlying problem.

A related but distinct concern – that CCS risks become a *"pillow to sleep on"* (i.e., a source of complacency) – recurred independently across multiple focus groups. A 55-year-old woman in FG-R1 expressed, for instance:

> *"I might be a bit more worried that it will become a sleeping pillow. That people won't think about other technologies for reducing CO_2 emissions. That people will say, 'Now we can store it, so we can reduce our carbon footprint that way,' instead of developing technologies that eliminate CO_2 emissions entirely."*

A nearly identical concern was raised by a 31-year-old male participant in FG-R2, who warned against using CCS to legitimise continued high emissions. This was echoed by participants in FG-A1.

Nervousness and unease rooted in uncertainty, rather than outright opposition, characterised the reaction of several participants. A 53-year-old woman in FG-I1 stated that she was not necessarily suspicious of the technology as such but was nervous about whether it had truly been thought through. By contrast, a handful of participants displayed relative equanimity or even positive associations. A 31-year-old woman in FG-I1, despite stating she had never heard of CCS before, associated the word 'storage' positively with the storage of solar or wind energy, and described her initial reaction as *"somewhat positive"*.

Awareness of local CCS activities is highest in the Aalborg focus groups

In the two Aalborg focus groups, associations with CCS were closely and immediately tied to Aalborg Portland, reflecting the plant's high local visibility. A 59-year-old male participant in FG-A1 framed CCS as necessary, describing it as

'a necessary evil' given the company's outsized emissions profile.

Aalborg Portland's dual role as a major local polluter and a significant employer and district heating provider generated ambivalent framing. A 64-year-old woman in FG-A2 pointed to the underlying political economy:

> *"There's politics involved in this, in relation to Aalborg Portland being a very large workplace. Aalborg Portland itself, of course, has an interest in continuing to be here and running their business. The municipality has an interest in this workplace being here."*

Similarly, a 33-year-old male participant in FG-A1 argued that despite a considerably smaller workforce than in the past, the plant remains critical to local infrastructure. He cautioned that closure could have significant and far-reaching consequences, not least for the cost of district heating in Aalborg.

A more critical, cost-based perspective was introduced uniquely in FG-A2 by a 50-year-old man with prior employment at Aalborg Portland. He questioned whether capturing CO_2 at the Aalborg plant was the most sensible starting point, arguing that cement could possibly be produced with a significantly lower emissions footprint in Germany or at other locations, where chalk for production is *"not being sourced from a lake"*.

Notably, media visibility of Aalborg Portland's CCS activities was reported to be relatively limited despite the plant's local proximity. One Aalborg participant – describing himself as a regular news consumer – noted that there had been little coverage beyond a single news item, and that the topic was *"not something one discusses specifically"* in his local area. This is noteworthy, given that the participants live near the pilot facility. For example, a press release published in regional and national news[13] at the beginning of May announced that Aalborg Portland had won a public tender for billions of Danish kroner in government funding from the so-called "CCS fund" to capture and store CO_2.

In both Randers (representing the Gassum area) and Ikast (representing the Thorning area), a recurring finding was that many participants were previously unaware that CO_2 storage exploration was already taking place in their immediate vicinity.

In FG-R1, once informed of the specific exploration area,[14] a 55-year-old woman confirmed having noticed the seismic survey activity around the municipality (see Section 3.1), but paired this recognition with concern about the proximity of the Gassum exploration site to major drinking water reserves.

> *"We've certainly seen that. They've been all around Randers Municipality [...].And if you look, for example, out in Hald, where they've been, and where they think it's a really good spot, where the soil conditions are favourable; well, there are also some huge drinking water reservoirs out there, which supply us with water."*

Other participants in the same group expressed relative indifference to proximity, treating the matter as abstract or low risk. A 58-year-old woman stated plainly that she was *"not afraid to walk around on it"*, while a 62-year-old man remarked that even if something were to go wrong, it would *"not be dangerous"* but simply *"a failed experiment"* and a waste of money, adding that this did not particularly worry him.

In FG-R2, the local Nordic Waste landslide disaster (see Section 2.6) was invoked early and unprompted as a frame of reference for evaluating trust (or distrust) in any future CCS project. A 40-year-old female participant noted:

"If we narrow it down specifically to, say, it [i.e., carbon storage] should be in the Randers area, then I think that if that was to happen, one would probably need to be quite thorough in explaining to people that this is not [like] Nordic Waste."

In the Ikast groups, awareness of the Thorning exploration area was similarly mixed. In FG-I1, when asked directly whether they were aware of exploration activities in their local area, a 36-year-old woman answered affirmatively, whereas a 53-year-old woman in the same group answered that she was not aware. In FG-I2, when presented with a map of the exploration area, a 41-year-old male participant reacted with a sense of geological plausibility rather than surprise, linking the site to his own knowledge of the local clayey terrain. A 57-year-old male participant in the same group raised a more pointed fairness concern regarding those living directly within an exploration zone, suggesting that risk perception is unevenly distributed depending on proximity. Those living outside of the affected area might consider it *"fine enough"*, while those residing within it might not share this view (also see Section 3.6 on distributive fairness).

3.3 Knowledge and understanding of CCS

Following an initial round of participants' spontaneous associations with CCS, the moderator provided a brief, neutral technical explanation of CCS in each focus group.[15]

Discussion was then reopened to explore what participants understood, or did not understand, about the underlying mechanics of the technology.

Technical understanding was patchy and unevenly distributed

Understanding of the basic CCS mechanism – i.e. capture at the emission source, compression into a liquid-like state under high pressure, and injection into porous rock layers sealed by an impermeable clay or shale caprock – varied considerably, both between and within focus groups. In most groups, one or two participants with directly relevant professional or educational backgrounds tended to drive the more technical parts of the discussion, while others largely followed along, asked clarifying questions, or reasoned by analogy. This included, for instance, a laboratory technician in FG-I1, an environmental consultant with a background in air pollution modelling in FG-R1, and a PhD student researching enzymes in FG-A2.

Even participants with directly relevant scientific training, however, explicitly acknowledged the limits of their own knowledge. When asked directly about the separation process at the chimney, a male participant in his 40s with a background in environmental science (FG-R1) candidly responded that he was unable to answer this question. He noted that his academic training had focused more on the geological conditions required for a site to be suitable for CO_2 storage than on the capture process itself. A woman in her 60s in the same group summarised a broader sense of conceptual difficulty:

"I still find it hard to understand how the CO_2 is sorted out from the rest. And although it's been explained to me many times now, in my mind it just doesn't make sense."

