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Abstract

Perception is a prerequisite for public acceptance to be possible. The research question for this study is therewith *"How has Norcem communicated its CO_2 capture project and how do the local residents perceive the project?"* The study shows that Norcem's communication to the local community of Brevik about the CO_2 capture project has happened through different channels, but that it has been limited due uncertainty on whether the full-scale project would be realized in Brevik.

The interviewees' knowledge and perceptions of the project varies. However, several interviewees state on their own initiative that the project can stimulate increased local employment and that reducing CO_2 emissions is positive for the environment. Also, some interviewees are concerned with how the project will affect their living conditions.

The study further argues that Norcem finds itself in a good situation to successfully communicate the project. First, because it historically has established itself as an important and well-liked cornerstone company which is part of the Brevik identity. Second, because Norcem through the general communication approach has been considerate and build trust with the Brevik community. In this regard, the study argues that people, ahead of the CO_2 capture project, hold perceptions of Norcem. Accordingly, Norcem's communication of the project is interpreted based on these existing perceptions. For this reason, the cement plant finds itself in a suitable situation for further communicating about its prestige-project.

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This project has received funding from the European Union's Horizon2020 Research and Innovation Programme under Grant Agreement No 641185

TABLE OF CONTENTS

Page

This project has received funding from the European Union's Horizon2020 Research and Innovation Programme under Grant Agreement No 641185

1 INTRODUCTION

This case study has been undertaken in the small village of Brevik in the Porsgrunn municipality in Norway. Norcem's cement plant is located in the middle of this small community and has been an important part of its identity for over a century. In an early planning phase, the present work was foreseen to investigate the public *acceptance* of the Norcem CO_2 capture project, hence the title of this report. When this study was undertaken, it became however clear that the Norcem CO_2 capture project was not enough advanced to make a meaningful study of public acceptance. The research question for this study was therefore formulated as *"How has Norcem communicated its CO_2 capture project and how do the local residents perceive the project?"* Focus has therewith been on elaborating a descriptive study of Norcem's communication and local residents' perceptions of the CO_2 capture project.

As background to this study, must be mentioned that Norcem had been part of a plan to establish a landfill for hazardous waste in their mine in Brevik. Norcem withdrew from this plan in the beginning of summer 2017 (i.e. before the present study was done). The landfill project, in general, has received negative attention from the local residents in Brevik. This may therefore have reduced the awareness about the CO_2 capture project for some of the interviewees. Norcem has also in Brevik kept a low communication profile about the CO_2 capture project because of the uncertainty related to the continuation (funding) of the Norwegian CCS full-scale demonstration project.

This study is a deliverable in the EU-funded Horizon2020 CEMCAP project, where Norcem AS is partner. CEMCAP (duration May 2015-October 2018) has as its primary objective to prepare the ground for large-scale implementation of CO_2 capture in the European cement industry. CEMCAP is a Research and Innovation Action (RIA), focusing on advancing CO_2 capture technologies and analysing and comparing them from a techno-economic perspective. The present study is therewith expected to reach readers with deep insight into CO_2 capture and CCS, while adding an element of SSH (Social Science and Humanities) to the technology-oriented CEMCAP project.

1.1 The Norcem CO_2 capture project

Norcem AS (part of HeidelbergCement Northern Europe) has a vision of zero CO_2-emission from concrete products in 2030 as seen over its lifecycle (Norcem website 2018a). To achieve this vision, the CO_2 must be captured from the cement production. The release of CO_2 from the cement production process is inevitable, when calcium carbonate ($CaCO_3$) is calcined to form burnt lime (CaO). For Norcem, the CO_2 capture project is thus a prestige project. It has advanced step by step. It started in 2013, with testing of three different technologies at the cement plant in Brevik[1]. The test project was finalized in 2017. Based on the results from the tests, a feasibility study for the most mature of the three tested technologies (the amine technology from Aker Solutions) was thereafter carried out (Norcem website 2018a).

Norcem's CO_2 capture project has for a long time been high on the Norwegian CCS agenda. In 2016, the Ministry of Oil and Energy published their feasibility study for full scale CCS in Norway. Norcem's project was one of three projects included in this study. In the Norwegian state budget for 2018[2] the Government wanted to await an evaluation of the Full-scale demonstration

[1] Amine capture, low-temperature CO_2 capture with a solid sorbent and CO_2 selective membranes. A fourth technology (Calcium looping) was tested at the University of Stuttgart in Germany in the Norem CO_2 capure project.
[2] October 2017.

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CCS-project (Norcem website 2018a). This created uncertainty about whether and to what extent a Norwegian full-scale CCS project will be realized. The situation was part of the background for the collection of data to the present study.