In the absence of technical training, participants across several groups drew on familiar, everyday phenomena to make sense of capture and storage – a pattern of analogical reasoning that recurred independently across locations. In FG-R1, a participant in his 60s compared the capture and filtering process to a kitchen sieve, while a test engineer in his 50s in the same group speculated more technically about the role of catalysts and pressure, summarising the process simply as *"chemistry and pressure"*.

In FG-R2, a teacher in his early 30s drew on his personal experience of keeping aquariums, where CO_2 is deliberately dosed into water to nourish aquatic plants. On this basis, he suggested that groundwater exposure to stored CO_2 is likely to pose limited risk, comparing it with plants' harmless uptake of CO_2 in rivers and streams. In the same group, a younger participant reasoned about safety by drawing an analogy to natural gas handling systems, suggesting that overpressure would likely be managed via buffer systems rather than result in catastrophic failure. In FG-I1, the participant with experience as a laboratory technician similarly reasoned that underground storage posed limited explosion risk, since no ignition source would be present a kilometre underground.

A recurring source of confusion across several groups was the conflation of CO_2 storage with superficially similar but technically distinct processes, such as fracking, natural gas storage and geothermal energy. In FG-A2, a health and safety representative in his mid-30s directly compared the process to fracking, prompting a moment of genuine uncertainty among the group about how the two processes actually differed. A woman in her 60s in the same group added that fracking additionally involves the use of chemicals, implicitly distinguishing the two processes, though the boundary was clearly not self-evident to participants without prompting.

The geological storage mechanism was broadly accepted, but questions of scale and permanence persisted. Once the moderator explained the specific storage mechanism (that CO_2 takes on liquid form under pressure at depth, is absorbed into porous rock and is sealed beneath an impermeable clay or shale caprock), this explanation was generally accepted at face value across groups. Several participants felt reassured by the moderator mentioning the Sleipner field in the Norwegian sector of the North Sea as an example of a carbon storage field that has operated for roughly two decades without measurable leakage.[16]

Nonetheless, a number of participants raised follow-up questions revealing that key uncertainties remained unresolved, particularly regarding scale, permanence, and long-term chemical interaction. A man in his late 50s in FG-A1 repeatedly asked whether the long-term chemical fate of stored CO_2 was actually known. A slightly older participant in the same group raised a more specific chemical concern, questioning whether stored CO_2 might react over time with unknown subsurface minerals in ways not immediately apparent. He described this as a potential delayed 'ping-pong effect'. A woman in her mid-50s in FG-R1 raised another concern about pressure changes underground, suggesting that increased injection pressure would likely displace something else in the subsurface, even if the exact consequences were unclear to her.

Several participants across multiple groups sought to understand the sheer physical and logistical scale of a functioning CCS system, including transport volumes and storage depth. A male participant in FG-A1 asked directly how many trucks would need to operate around the clock to transport the CO_2 captured at Aalborg Portland. Other participants in the same group highlighted alternative – and more likely – transport options, namely a pipeline and shipping from the port of Aalborg. In FG-R1, a male participant in his early 60s asked for more information on the emissions associated with transporting the captured CO_2, criticising the absence of such a calculation in the information he had encountered so far:

> *"I'd like to get a rough estimate of when such a project will turn net positive. How much CO_2 would it actually cost before the first cubic metre could be pumped underground? After all, you still have to transport huge quantities of CO_2 first. There's talk of a pipeline, but they haven't been able to build it yet […]."*

3.4 Expected advantages

Following the discussion of participants' understanding of CCS, the moderator introduced a set of prompt cards listing potential advantages of the technology:

- Reduced CO_2 emissions
- Contribution to Denmark's climate goals
- Cleaner air/less pollution
- Job creation
- Local investment
- Use of waste heat for district heating
- Research and innovation
- Green transition of industry
- Increased competitiveness
- Positive local publicity

These cards were used to structure a more focused discussion of the advantages participants considered credible, and those they qualified or actively rejected.

Contrasting opinions on the environmental benefits

While several participants accepted that CCS could contribute to Denmark's climate targets on paper, this view was frequently qualified with the observation that captured CO_2 is not genuinely 'reduced' but merely relocated. A 33-year-old male articulated this 'distinction sharply in FG-A1:

> *"That 'less CO_2 emissions' thing is funny, because you don't actually get less CO_2 emissions from it, it just doesn't come out into the air. CO_2 emissions are what comes out of the chimney, regardless of where it ends up afterwards."*

This opinion was challenged by a participant in his 40s in FG-R1, who defended the accounting logic by arguing that, in terms of climate change, what matters is not whether CO_2 is produced, but whether it is released into the atmosphere – which is precisely what CCS is designed to prevent. By contrast, a 55-year-old woman in the same group explicitly refused to categorise storage as a genuine contribution to the green transition, arguing that, in her understanding, green transition means reducing CO_2 output altogether.

A similarly sharp rejection was voiced in FG-I2, where a younger male participant dismissed both the 'climate goals' and 'green transition of industry' cards outright. He argued that the underlying problem does not disappear, characterising the framing as a form of greenwashing, a way of *"washing one's hands"* of the issue by claiming that it has been dealt with, simply because the CO_2 has been stored underground.

Several participants pushed back specifically against the 'cleaner air' advantage, arguing that CO_2 is not a pollutant in the conventional sense, and that framing it as such risks overstating the benefit. A 59-year-old male participant in FG-A1 argued that this was odd: CO_2 is already present in the air, so it cannot really be described as pollution in the same way as other emissions. A younger participant in the same group went further, linking his opinion to capture activities at Aalborg Portland:

> *"It sounds like saying we're taking the CO_2 away from Aalborg Portland, or that Aalborg Portland no longer emits CO_2, so we get cleaner air. That sounds a bit like a PR guy spinning it…"*

Some participants, however, identified a more genuine secondary benefit relating to particulate filtration alongside CO_2 capture. A participant in his late 60s in FG-A1 suggested this was a plausible co-benefit, reasoning that since capturing CO_2 is a purely chemical reaction, other airborne particulates would likely be captured simultaneously.

Research and innovation are the most consistently endorsed advantages

Across nearly all groups, research and innovation was one of the few advantage cards ac-

cepted with little qualification, often regarded as valuable, regardless of whether large-scale storage ultimately proves viable. A male participant in FG-I1 argued that even a failed pilot project would generate useful knowledge, since understanding why it failed would allow future efforts to become less polluting or less costly.

A 33-year-old male participant in FG-A1 linked research and innovation directly to the future possibility of using rather than merely storing CO_2, describing this as the outcome he would consider genuinely valuable, and stating that he could see no way in which a CCS project would not contribute to research and innovation. In FG-R2, a 31-year-old male teacher similarly endorsed research and innovation as a benefit, stating:

> *"I don't believe that's the only solution, but it can be part of a larger network of solutions. And it could well be allowed to be a spearhead, in my view."*

The prospect of utilising waste heat generated during CO_2 compression for district heating purposes was one of the more consistently endorsed advantages, though several participants stressed that its value would depend heavily on proximity to population centres. A younger participant in FG-I2 reasoned that the benefit would likely be negligible in his own sparsely populated area, given the distance to his nearest neighbours and the cost of laying the necessary infrastructure, but potentially valuable closer to towns. A 33-year-old male participant in FG-A1 raised a related point about the physical scale required for such heat to be captured and used effectively, suggesting that the benefit would likely be realistic only within a limited geographic radius. In Ikast, another participant suggested that industrial users located near a storage site, rather than private households, might be better placed to benefit from surplus heat.

Several participants supported the 'job creation' advantage in principle but questioned how significant or locally concentrated the resulting employment would actually be. In FG-R2, a 57-year-old female participant directly challenged a more optimistic view expressed by a fellow participant, pointing out that the actual capture activity would take place elsewhere (in Aalborg):

> *"But which jobs specifically in Randers Municipality would this create? ...the place where the CO_2 gets captured, that won't be in our municipality. We're just going to store it."*

The suggestion that CCS could enhance industrial competitiveness, for instance by enabling Aalborg Portland to market 'greener cement', was among the most contested advantage claims, frequently dismissed as marketing rather than substance. A 33-year-old male participant in FG-A1 argued that gains in competitiveness might be credible if the captured CO_2 were actually used; for example, by being sold as input in other processes. However, he compared a 'green cement' branding claim to organic food labelling, as something consumers claim to want but are often unwilling to pay a premium for. He concluded that he did not believe in increased competitiveness through this framing, but he expected it to be used increasingly for PR purposes.

Conditional support – advantages often linked to a perceived necessity of CCS

A recurring pattern across groups was that participants were considerably more willing to endorse the advantages of CCS when its use was framed as an unavoidable necessity for hard-to-abate industrial processes with no immediate technological alternative. This necessity-based logic was articulated most clearly by a participant in his 40s in FG-R1. Referring specifically to Aalborg Portland, he argued that the underlying industrial process is inherently difficult to decarbonise, because it cannot simply be

electrified, while the main alternative, e-fuels, remains considerably less commercially mature than carbon capture. On this basis, he concluded that, in his view, the relevant question was not whether one personally liked the technology.

3.5 Expected disadvantages and perceived risks

Following the discussion of advantages, the moderator introduced a corresponding set of prompt cards covering potential disadvantages of CCS:

- CO_2 leakage (including impacts on nature, agricultural land, and groundwater)
- Health risks
- Accidents or emergencies
- Increased traffic
- Disturbance from construction efforts
- Dust, noise or odour
- Falling property prices
- Costs for taxpayers
- Resources taken from other climate solutions
- Unfair distribution of benefits and risks

This section presents the disadvantages and risks raised by participants.

CO_2 leakage is the most consistently raised and least resolved concern

Across nearly all six groups, the possibility of CO_2 escaping from underground storage was the single most frequently raised concern, even where participants simultaneously expressed relatively low concern about acute danger. A 33-year-old male participant in FG-A1 described the core uncertainty in terms of a gradual, rather than catastrophic, scenario forming underground:

> *"I'm just thinking, if you pump a huge amount down into the ground, into some kind of bubble. Imagine you've got enough pressure that it became [mobile]... if a hole appeared somewhere, then I don't know whether it could flow back up again."*

A participant in FG-I1 raised a related, more technically framed concern about pressure build-up in the storage cavity over time, questioning when the pressure might become too great and what could happen if the cavity were to break. Even participants broadly reassured by the moderator's explanation of the geological sealing mechanism qualified this reassurance. A 59-year-old male participant in FG-A1 repeatedly returned to the question of whether the long-term chemical fate of stored CO_2 was genuinely understood, asking simply:

> *"But do we actually know what happens to it?"*

Beyond the risk of leakage itself, several participants raised more fundamental concerns about the long-term unpredictability of subsurface chemical interactions. A 28-year-old PhD student in FG-A2, drawing on her scientific background, raised the possibility of an unforeseen biological interaction specific to Danish subsurface geology, speculating that even if nothing had happened at existing storage sites abroad, conditions in the Jutland subsurface might be different and have potentially destabilising effects.

Physical safety concerns were consistently discussed with reference to comparable industrial or energy-related accidents. One participant in FG-I1 pointed to the basic physical risks associated with pressurised storage, noting that gas under pressure always carries an explosion risk if it leaks and encounters an ignition source. A 59-year-old male participant in FG-A1 referred to fires on offshore oil and gas platforms when discussing risks associated with injection stations. Another participant noted a mitigating distinction: unlike natural gas, CO_2 is not itself flammable.

A 30-year-old male participant in FG-R1 cited the Fukushima nuclear disaster to argue that engineered systems can be made safe if foreseeable scenarios are properly accounted for.

He characterised the accident primarily as a failure of imagination — a failure to anticipate a tsunami coinciding with a power loss — rather than a failure of engineering as such.

Concerns about increased heavy goods traffic – including noise, road wear, congestion and general disruption – were raised independently in multiple groups and were often described as the most tangible and immediate disadvantages, in contrast to the more abstract underground risks. For instance, A 57-year-old female participant in FG-R2 described this as a source of genuine unease, despite feeling entirely comfortable with the underlying storage concept. She argued that transporting the CO_2 by truck seemed at odds with the goal of reducing emissions, and that a pipeline solution ought to be found instead.

Costs to taxpayers and falling property values were flagged repeatedly

Several participants questioned who would ultimately bear the financial cost of CCS, and whether the sums involved represented good value relative to alternative climate investments. A 50-year-old male participant in FG-A2 directly challenged the scale of public subsidy involved (referring to Denmark's recent CCS tender won by Aalborg Portland[17]), arguing that this amounted to substantial state support for what is otherwise an ordinary business. A 64-year-old female participant in the same group linked this cost concern explicitly to opportunity costs, arguing that the billions being invested in the local project could achieve far more if redirected towards other measures to reduce Denmark's carbon footprint.