After the interviews for the study were undertaken, the Norwegian government decided that Norcem is the first candidate to proceed with a Front End Engineering and Design (FEED) study for full-scale CO_2 capture in the Norwegian CO_2 Capture and Storage (CCS) Full-scale demonstration project (Regjeringen 2018a)[3]. In this perspective, the present study can be a starting point for considering further research on public perceptions and acceptance.

1.2 Existing literature on social acceptance for CCS in cement industry

Many[4] point to CCS as important for reducing greenhouse gas emissions in the cement industry, and social acceptance is necessary for successful implementation of this climate technology. Amanda Boyd (2017) provides a good insight into the different sides of understanding public CCS perceptions. According to Boyd (2017), successful implementation of CCS requires an understanding of many technical and social factors. The author further states that research on populations affected by CCS has been completed in a number of countries and regions.[5] These studies demonstrate that CCS risk perceptions can differ depending on the location and the technical and social context associated with the project.

Teir et al. (2010) state the need for further research on site-specific local community context. The present study does so by drawing on previous research from Norcem's CO_2 capture project in Brevik. Haug and Stigson (2016) shortly describe this project and argue that the long industrial history of the Porsgrunn area creates favourable social conditions for the project

1.3 Research question and research design (methodology)

The research question for this study is *"How has Norcem communicated its CO_2 capture project and how do the local residents perceive the project?"* The study looks at the communication activities and asks what residents know about the project and how they perceive it.

It is emphasized that the quotes provided illustrate the *perceptions* local residents have of Norcem's CO_2 capture project. The residents have not been asked or expected to provide correct facts. This is thus a descriptive case study. It relies on primary sources and interviews with regular members and steering committee members of Brevik Vel, other residents and Norcem employees. Semi-structured interviews with mainly open-ended questions have been used as method (Leech 2002). While using interview as a method requires the consideration of several issues,[6] meeting the local residents in person has made it possible to understand the social dimension better than any document could have provided. The interviews resembled a conversation. While there was room for the respondents to speak freely about the topic and thus reveal new information, an

[3] In august 2018, the Norwegian government decided that also the Fortum waste incineration plant at Klemetsrud, Oslo can proceed with a FEED study (Regjeringen 2018b).
[44] See Dütschke et al., 2016; WWF, 2009; Rootzén et al., 2011.
[5] Boyd (2017) refers to examples from United States (Bradbury et al., 2009; Feldpausch-Parker, 2010; Wong-Parodi & Ray, 2009), Canada (Boyd, 2015, 2016, 2017; Shaw et al., 2015); Australia (Anderson et al., 2012; Ashworth et al., 2010), and Europe (Oltra et al., 2012, Brunsting et al., 2011; Huijts et al., 2007).
[6] See Brinkmann (2014) and King (1994).

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interview guide was followed to make sure questions were sufficiently answered (see Appendix D). The interviews lasted from 30 minutes to one hour.

31 people were invited to participate in the study. The selection was made by picking street names in different parts of Brevik and by randomly choosing a name from each street. The selection was also made by randomly selecting names in residents' association's member list. A balance between men and women was sought. There was also a good age range. The request to participate was made over phone by the lead author of this study and by using an information letter about the project (Appendix D). The participants were reassured that the information they provided would be anonymized in order to protect their identity and to make them feel free to express their views. Interviews were undertaken by the lead author of this study. Some interviews were conducted over the phone, others were face-to-face meetings at a café in Brevik.

The aim of the current study is not to provide the view of all the local residents. The study rather looks at a handful of local residents and the local interest organization linked to Norcem. 14 interviews were conducted in the period from January to February 2018. The analysis is also based on a background conversation with a Norcem employee during spring 2016. Thus, information from 15 persons lays the foundation for the study's analysis (Annex A). The interviewees are anonymized as Interviewee 1-15.

In the study, the local residents are expressed through direct quotations and through the lead author's interpretation of what they are saying. The researcher voice of the lead author is therewith expressed via the reviews of the collected data.

1.4 Report structure

The study has two main focuses in attempting to answer the research question:

- Chapter 2 targets Norcem's general communication approach towards the local residents.
- Chapter 3 accounts for Norcem's communication approach specifically related to the CO_2 capture project and the related social perceptions.

Supporting Chapter 2, Annex B and C illustrate how Norcem has developed in the Brevik society from its early beginning up until present time. Norcem has built trust for more than 100 years and has become a part of the local identity. The Annexes support the argument made in the study that the significance of Norcem's historic and present position in Brevik can be crucial in understanding how people perceive the communication of the CO_2 capture project.