Concerns about property values were raised both regarding construction disturbance and, more specifically, the reputational stigma of proximity to a storage site, regardless of the actual risk. A 40-year-old female participant in FG-R2 framed the risk to property value not as a consequence of actual danger, but of public perception and information gaps that might deter potential buyers. She noted that although the risk of leakage is genuinely low, it is not zero, and that a lack of public information would likely make people hesitant to buy a house nearby.

A slower-moving risk – lock-in and shifting burdens to future generations

A distinct category of concern concerns the long-term structural and generational consequences of committing to CCS infrastructure. A participant in his 40s in FG-R1 introduced the economic concept of 'lock-in' to describe how infrastructure investment could entrench continued emissions rather than incentivise their reduction. He argued that once pipelines and pumps have been built, considerable economic and infrastructure-related interests become tied to their continued use, making it harder to reconsider the underlying need to produce CO_2 in the first place.

A 31-year-old male participant in FG-R2 linked this concern directly to the issue of intergenerational burden, describing CCS as deferring rather than resolving the underlying problem, thereby postponing it for future generations to confront. This intergenerational framing was also made by a 48-year-old male participant in FG-I1:

> *"I will only have to worry about short-term effects, which we get to experience in our own time. But what are the long-term effects?... In my lifetime it won't be a problem. Sorry to say it, but it won't. But it will be for the next generation. They'll have to live with our decisions."*

In relation to these concerns, some participants highlighted the physical footprint of injection infrastructure on natural or undeveloped land. A participant in FG-I1 expressed greater concern about locating infrastructure in forested or natural areas than on already developed or paved land, arguing that Denmark

has little wild nature left as it is, given the extensive use of land for agriculture, and that it would be particularly regrettable to sacrifice remaining forest for this purpose.

3.6 Trust, responsibility and distributive fairness

Trust, oversight and the conditions for local acceptance emerged as closely interconnected themes throughout the focus groups. Trust in a given actor along the CCS value chain was almost always framed in terms of who would bear responsibility if something went wrong, while acceptance was almost always framed in terms of whether risks and benefits were seen as fairly distributed.

Arm's length oversight preferred over both state and industry alone

Across all six groups, there was strong and consistent support for monitoring to be conducted by an independent third party, rather than by the implicated company, the municipality, or the state alone – reflecting a broader pattern of conditional, rather than unconditional trust in institutions. A participant in FG-I1 argued that external, accredited verification was necessary even where a company's internal controls appeared adequate, since companies could otherwise be tempted to *"fiddle the numbers"* to make results look more favourable, whereas an accredited external lab would be obligated to report to a public authority. A similar model, in which the polluter pays for testing, but an accredited, independent institution (such as a university or research and technology organisation) performs the actual monitoring, was described almost identically by a participant in his 40s in FG-R1 as standard Danish practice for industrial environmental regulation more broadly.

Notably, several participants expressed distrust in both ends of the ownership spectrum, rather than simply defaulting to trusting the state over companies. A 57-year-old male participant in FG-I2 argued in favour of state ownership because it would remove the profit motive from decisions about land use. Drawing on his experience in the wind and solar sector, he contrasted this with private landowners' profits while neighbours *"get nothing"*, and cautioned that the state, too, *"shouldn't turn this into a business"*.

Further, participants in FG-R2 expressed pointed distrust of municipal administration, specifically citing the Nordic Waste landslide disaster as evidence of local government's inability to adequately supervise high-risk industrial activity, a concern that recurred throughout both Randers groups. A 40-year-old female participant in FG-R2 stated plainly that she did not think Randers Municipality should be responsible for oversight, *"because the track record isn't very good"*. A 31-year-old male participant from the same group pointed to a further complication specific to the Gassum area: the exploration zone spans multiple municipal boundaries, which he felt strengthened the case for oversight above the municipal level.

A proposed resolution, voiced independently in FG-A1 and FG-I2, was a hybrid model in which the state retains ownership of the underground storage resource itself, comparable to mineral rights, while operational work is contracted to private actors under strict licence. A participant in FG-A1 argued that ownership of storage sites should remain with the state precisely because *"you never know what [private companies] might come up with"*. Relatedly, a participant in FG-R1 proposed a non-profit model in which any commercial surplus would be legally earmarked for reinvestment in further emissions reduction, rather than distributed as private profit.

Geographic mismatch between burden and benefit

Concerns about distributive fairness recurred across all three areas, frequently framed

through comparisons with perceived inequities in wind turbine and solar park siting. As mentioned before, one participant (FG-I2) argued that current renewable energy compensation practices unfairly concentrate financial benefit with a single landowner, while neighbours who bear the visual or noise burden receive nothing, suggesting that such neighbours should instead receive generous compensation. A participant in FG-R2 applied the same logic to CCS, stating that he was more interested in the project's contribution to the local municipality's finances than in abstract national climate arguments. A 59-year-old male participant (FG-A1) captured this asymmetry succinctly, remarking that *"if it were in Copenhagen, it wouldn't be so bad"*, thus implying that rural areas are disproportionately expected to host such infrastructure.

Several participants proposed that fairness concerns could be addressed through mechanisms already used in the renewable energy sector, such as local co-ownership or shared financial upsides, rather than through compensation alone. A 64-year-old female participant (FG-A2) argued that genuine local involvement, not merely financial compensation, determines whether such projects succeed. She contrasted cases where locals have a real stake in wind turbine projects with cases where *"some giant energy conglomerate just turns up and slaps something down"*. A 33-year-old male participant (FG-A1) cited a solar project on the island of Funen as an example, in which local support arose because landowners were given genuine agency and a financial stake from the outset.

3.7 Information, citizen engagement and communication

Across all six focus groups, participants discussed how, when, and by whom information about CCS should be communicated. They also shared direct experiences, positive and negative, with existing engagement formats.

Early, genuine and honest engagement essential for acceptance

A recurring precondition for acceptance was that engagement occur before key decisions are finalised and that it be meaningful and genuine rather than merely a formality. Further, a 53-year-old female participant (FG-I1) drew a sharp distinction between being informed and being genuinely consulted, arguing that if a decision has already been made, citizens should naturally be included in the implementation, but that – ideally – citizen involvement should begin before that point.

This preference for early involvement was echoed by a 64-year-old female participant in FG-A2, who linked it to a broader climate of institutional distrust that she felt made transparency especially urgent:

> *"I believe the more transparent authorities are, the better. And people can handle these things perfectly well... And there's already this distrust in society towards authorities and politicians and so on. So it's perhaps especially important these days that we're actually very clear and upfront."*

Across groups, participants expressed a strong preference for information to come from sources without a direct financial or political stake in the outcome. Male participants in FG-I1 and FG-I2 argued explicitly against relying on information from private stakeholders with financial interests. By contrast, a female participant in her 60s (FG-R1) took a more pragmatic view, suggesting that source credibility mattered less than balanced representation, provided that both sides were heard.

Different preferences when it comes to communication channels

Not surprisingly, participants had different preferences when asked how they would like to receive information on CCS. Several participants described existing communication as

sporadic, appearing briefly and then disappearing for extended periods, which undermined a sense of continuity and trust. A male participant in his 50s (FG-R1) described this pattern directly, noting that *"it's a long process in general... and then you hear something, and then it's gone again,"* before resurfacing a year or two later. He proposed a dedicated, continuously updated project website as a remedy, combining easily accessible and more in-depth information – while seemingly unaware that Greenstore project's[18] existing website already offers news and information on its carbon storage project in the Gassum area.

Secure digital mail (e-Boks, which is used to send and receive official documents in Denmark) was frequently proposed as a channel, but its adequacy was contested, with participants across age groups expressing doubt that formal digital notices would be read. A 31-year-old male participant (FG-R2) argued this was less a generational issue than a matter of how e-Boks is generally used, noting that his generation deals with it quickly for bills but does not *"sit down and read into it properly"*. A 57-year-old woman in the same group explicitly rejected the idea that this was age-specific, stating that she shared the same habit despite being considerably older. Instead, she argued for a continuous, multi-channel information stream delivered through online, television, radio and other media. A female participant in her 50s (FG-R1) reported that e-Boks notices about the geological survey had in fact reached her adequately, though she felt subsequent updates on the project's progress had since dried up.

A recurring and important distinction emerged between different formats of in-person engagement, with participants clearly favouring informal, dialogue-based formats over plenary-style public hearings, which several described as being dominated by vocal complainants rather than genuine information exchange. A 31-year-old male participant (FG-R2), who described himself as politically active and experienced with public meetings, was sharply critical of the traditional format, stating that such meetings are *"for people who want to complain"*, and that one rarely leaves any wiser. This was corroborated by an older female participant (FG-R1), who noted that vocal complainants tend to take up so much space that key points get lost.

By contrast, participants responded favourably to the moderator's account of an event held in Gassum, where representatives from GEUS (the Geological Survey of Denmark and Greenland) and participating companies stood at separate tables, allowing attendees to circulate and ask questions individually. A 40-year-old female participant (FG-R2) proposed a specific term for this preferred format, describing it as more of an *"information fair"* than a public hearing, which she felt could otherwise feel unnecessarily intense.

On a more general note, several participants emphasised that information needed to be genuinely compReehensible to a lay audience, not merely technically accurate. A 53-year-old woman (FG-I1) linked compReehensibility directly to the risk of unfounded rejection, arguing that information written for *"ordinary people"* would help prevent people from dismissing CCS outright. She added that genuine understanding would allow people to form a considered view, whether positive or negative. A male participant in his 50s (FG-R1) proposed producing both more detailed, technical information and shorter, simpler material in a *"pixie book format"*.

3.8 Interim conclusion

The focus group findings add nuance to the survey results in Chapter 2 by revealing the reasoning underlying citizens' attitudes towards CCS. Awareness remains highly uneven,

both between and within groups, and does not necessarily correlate with geographic proximity to CCS activities, suggesting that closing this gap requires active rather than passive communication.

Where participants engage substantively with CCS, their views are rarely reducible to blanket support or rejection. Advantages tied to research, innovation, and the need to address hard-to-abate emissions are more readily accepted, while broader claims about climate contribution, cleaner air, or competitiveness are often dismissed as accounting exercises or greenwashing. Concerns about CO_2 leakage, long-term uncertainty and intergenerational burden-shifting recur across all three areas, alongside more immediate concerns about transport, costs and property values.

Across all groups, trust, responsibility and fairness emerge as closely intertwined, shaping conditions for acceptance more strongly than technical risk assessments alone. Participants consistently favour independent oversight, clear liability, and models of local co-ownership drawn from experience with renewable energy. They also expect information to be early, honest, delivered by disinterested or neutral sources, and genuinely accessible – expectations that existing formats such as e-Boks notices and public hearings often fail to meet.

Taken together, these findings suggest that public acceptance of CCS depends less on information provision as such than on demonstrable fairness, transparent governance, and genuine citizen involvement. These themes also recur throughout the interviews with key stakeholders discussed in the following chapter.

4. Key stakeholder perspectives on public engagement

This chapter presents findings from online interviews with two key stakeholders involved in Denmark's emerging CCS value chain. The first is Henrik Sulsbrück, Head of Division CCS at the Danish Energy Agency (DEA). The DEA is responsible for granting exploration and storage licences under the Danish Subsoil Act.[19] The second interviewee is Regitze Reeh, Head of Corporate Affairs at Harbour Energy, an international, independent oil and gas company. Harbour Energy holds the exploration licence for the potential onshore CO_2 storage site near Gassum under the Greenstore project.

The purpose of the interviews was to understand how Sulsbrück and Reeh approach public communication and engagement around CCS, and how they reflect on the challenges and dilemmas involved in informing and involving citizens in areas affected by CO_2 capture, transport or storage activities.

The interview with Sulsbrück was conducted on 2 July 2026, while Regitze Reeh was interviewed on 5 August 2026, in line with her responsibilities for communication and public engagement within the Greenstore CO_2 storage project.

4.1 The perspective of the Head of Division CCS at the DEA

The views, statements and interpretations presented in this section stem from an interview with Henrik Sulsbrück in his role as Head of Division CCS at the Danish Energy Agency. They reflect his personal observations and opinions and should not be understood as official positions of the Danish Energy Agency.