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2 BUILDING TRUST THROUGH THE GENERAL COMMUNICATION APPROACH

2.1 Close cooperation and dialogue with the residents' association

One of Norcem's communication channels with the local inhabitants, is the residents' association *Brevik Vel*. Norcem has had an open dialogue with Brevik Vel since the 1980s. Examples of this dialogue are many, two are provided here. First, Norcem and Brevik Vel meet in the *Contact Committee* 2-4 times per year to go through the emission situation and future plans for the plant, providing a forum in which the Brevik Vel can ask questions and present proposals. Second, Norcem's policy has been that the residents' association receives relevant information before it gets to the media (Interviewee 14). In sum, the residents are taken into consideration by Norcem.

One interviewee describes a fruitful contact with Norcem through many years (Interviewee 9). Another describes a good relation with the plant manager and further states "We want to contribute towards how they [Norcem] can be good" (Interviewee 10).

In practice, using the resident's organization as a means to reach the public implies that Norcem relies on the good reputation of the residents' association. At present, this is largely working well because the public, i.e. the interviewees, have confidence in the resident's association. Interviewees experience that the steering committee is open for input and feedback and consider the committee members to have the right knowledge and competence to promote the case that at present receive the most attention (which is not related to the plans for full-scale CO_2 capture). The current steering committee is perceived as proficient and constructive in its argumentation.

2.2 Shows consideration with complaint function

The internet is another part of Norcem's general communication approach. Norcem has a website and an official Facebook page. In addition to the Facebook-page for the whole company, Norcem Brevik has an additional Facebook page "Norcem Brevik"[7]. Here, Norcem provides an easy way to complain on matters related to the plant's operation and inform about their activities. People have the possibility to make direct contact with plant operators. Much of the direct contact with the neighbors in Brevik happens through this channel (Interviewee 14). At Norcem Brevik's Facebook page "about section", the company states:

> Norcem Brevik wants to be a good neighbor. We will tell about our activities and show who we are. (…) Feel free to send us messages or comments via this page, and we'll try to respond as quickly as possible. If you would like to submit a complaint about dust, noise, odor etc, we have a separate complaint form on our website: www.norcem.no/documentsheet (Norcem Brevik Facebook 2018).

Here, Norcem provides an easy way to complain on matters related to the plant's operation. They also state that they will inform about their activities which they also do, and which prepares the neighbors on what they can expect in the coming hours and days. Here are two examples:

> Due to the pressure schedule for a boat that unload here this afternoon / evening we must continue unloading until midnight. We do our best to ensure that this is done as quickly as possible and with the least possible noise (Norcem Brevik Facebook 01.02.2018).

[7] Norcem Brevik Facebook page has per March 2018 709 followers (Norcem Brevik Facebook 2018).

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> Unfortunately, we have had operational problems and cyclone close on the stove, which means we have to shoot with dynamite. We really hope it will be enough with one shot or two, but it may also be more shots this night if we are unfortunate. Sorry for the noise this causes (Norcem Brevik Facebook 18.12.2017).

Furthermore, on the website for filling out the complaint it is e.g. stated that:

> The complaint form is only processed on weekdays during the day, we try to process all complaints within 1-3 business days. If you want quick notification or feedback, you can call the given phone number for the evening / weekend. (Norcem website 2018b).

All interviewees appreciate the plant's openness and to be oriented about what is going on. This is also expressed in the online posts with comments like "Thanks for the message" and "Good that you let us know". Hence, people feel that they are taken into account. They are being involved. This also appears to create trust among the local residents. When asked whether they have confidence in Norcem, several interviewees underline to possibility to complain and get feedback. As three interviewees state:

> There are things we don't agree on. When they start up their forklifts at two o'clock in the morning, it makes a terrible noise when they reverse. You can't avoid hearing it. [But] when something happens at Norcem and you call to complain, they sort it out. They're doing a good job – the best they can for the local community. (Interviewee 5).

> They answer the phone when people call to complain and, when they have to, pay for you to get your car washed. All of a sudden, something gets discharged from a chimney and rains down on us. If you call then, they'll pay for you to get your car washed. (Interviewee 12).

> Yes, I have [confidence in Norcem]. They've succeeded in managing the company for many years, and they're obliging and listen if you complain and so on. (Interviewee 7).

Several of the interviewees said that the cement plant's treatment of the local inquiries contributed to creating a good impression of Norcem.

2.3 Spreading information through media, internet and information brochures

Norcem's general communication approach also includes sending out press releases and other information material (Interviewee 14). The press releases tend to result in news articles in the local media. Furthermore, Norcem used to send out the information leaflet "Utsikt" and other? information letters. However, as Norcem receives much local media attention and the readers get the same information elsewhere i.e. through Facebook, these letters are rarely sent out nowadays.

This chapter has shown that the resident's association, online channels such as Facebook and the complaint function as well as general information sharing, are important elements of Norcem's general communication towards the local inhabitants. In sum, the plant has built trust with the residents through these channels over a long time.