According to Sulsbrück, the DEA's communicative role has changed considerably since Denmark began developing its CCS framework in 2021. In the early phase, he recalls the agency to have played an active, explanatory role towards the general public, organising citizen meetings[20] in all five onshore areas designated for exploration at the time, hosting webinars and running information campaigns on social media as part of the mandatory strategic environmental assessments preceding licensing rounds. Once exploration licences have been granted for specific areas, however, the DEA's role seems to become more reactive. As Sulsbrück explains:

> *"Once decisions have been made about specific onshore areas [...] the Danish Energy Agency's role has actually become somewhat more withdrawn after that, because then we have companies, licence holders for subsurface exploration, and it becomes primarily their responsibility to inform neighbours and citizens about what is going on."*

Sulsbrück states further, that this division of responsibility is formally written into the companies' licences, and the DEA's remaining role is mainly to approve companies' neighbour engagement plans and to supervise their

implementation. The agency maintains some direct contact with local communities, but this tends to be reactive and demand-driven – for instance, by participating in citizen meetings organised by municipalities or local interest groups, rather than initiating such activities itself.

Results from the interview show that the DEA makes a conscious effort to avoid blurring the line between its own role as an impartial authority and licence holders' commercial interests. This is particularly relevant given that citizens in the focus groups expressed greater trust in public authorities than in private companies with financial stakes in CCS projects (see Chapter 3). Sulsbrück is aware of this trust asymmetry, yet – according to him – the DEA does not systematically leverage its authority by participating actively in company-led information meetings. Partly, this reflects resource constraints and disappointing turnout at agency-led citizen meetings in the past; partly, it reflects a concern about role confusion:

> *"I also have a responsibility towards the companies holding exploration licences – if they are not doing their work properly, I need to tell them so. And if I stand next to a company's representative [at an information meeting] […] I might end up blurring that role in a way I shouldn't – also in the eyes of the audience."*

Asked whether the DEA has a formal communication strategy for CCS, Sulsbrück responds directly: while such a strategy existed during the initial phase, it has since given way to less formal guidelines developed in ongoing dialogue with the agency's communication specialists. This guidance addresses both anticipated and reactive communication needs. This approach, he notes, is not specific to CCS but follows the DEA's general communication practice across policy areas.

Several challenges make public engagement difficult

Sulsbrück identifies a generally low level of public knowledge as a core communicative challenge, though he distinguishes between a low awareness level in the population at large – which he does not consider problematic in itself – and low awareness in specific, potentially affected local areas, where lack of information can give rise to concerns that are not necessarily well-founded (as arguably reflected in the phone survey and focus group results). He stresses that citizens are entitled to remain concerned, but that concerns should ideally rest on an informed basis rather than on assumptions.

Sulsbrück also points out logistical challenges in reaching local communities, which he describes as unexpectedly resource intensive. The challenges include, for instance, identifying the right local Facebook groups to advertise citizen meetings, since seemingly similar groups in the same area can serve entirely different purposes. Further, Sulsbrück notes that hosting citizen meetings is not cost free, while the agency had some somewhat negative experiences in the past, linked to a relatively low level of attendance and some attendees having as little trust in public authorities as in private companies. The DEA thus must weigh its resource expenditure against the likely outcome/impact when considering arranging and hosting such meetings.

Cooperation with municipalities in the affected areas is generally described by Sulsbrück as good. However, he points out that some municipalities face challenges associated with unfamiliar task types – particularly environmental assessments – as well as broader resource and prioritisation pressures, given the scale of new CCS projects without dedicated funding. To help build municipal capacity, the DEA has organised training days for caseworkers in affected municipalities. Municipalities also sometimes act as local engagement initiators in their own

right, as seen in Thorning, where a municipality organised a citizen information meeting and invited the DEA to participate.

The dilemma of early engagement

Sulsbrück agrees with the general principle that early involvement tends to improve citizens' sense of being heard when public or private stakeholders are developing and implementing projects that (may) have an impact on local communities. In the case of CCS, he points to a genuine dilemma: in the early exploration phase, he can often only answer citizens' questions in general terms, since concrete plans, for instance in terms of location, scale, or timeline, have not yet been determined. This can leave citizens frustrated with what they perceive as vague or evasive communication.

At the same time, Sulsbrück points to the opposite risk of communicating too early or too extensively about projects that may never materialise. He argues that it is not necessarily problematic for citizens to know little about CO_2 storage at a given point in time, precisely because the technology is still new and because it remains uncertain whether the projects under discussion will actually be realised. Raising awareness prematurely may therefore generate concern about possibilities that never come to pass, while placing an uneven burden on citizens' attention and engagement. He illustrates this with reference to questions he is often asked at citizen meetings about when a project might happen:

> *"They ask me: Henrik, when is this going to happen? So, I say, if it happens, it might be in 5, 8, 10 years. [Some might think:] okay, I don't need to spend my Wednesday evening on this. Meanwhile, someone sitting right next to them might actually have that need [for information]."*

This illustrates a fundamental tension between the ambition of early transparency and the practical constraints of communicating about a project whose details are still undecided – with the risk of appearing either prematurely alarming or unhelpfully imprecise.

Looking ahead, Sulsbrück raises the coming challenge of onshore CO_2 transport pipelines, which he expects to bring new concerns (given that pipelines run closer to the surface) and to involve additional authorities, notably the Danish Business Authority, which in the current Danish government holds safety responsibility for transport infrastructure. He notes that most citizens cannot be expected to distinguish between different public authorities' areas of responsibility, which points to a coordination challenge that the DEA has to resolve going forward as CCS projects move from the exploration phase towards realisation.

4.2 The perspective of the Head of Corporate Affairs at Harbour Energy

As previously indicated, Harbour Energy is the main stakeholder in the Greenstore CO_2 storage project, which, at the time of writing, continues to explore the subsoil layers in the Gassum area to assess the suitability for carbon storage. Harbour Energy's engagement with the Gassum area communities did not begin smoothly. When Regitze Reeh joined the company in late 2024, Harbour Energy had recently merged with the German company Wintershall Dea, which originally held the Gassum exploration licence. Notably, two citizen meetings required under the licence conditions had already taken place at that point. They had been organised in cooperation between an agency and colleagues based abroad. According to Reeh, this initial approach was not well received locally, as it did not sufficiently consider the local context and citizens' existing familiarity with the project. Further, the timing coincided with intense local media coverage of the

Nordic Waste scandal (see Section 2.6), which meant that communication from an international company perceived as distant took place in an already distrustful local climate. Reeh was hired partly in response to this experience, with an explicit mandate to strengthen the project's local presence and understanding of local culture – what she describes as having *"feet on the ground"*.

Moving away from citizen meetings towards direct, local outreach

One of Reeh's first decisions was to abandon the traditional citizen meeting format altogether, partly because the Gassum exploration area is very large (527 km²), making it impractical to organise citizen meetings that could give a meaningful sense of geographic coverage. Instead, the company adopted a more resource-intensive but targeted approach centred on direct contact with a wide range of the roughly 3,000 landowners whose consent was needed to access relevant land for the seismic survey of subsoil layers in the Gassum area, which involved the use of vibration trucks (see Section 3.1).