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3 NORCEM'S COMMUNICATION ABOUT THE CO_2 CAPTURE PROJECT

This chapter presents the specific communication approach of the Norcem CO_2 capture project.

Norcem has largely used the same channels as described in Chapter 2 to communicate the CO_2 capture project. First, the residents' association has been a central channel for reaching out to the local residents. In spring 2017, two representatives from Norcem presented the plans for the CO_2 capture project. In February 2018, Norcem's new plant manager orientated about his plans and ambitions for Norcem (Brevik Vel 2018). In addition, the Brevik Vel steering committee members meet with Norcem and share information in the member meetings and the annual report. Second, the media, website and the social media has been used to share information about the CO_2 capture project. A two-page article in the major Norwegian newspaper Aftenposten triggered the local media, and they are now proactive in getting project updates out to the public. Importantly, many interviewees referred to local media as a central source of information. The CO_2 capture project is described on Norcem's website and the Facebook page of Norcem Brevik. In the period between October 2015 up until March 2018, Norcem posted 14 posts with information about the CO_2 capture project (e.g. link to articles).

Norcem has thus communicated the project through different channels. In addition, the government's funding institution for national CCS projects, Gassnova, has also disseminated information about the project. Compared to the communication about the general operations however, the communication about the CO_2 capture project to the local community has been limited. In fact, Norcem has sought not to communicate too much about the CO_2 capture project too early in the process (Interviewee 13). Keeping a low communication profile has been considered suitable because of the political and economic uncertainty related to the actual realization of the project. Also, and importantly, the cancellation of a previous Norwegian full-scale CCS project has affected the current Norcem communication approach. The Norwegian government previously set out ambitious national plans for CCS in 2008, with a project for a CCS chain with CO_2 captured from the Mongstad oil refinery. In 2013, cost overruns and delays put an end to a project that had been dubbed as Norway's "moon landing" by Prime Minister Jens Stoltenberg. With regards to Norcem's CO_2 capture project, it has been desired "to hold it [the communication] down" until they "have something more to offer ", i.e. more facts to communicate to the public about the CCS project realization (Interviewee 13). Instead of focusing on the public, Norcem has thus focused on reaching out to technology networks at the national and international level and Porsgrunn municipality where Brevik is located.

In sum, Norcem has communicated the CO_2 capture project through several channels. The project specific communication to the local community, compared to communication about general operations, has been limited.

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4 LOCAL RESIDENTS' PERCEPTIONS OF THE CO_2 CAPTURE PROJECT

What do people know about Norcem's CO_2 capture project? How do the local residents perceive it? This chapter presents the social perceptions of the CO_2 capture project. The perceptions have been shared on the interviewees own initiative i.e. they were not asked directly to answer yes or no to each of the perceptions (see Annex D).

4.1.1 Residents believe that the project can stimulate local employment

Haug and Stigson (2016) find that Porsgrunn municipality considers CCS as important to legitimize and maintain the industry in the region, and that it can stimulate employment. Equally, three interviewees state on their own initiative that the project will stimulate job creation. One of the interviewees has an engineer background and a genuine interest in technology development. The interviewee believes the captured CO_2 should be used instead of stored and argues that using the CO_2 would create positive spill-over effects in the local community. The interviewee also considers the current CO_2 capture project as positive for job creation (Interviewee 10).

4.1.2 Residents believe the project can be good for the environment

Five interviewees directly state on their own initiative, and thus has the perception, that the project is good for the environment.

> (…) It is important to reduce the CO_2 emissions. I know that the cement producers stand for a large amount of the world's emissions. (Interviewee 10)

Also, at the end of each interview, people were asked to make a standpoint on the statement that "It is important that that Norcem contributes with environmentally friendly technology to solve the climate crisis". All interviewees agreed to the statement.

4.1.3 Residents are concerned about how the project affects their living conditions

Some interviewees are concerned with how the project will affect the local residents' living conditions. One interviewee argues that Norcem needs to deal with risk challenges related to health, noise, smell and storage of the CO_2.

> (…) amine emissions aren't really good for your health, so that has to be sorted. Plants like these make such a terrible noise, so we have to find a solution to that. (Interviewee 10).

Further, one interviewee who has a family member suffering from a lung disease states:

> My mother has lung problems. As for Norcem – it's good that the plant is there, but it spews out so much dust. I think that's bad. When I lived in [road close to Norcem] I had to wash my window every day even though I'd closed it. I don't like seeing people living so close to Norcem, because of all the dust they emit. They may be working to emit less, and perhaps that day will come. (Interviewee 11).

The quote indicates that people may be concerned with how the CO_2 capture project affects people's health. Furthermore, one interviewee refers to the location of the project as a concern arguing that the connection between land and ship should be placed where it is considered most favourable for local households.

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> [It's important to consider] the connection between an onshore CO_2 gas plant and the ship. The site where the gas is transferred is a big factor. There have been many alternatives. One is very close to people's homes, and another is at the end of the quay. Even if there's no special risk attached to that, will people be thinking that they don't want a tank located so close to their homes? (Interviewee 8).

It appears that despite Norway's long traditions of handling gas in terms of combustible natural gas, placing the CO_2 transfer connection close to peoples' homes can lead to a general worry and unrest in the neighborhood, which must be addressed.

4.1.4 Residents mix the project with other projects and request more information

While some of the interviewees seem to understand what the project is about, others mix the CO_2 capture project with another project dealing with CO_2 which is owned by another company. One interviewee who is not familiar with the CO_2 capture project is afraid that the project may have a negative impact on the local community. The interviewee believes that Brevik Vel should follow up on this case so that the result is the best possible for the local environment. Other interviewees request more information:

> I don't know how many people have been interested in the carbon capture project, but I try to keep myself informed. I went to a briefing about the project, but I can't say that I know much about the technical process going on at the plant. I think there'll be a need to give out some general information to local residents. (Interviewee 9).

The reason for Norcem's limited communication about the CO_2 capture project is, as already mentioned, linked to the uncertainty about the actual realization of the project up until the decision in May 2018 by the Norwegian Government that Norcem is a candidate for full-scale CO_2 capture in the Norwegian full-scale CCS project.

4.1.5 A way forward for Norcem in their communication approach

In sum, there are positive perceptions of the CO_2 capture project, related to job creation and environmental impact, but the study also revealed worries and requests for more information. As communication about the CO_2 capture project with local residents in Brevik is pursued, Norcem could confirm the positive perceptions with studies about job creation[8] and the need for CCS to limit global temperature increase[9]. Norcem could also address worries by providing information based on scientific evidence regarding topics such as amines and health (see e.g. de Koeijer et al, 2013).

4.2 Local involvement in the CO_2 capture project

The previous chapter showed that Norcem has been successful in informing and involving the local community of Brevik in its general communication approach. This chapter has so far shown that Norcem has informed about the CO_2 capture project. The next question therewith is if they also have involved. At present, the Brevik Vel committee members, the regular members and the other residents do not feel that they have been involved in the CO_2 capture project. Three

[8] After the interviews were undertaken, SINTEF and NHO have published the study "Industrial opportunities and employment prospects in large-scale CO_2 management in Norway". https://www.nho.no/contentassets/e41282b08ceb49f18b63d0f4cc9c5270/industrial-opportunities-ccs_english.pdf

[9] As a reference, IEA Energy Technology Perspectives (2017) project that CCS will contribute with 14% of the CO_2 emissions reductions necessary to reach the 2DS (2 Degrees Scenario, where global temperature increase is limited to 2ºC) and with 32% of the additional emissions reductions required to reach the B2DS (Beyond 2DS).

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interviewees do neither want to be involved in the project, some because they are simply not interested, others because they consider that the project should be handled by experts. However, five interviewees state that they *would* like to be involved in the project. This group expresses a need for more in-depth information and knowledge to be able to ask relevant questions throughout the process. I.e. they consider information and knowledge as a means to be involved. Other than that, most interviewees where not sure exactly what form the involvement should take. Altogether, as it is not obvious from the current study what residents actually mean by being involved, this issue should be explored further in other studies.

Building on the previous paragraph, the Norcem case study sheds lights on an issue of more general character; the interaction between a local community and industry. To be involved in topics that will affect oneself, is in many ways a basic democratic principle. In situations where complex industrial projects meet the individuals' demand/desire to be involved despite the lack of sufficient technical knowledge, the key question that remains open in the present study is how this best can be done.

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5 SUMMARY AND CONCLUSION

This study has investigated Norcem's communication of its CO_2 Capture Project and how the local residents perceive the project. Norcem has communicated about the project through different channels, but only to a limited extent to the local residents. The community's knowledge and perceptions about the project varies. While some have never heard about the project, others have in-depth knowledge. Several interviewees state on their own initiative that the project can stimulate increased local employment and that reducing CO_2 emissions is positive for the environment. Also, some interviewees are concerned with how the project will affect their living conditions. It seems that people regardless of their insight into the project appear to create perceptions of it.

The study finds that Norcem as a cornerstone company in Brevik has succeeded in building trust for over a century. Norcem has informed and involved the local residents in its general operations. This is largely the starting point from which local residents will perceive the Norcem's CO_2 Capture Project. For this reason, the cement plant finds itself in a suitable situation for further communication about its prestige-project. Hence, *trust, resulting from many years of open and accommodating communication with the local society, can be a key to gain support for a CCS project.*

The findings in this study should be further investigated. A larger study including further qualitative interviews, the use of quantitative methods and more in-depth analysis of primary sources may increase our knowledge about and understanding of the social perceptions of Norcem's CO_2 Capture Project. Also, a comparative study on the public perceptions of a variety of planned (or, if possible, operating) CO_2 capture projects from other industrial or power plants in different types of neighboring communities, would create more and broader knowledge about the perceptions formed about CO_2 capture. Furthermore, it should be relevant to explore what could be the means to create local involvement in a project as technically complex as the Norcem CO_2 Capture Project.