After an initial round of consent requests via secure digital mail (e-Boks) yielded only a partial response, the company rolled out a door-to-door visiting programme according to farm size. Reeh and a geologist colleague from Jutland, as well as a locally rooted employee from a consultancy, visited the largest landowners; other contracted staff visited the remaining categories of landowners. Reeh describes the resulting direct, kitchen-table dialogues as an important source of continuous learning about local concerns, values and culture. She notes that the approach generated a level of local acceptance rarely accompanied by any real protest. The notable exception that encountered strong opposition was primarily directed at Randers Municipality (over unrelated green transition projects), rather than at Harbour Energy itself, occasionally putting Reeh in the position of an informal mediator between frustrated landowners and the municipality.

The company also established a local office in Randers, and Reeh emphasises the value of employing colleagues who speak the local dialect and share a cultural background with the farming community.

Proactively addressing concerns before they are raised

Reeh describes a deliberate effort to anticipate and pre-empt citizens' concerns rather than wait to be asked. Recognising that drinking water and groundwater were recurring worries, the company convened meetings with local waterworks associations to address these concerns directly. Harbour Energy has similarly met with mainstream and more activist agricultural organisations alike, seeking to create what Reeh calls 'ripples in the water' – i.e., a form of second-hand social validation, whereby local trust in the company is reinforced when citizens hear from other credible community actors that Harbour Energy has engaged constructively with them.

On matters of safety, Reeh describes drawing on third-party sources, such as existing studies and reports, to build trust rather than relying solely on the company's own assurances. She stresses the importance of independent, credible expertise given Harbour Energy's position as a relatively unknown, foreign commercial actor:

> *"No one has ever heard of Harbour Energy. That's why it's invaluable to have [our geologist colleague] in Aarhus, who speaks Jutlandish, and to use [locally rooted] consultants; finding third-party endorsement is extremely important when you arrive as a British oil and gas company that nobody knows."*

She also refers to GEUS as a trusted, independent authority on subsurface conditions, while highlighting the stringent CCS regulations that

Harbour Energy must adhere to. These include strict state-imposed monitoring obligations extending 20–30 years beyond site closure, as well as a mandatory state guarantee scheme, which Reeh presents as a strong incentive for the company to proceed only if geological containment can be reliably ensured.

Time and local visibility as decisive factors

Asked to identify the most decisive factors for building understanding and acceptance of CO_2 storage, Reeh highlights local presence and accessibility, alongside – and perhaps above all – time. Reeh emphasises that the extended timeline of the Greenstore project – due to unexpected developments – has been central to building local acceptance – possibly more so than any single communication activity. Delays that pushed back the start of the seismic survey allowed the company more time to build local relationships and let community attitudes gradually shift from initial rejection towards more settled, 'wait-and-see' acceptance:

> *"If we had concentrated everything we've done here into two months, we wouldn't have achieved the same licence to operate that we have now."*

Rather than repeating the earlier citizen meeting format, Harbour Energy used the additional time to introduce an 'open house' concept in a sports hall foyer, staffed by associated consultants for four hours over two days, where individual landowners could ask specific questions about how the project would affect their plots of land. Reeh describes this format – reportedly attracting around 200 landowners – as considerably more effective at fostering constructive dialogue than a traditional public meeting.

A similar open house event was held in January in Spentrup (6 km south of Gassum), where local residents were invited to see a seismic survey vibration truck in action. The event was accompanied by coffee, traditional pastries and informal conversation. According to Reeh, the event drew around 100 attendees and some media coverage, illustrating how combining a technical demonstration with an informal, low-key setting could help demystify the project's more visible field activities.

Beyond formal consultation activities, Reeh describes a broad range of visibility-building initiatives: information stands at local or regional fairs and exhibitions, participation in local business networks whenever invited, and ongoing use of local press, newsletters and social media advertising. She notes that these efforts have had secondary benefits beyond direct interactions, since visible local presence can also be referenced in media outreach and on professional platforms such as LinkedIn.

For a newer, visible exploratory drilling site[21] near a motorway with few immediate neighbours, Reeh describes a deliberately scaled-down communication approach, limited to signage at the site, a leaflet distributed to households nearby, and local open house events – reflecting her broader philosophy of tailoring communication intensity to the specific local context rather than applying a standard format uniformly.

4.3 Interim conclusion

The key stakeholder interviews point to a shared recognition that public trust in CCS cannot be built through information campaigns alone, but requires sustained local presence, tailored communication and time. The apparently more arm's-length, resource-conscious approach at the DEA and Harbour Energy's intensive, hyperlocal engagement strategy illustrate two structurally different positions in the CCS value chain: one shaped by a public authority's need to maintain impartiality and manage limited resources across many potential project areas, the other by a commercial actor's need to earn local trust and a functional 'licence to operate' from a position of low initial credibility. These differing starting points and strategies form an important context for interpreting citizens' accounts of information needs, trust and scepticism, as presented in the focus group findings in Chapter 3.

> **Communication should be tailored to each segment in the value chain, reflecting the distinct concerns associated with capture and storage activities.**

5. Conclusion

This Social System Analysis examines public awareness and acceptance of CCS among citizens living close to different parts of an emerging Danish CCS value chain, spanning carbon capture in Aalborg and potential onshore CO_2 storage in Gassum and Thorning. Drawing on a phone survey, six focus groups, and interviews with two key stakeholders, the study offers a multifaceted picture of how citizens understand, evaluate, and relate to CCS, and how a public authority and a company currently approach public engagement in this field.

A first key finding is that awareness of CCS, and particularly of concrete local activities, remains moderate and unevenly distributed. Across all data sources, awareness is strongly associated with gender, age and prior exposure to information, but not consistently with geographical proximity to CCS activities. This suggests that physical proximity alone does not guarantee awareness, and that closing this gap requires active, targeted communication rather than passive assumptions about local knowledge.

Second, the study points to a consistent local-national benefit gap. Citizens across all three areas are considerably more likely to see CCS as beneficial for Denmark than for their own local community, and this gap is most pronounced in the potential storage areas. The qualitative material helps explain this pattern: capture is more easily linked to visible industrial and climate benefits, while storage is more readily associated with risk, disruption and asymmetrical distribution of burden and benefit. This asymmetry between capture and storage areas represents an important consideration for future CCS communication: the value chain should not be treated as a single, undifferentiated object of public opinion.