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A OVERVIEW OF 11 INTERVIEWEES' PERCEPTION OF THE CO_2 CAPTURE PROJECT [10]

	Heard little or nothing about the project	Heard something about the	Knows much about the project	General support	Positive for job creation	Positive for the climate /environment	Possibly negative for local community	Project can affect living conditions	Expensive project	Favour other project alternatives	Project is not communicated enough	Mixing with other projects
Interviewee 1		x		x								
Interviewee 2	x											
Interviewee 3	x							x				x
Interviewee 4		x							x			
Interviewee 5		x										
Interviewee 6		x		x		x						x
Interviewee 8			x	x	x	x		x			x	
Interviewee 9		x		x		x		x				
Interviewee 10			x		x	x	x		x	x	x	
Interviewee 11	x											
Interviewee 12		x		x	x	x						x

[10] The columns describe what the interviewees highlighted about the project.

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B OPERATING IN AN INDUSTRY FRIENDLY ENVIRONMENT – A SHORT INTRODUCTION TO THE BREVIK COMMUNITY

Annex B and C illustrate how Norcem has developed in the Brevik society from its early beginning up until present time. Norcem has built trust for more than 100 years and has become a part of the local identity. The Annexes support the argument made in the study that the significance of Norcem's historic and present position in Brevik can be crucial in understanding how people perceive the communication of the CO_2 capture project.

B.1 Coastal village proud of its long industrial history

Situated on the South East coast of Norway, Brevik enjoys the image of being an idyllic coastal village with wooden houses and small streets. Today, Brevik has around 2700 residents. Because of its geographical location, Brevik has been attractive for both tourists and the shipping industry. In fact, trade and shipping were the most important businesses in Brevik until year 1900. From that time on, modern industry settled in the village. The new business dealt with the production of canned and iron products, mechanics and engines, toys and mineral water, ice-cream, and cement. Importantly, people living in Brevik today are very much aware the local industrial history – which Norcem has been a part of for over 100 years.

> Dominated by *Dalen Portland Cementfabrik AS*/Norcem and *Trosvik Verksted* [boat builders]. These were the two big employers here. But, heavens above, living here in Grenland, there were many people who worked at Hydro, Elkem and the other companies on Herøya. Brevik was once a real industrial town. (…) (Interviewee 4)

> Brevik was a vibrant town, wasn't it, with a lot of timber merchants and that sort of thing. We had ice ponds and transported ice to England. Most people in Brevik had their own businesses or were linked to sailing boat trades. Once Norcem got started, a lot of industrial jobs began to be created (…). (Interviewee 2)

B.2 Need for more jobs locally

The once lively village is today considered as calm and quiet because there are few shops and stores. Several of the of the interviewees refer to Brevik as a place where people live, but not work. Consequently, when asked about what will be important for Brevik in the future, all interviewees highlighted the need to increase the local business activity to maintain and create jobs and thus make it possible for people to work closer to their homes.

> It's important to focus on Brevik retaining its own identity and not becoming swamped by Grenland. We can offer activities, employment and lots besides. [Ensure that] people don't just abandon us and turn the town into a dormitory. Focus on attracting businesses, internet-based companies and tourism. (Interviewee 9)

With regards to employment, the existing local industry – hereunder Norcem – was referred to as a very central cornerstone company. Norcem (former A/S Dalen Portland Cementfabrik) started production in 1919 and quickly took an important place in the village's economic life. The plant is still an important employer and the local residents consider that Norcem eventually can play a central role in creating more jobs.

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B.3 Village with a rich association life

The *dugnad*[11] was another central contributor to the village's liveliness. As one interviewee states there was "a rich association life" (Interviewee 3). The dugnad is still alive today and the local residents retain a strong community spirit. Among many, there seems to be an unspoken truth, that if you want good living conditions and feel part of the Brevik society, engaging directly in or supporting local associations and teams can be key.

> [Brevik is a] very nice, small town, full of very enthusiastic residents. We have lots of clubs and associations. Sports clubs, scouts, residents' associations, a historical society, private clubs, revues, drama groups – for children as well, a sailing club, a boat club. Lots of things to get involved in if you want to (…). For such a small area, [Brevik has] an incredible number of enthusiastic people. (Interviewee 2)

> That we have some values here that you won't find anywhere else (…). And I have to say that this is impressive, isn't it? Whether our level of voluntary work is on another level, I just don't know, but everyone can see that we have a core of people who you'll always find leading the way in many of our clubs and associations. You see the same people all the time. Someone will always step in if another can't manage it. But I think that there are a lot of people who are good at supporting the "leading lights". (Interviewee 10)

A central actor is the resident's association Brevik Vel, which Norcem uses a key communication channel to reach the local community.