Third, attitudes towards CCS are best characterised by ambivalence and conditionality rather than outright support or opposition. Survey respondents most frequently adopt a neutral position, while focus group participants oscillate between cautious optimism, pragmatic acceptance of necessity, and scepticism towards claims about climate benefits, cleaner air and competitiveness. Such claims are often regarded as accounting exercises or greenwashing. Acceptance appears less tied to technical risk assessments than to perceptions of fairness, transparency and trustworthy governance – themes that recur across survey findings (safety, disadvantages, distribution of benefits and risks) and focus groups (independent oversight, local co-ownership, comparisons with renewable energy siting).

Fourth, the stakeholder interviews reveal two structurally different, but complementary, engagement logics. The Danish Energy Agency seems to adopt an impartial, resource-constrained position, favouring a more reactive, arm's-length role once licences have been granted. Harbour Energy, by contrast, operates from a position of limited credibility as a foreign commercial actor and has invested heavily in building trust over time through a sustained local presence, tailored formats (such as door-to-door dialogue and open-house events) and third-party endorsement. Both actors agree, however, that trust cannot be manufactured quickly through information campaigns alone; it requires sustained local visibility, credible independent verification, and considerable time.

Taken together, these findings suggest several lessons for future CCS deployment, communication and engagement in Denmark. Communication should be tailored to each segment in the value chain, reflecting the distinct concerns associated with capture and storage activities. It should move beyond one-off, plenary-style formats towards more dialogue-based, localised engagement, complemented by continuous and multi-channel information provision. Independent oversight and demonstrable, fair distribution of costs and benefits should be treated as core preconditions for legitimacy rather than secondary concerns. Finally, engagement strategies should recognise the significant time required to build local trust, particularly in areas facing new industrial infrastructure. Engagement should be initiated early, even where project details remain uncertain, to avoid citizens feeling that key decisions are being made without their involvement.

Notes

[1] e-Boks is a secure digital mailbox for sending and receiving official documents in Denmark.

[2] The views expressed by Henrik Sulsbrück in this interview are his own and do not necessarily reflect the official position of the Danish Energy Agency.

[3] Norne Thorning Storage had been awarded the exploration licence for the Thorning area in 2025 by the Danish Energy Agency (DEA). However, the company has recently withdrawn from plans to store CO_2 in the area. (Source: Energy Supply (2026). Dansk CO_2-lager er droppet. Available at: www.tinyurl.com/2chmsw9x).

[4] The views expressed by Henrik Sulsbrück in this interview are his own and do not necessarily reflect the official position of the Danish Energy Agency.

[5] See the imprint page for more information on Aalborg Portland's role in the development of this study.

[6] Aalborg area: postal code 9220 Aalborg Ø; Gassum area: postal codes 8900 Randers C, 8920 Randers NV, 8930 Randers NØ, 8981 Spentrup, 8983 Gjerlev J, 8990 Fårup, 9550 Mariager; Thorning area: 7442 Engesvang, 7470 Karup J, 8620 Kjellerup. The geographic delineation of the Gassum and Thorning areas is based on a map from the Danish Energy Agency delineating the potential CO_2 storage sites, with the villages of Gassum and Thorning at their respective centres. You can access the map here: www.tinyurl.com/mr3n37w4.

[7] Meaning respondents having answered 'not at all' to the question: To what extent do you believe CO_2 capture at Aalborg Portland / CO_2 storage near Gassum or Thorning will benefit your local area? (n=251) This group was not asked about expected local advantages.

[8] Please note that there is a significant overlap between respondents foreseeing little or no advantages of CCS at a national level and respondents who do so at a local level.

[9] DR (Danish Broadcasting Corporation) (2024). Hvad handler sagen om Nordic Waste om? Få overblikket her. Available at: www.tinyurl.com/bdzxxzc5.

[10] More information on Greenstore can be obtained on the project's website – available at: www.tinyurl.com/bdk98uux.

[11] Greenstore (2026). Denmark's largest 3D seismic survey has been completed. Available at: www.tinyurl.com/3hhzrnym.

[12] To ensure fairness, all focus group participants received gift cards of equal value, regardless of recruitment channel.

[13] Nordjyske.dk (2026, 5 May). Aalborg Portland vinder milliardordre om at fange og lagre CO_2. Available at: www.tinyurl.com/yvtwawt7; Nyheder.tv2.dk (2026, 5 May). Aalborg Portland vinder milliardordre om at fange og lagre CO_2. Available at: www.tinyurl.com/2xrm37ck.

[14] In the Ikast and Randers focus groups, the moderator used maps by the Danish Energy Agency (DEA) of the Gassum and Thorning areas that have been/are being explored for potential CO_2 storage. Available at: www.tinyurl.com/bdfwehu9.

[15] This definition was given: Carbon capture and storage (CCS) involves capturing CO_2 from sources such as factories, waste-to-energy plants or power stations. It is then transported by pipeline, lorry or ship to a storage site on land or at sea. There, the CO_2 is pumped deep underground, for example into depleted oil or gas fields. The aim is for the CO_2 to remain safely contained for several hundred years.

[16] See, for instance, Furre et al. (2024). Sleipner 26 years: how well-established subsurface monitoring work processes have contributed to successful offshore CO_2 injection. Available at: www.tinyurl.com/5n99w4n8.

[17] Nyheder.tv2.dk (2026, 5 May). Aalborg Portland vinder milliardordre om at fange og lagre CO_2. Available at: www.tinyurl.com/2xrm37ck.

[18] The Greenstore website is available at: www.tinyurl.com/bdk98uux.

[19] Danish Energy Agency (n.d.). Legislation and guidelines for subsoil activities. www.tinyurl.com/fmbpn33t.

[20] A citizen meeting ('borgermøde' in Danish) in the context of this study is understood as a public meeting organised by public authorities and/or private companies, where they invite and gather local residents to communicate, discuss, and hear feedback on local issues, plans, and projects.

[21] The Greenstore project erected a temporary test well near Fårup, Jutland, starting in late June 2026, to assess geological suitability for CO2 storage. The aim is to drill to a depth of more than 3,000 meters. Drilling is meant to run until the end of 2026 with the site restored to farmland by the first quarter of 2027 (Source: Greenstore (2026). Midlertidig prøveboring skal give vigtig viden om undergrunden. www.tinyurl.com/342vnzrj.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