Furthermore, Norcem has through many years supported different social activities in Brevik e.g. marching band and celebration at the national holiday on 17th of May. Brevik retains a strong community spirit and many takes part in a wide range of voluntary activities. In this regard, many consider Norcem's engagement in the community's social activities as positive. The engagement helps to integrate the plant into the everyday lives of the inhabitants. By doing so, Norcem also consolidates its position on a community level.

This Annex has shown that Brevik is characterized as an idyllic coastal village with a significant social engagement which for many years have put its mark on the city. Historically, Brevik is also closely associated with trade and industry. People appreciate the industry because it is an important part of the local history and identity. It has also been an important employer and contributor to the social activities in the community.

[11] Norwegian word signifying that individuals work together (without payment) for a common purpose and for the common good.

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C NORCEM IS PART OF LOCAL HISTORY AND IDENTITY

Annex B and C illustrate how Norcem has developed in the Brevik society from its early beginning up until present time. Norcem has built trust for more than 100 years and has become a part of the local identity. The Annexes support the argument made in the study that the significance of Norcem's historic and present position in Brevik can be crucial in understanding how people perceive the communication of the CO_2 capture project.

C.1 A cornerstone: Norcem created jobs

Norcem was established in Brevik in 1916 and started the production in 1919 (Norcem 2018)[12]. Providing jobs to many of the locals, the plant quickly became an important player in the village's economic life. Already in 1920, the plant produced 68,000 tonnes of cement, and the annual production was doubled during the next five years. Already before the production started, many people worked at the cement plant which built houses for workers and functionaries. At its peak, 700 people worked at Norcem. People came there to work, they settled and Brevik became a workers' village. To a certain extent, one may argue that the first decades of the plant's operation, laid the basis for Brevik as we know it today (Norcem 2018).

After the Second World War, the demand for cement was big and the plant expanded throughout the next decades. In the early 1970s, the annual production was over 1.3 million tonnes of cement, and up to 600,000 tonnes were exported. Export has been an important business activity since the very beginning. The plant was based on the assumption that one would produce more than national needs, and there was an optimistic expectation that the plant's reasonable production costs and the position near the sea, would make the cement competitive on the international market (Norcem 2018). Thus, as the global demand for cement increased, Norcem was able to maintain and create jobs at the plant in Brevik. Today, Norcem still exports large volumes from the plant in Brevik[13] and is still a cornerstone company. In 2018, Norcem Brevik has 200 employees and most of them live in the nearby area.

C.2 The personal experiences of the plant

People's personal histories related the plant have developed in line with the development of Norcem itself. As a cornerstone company, most people have a family member or know somebody who works or has worked at Norcem. As one interviewee states when asked about what he knows about Norcem:

> (…) Otherwise, almost everyone in Brevik knows someone who works there. That [the plant] has been important to the town, it has provided jobs that have encouraged people to settle here. Families that have worked there for generations. (Interviewee 3)

Several of the interviewees mentioned Norcem or talked about it more extensively. One interviewee recalled how his grandfather eventually got a job at the workshop when another family member already was working at the plant:

> (…) My maternal grandfather later got a job at Norcem. After a while he got a job in the workshop there. When he started [at Norcem] he worked all over the place. He was recommended by a relative who also worked at Norcem. (Interviewee 12).

[12] Norcem is used throughout this study. The name change came in 1968.
[13] Between 100 000 and 250 000 tonnes each year.

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Another interviewee has a dad who worked and a husband that still works, at Norcem. Growing up in Brevik and living there a whole life, the interviewee is very much aware of the plant and its value for the community. This person has visited the mines both as a child and an adult. Hinting about proudness, the interviewee talks eagerly about the life of the plant workers:

> Both my father and grandfather worked down the mine at Norcem. Just as many others here in Brevik have done. Dad began when he was just 18 (…) [Down in the mines it's] as black as night. We went on bus trips, but then they were stopped. (…) They drive down into the darkness. The only lights are those on the trucks and helmets. When they get to their work locations it's completely dark. They know the tunnel network [in the mine] like the backs of their hands. Many people don't know about it. Even some living in the area have never heard about it. Some people believe that there are coal mines where they're sent down in shafts, but in fact they drive along tunnels. It's completely quiet, you can hear some running water. It's a very peculiar feeling. There's a vein at about 300 metres. Right now, they're working just outside where we live. Because they work underground, they work shorter hours. They're driven down at seven in the morning and brought back before lunchtime. They wear thermal suits, overalls and helmets. There's a separate workshop down there with lights. "*Knusern*" is where they crush the rock and make cement. The buses were full when they ran the guided tours. (Interviewee 5).

People without any job relation to Norcem still have their own stories about the plant. Furthermore, one interviewee mimics his time as a child:

> They've [Norcem] been here since the beginning of the twentieth century, and people say it has been a good company to work for. But I don't know much about how it operates, only what I've seen when I've driven past or cycled around the prohibited areas. When I was […] delivering flowers, I cycled through prohibited areas. It wasn't a very good idea. (Interviewee 12).

Interestingly, Norcem has also been a part of childhood fantasies. One interviewee recalls from childhood the idea about what the plant was all about:

> I used to think that the rubber crumb on football pitches came from Norcem. My sibling thought that the three chimneys spewed out coffee, tea and sugar. It came as a bit of a shock to find out that they made cement from rock, and not the big rubber granules. The biggest dream I had when I was little was to jump into the pile, but it turned out to be gravel. (Interviewee 11)

This section has described how Norcem developed and became a cornerstone business in Brevik. Is has shown that the plant gave rise to the Brevik of today. It provided and still provides, jobs and thus income for the local residents and the personal stories from the plant are manifold. These stories account for a part of the explanation as to why and how Norcem is a part of the local history and identity in Brevik.

C.3 Steady operations: Adjusting to environmental concerns

Norcem has dealt with changes in the market such as environmental requirements. When asked about the impression of Norcem, an interviewee sums it all up:

> I have the impression that it is a good, solid company. They've been smart. When I first came to Brevik, there were almost 600 people working at Norcem (Dalen). They have since modernised and become more efficient. Today I think there are about 180 people employed at the plant. It was once a major employer, but has since been downsized. But it is a company with big ripple effects. Survival for a 100 years must be a sign that it's a good company. (Interviewee 4)

The interviewees believe it is positive that Norcem takes environmental responsibility. All interviewees supported the statement that "It is important that Norcem contribute with environmentally friendly technology to solve the climate crisis".

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In sum, Annex B and C have illustrated how Norcem has developed in the Brevik society from its early beginning up until present time. Norcem has built trust for more than 100 years and is part of the local identity.

> "Obviously, I'm very familiar with Norcem. It's not very far away, after all. In some ways it's almost a sacred place. They were here before I was, so they may as well stay. You get a little dust and dirt from time to time, but you learn to live with it, don't you. (Interviewee 3)

The significance of Norcem's historic and present position in Brevik can be crucial to understand how people perceive the communication of the CO_2 capture project.

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D INFORMATION TO INTERVIEWEES AND INTERVIEW GUIDE

Information letter

Dear inhabitant of Brevik Vel,

The research institute SINTEF wishes to get in touch with people in Brevik to talk with them about their opinions of their own local society. We are writing a scientific report in an on-going research project. The project is considered important for the development of Brevik, and it is therefore important to get in touch with you who are a part of the local community. The only requirement for participation in the project is that you have lived and/or worked in Brevik. I am interested in your perceptions/experiences as a person in the local community. I plan to come to Brevik to conduct interviews. The meetings are planned to last approximately 30 minutes. The interviews will be anonymized according to guidelines for research ethics. The information you provide will not be traceable to you. You can at any time withdraw from the project without any reason.

Would you be interested in participating?
When will it be suitable for you to meet?
Where in Brevik can we meet? (Suggestion: Sjøloftet, Stålpressa Øl & Vinstue).
If meeting is not possible: Would you be interested in a phone interview?
If you have questions, you can contact me on phone or e-mail.

Introduction to interview

Present myself and the project (see information letter).

Practical information and confirmation: I am going to use a recorder during the interview. You will be anonymized in the study. You have the possibility to withdraw from the study at any time without any reason, both during and after the interview. Does this sound OK?

Themes for interviews

Theme 1: The development of Brevik as a small community (3000 inhabitants)

- Theme 1.1.: Personal connection to Brevik, and Brevik "in the old days"
- Theme 1.2: Brevik Today
- Theme 1.3: People's attitude to industry in and around Brevik

Theme 2: Experience with and knowledge about the Norcem CCS project

- Theme2.1 Experience and knowledge, and what it is based on
- Theme 2.2. Involvement in the Norcem CO_2 capture project

Theme 3: Opinions about how a society should tackle the climate crisis

Ending the interview

Thank you for your time. Your input is very valuable to the study. In the days and weeks ahead I will transcribe the interview. When it is done I will delete the file containing this interview. If you have any questions you are welcome to contact me on e-mail.
Can I contact you if I need clarifications or additional information?

Thank you!

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