



# Note 3

## Key barriers in the 5 cities



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This section discovers the barriers experienced in the 5 cities, and thus serves to designate areas where further adjustments or support is needed to accelerate the utilisation of CCSU technologies in cities, as well as to illuminate whether the barriers suggested in literature likewise are present in a city perspective.

## Cities have limited mandate for accelerating CCSU projects

CCSU is in the 5 cities perceived as a needed method to meet the goals defined in their climate agendas. Cities however have limited mandate for influencing the terms of operations at local energy utilities, despite the energy utilities being partly or fully owned by the cities. This is often due to the energy utilities being operated as private sector businesses focused on demand, competition and revenue as well as influenced by political direction, and where greener solutions often is a conditional desire. The cities' current activities in introducing CCSU technologies are therefore mainly based on establishing collaborations with relevant partners and point sources, conducting research and advocating for the acceleration of more influential methods to be undertaken to tackle the climate challenges such as CCSU. The energy utilities in these cities are in general already positive stemmed towards CCSU and are exploring the opportunities for commissioning carbon capture in the near future, especially since the use of waste incinerations may decrease in the future, making CCSU a means to increase market competitiveness and ensuring future operations.

The cities' mandate is however limited in relation to the decisions made at energy utilities, which poses a challenge for the cities' abilities to directly accelerate the use of CCSU technologies.

## A new and unexplored technology

As CCSU generally is a new area considered for emission reduction in these 5 countries and cities, several questions of applying the CCSU technologies yet remain unanswered and unexplored, and in most of these cities CCSU is a new discussion both at a political and community level. Norway however already has quite a lot of experience in the field of CCS, and Oslo's readiness and level of maturity therefore generally exceeds the development seen in the other countries and cities, despite their equal interest in reducing emissions through CCSU. The level of experience is a concern expressed in some of the cities where the discussion of CCSU is rather new, and where CCSU thus is handled with high precaution.

Other concerns of introducing a new technology is found in the settlement of a new value chain for CCSU, where

technological deliverables may cause difficulties throughout the entire chain, and where new market infrastructure is needed. The unknown deliverables of the CCSU technologies for some cities moreover raise a concern of how longterm sighted the solution is, and whether better solutions will arise in the future. For some cities the CCSU technologies is considered a short-term solution that can provide CO<sub>2</sub> reduction here and now, where others perceive CCSU as a measure that can be used to reduce CO<sub>2</sub> emissions in a long-term perspective.

For the cities in which the work with CCSU is new, the good story exemplifying the impact and successfulness of CCSU is desired, in order to invalidate the concerns linked to being first-movers, and to clarify the specifics of how the technology is being used elsewhere. However, while some cities are concerned about the risk of being first-movers, others have a clear desire of being first to implement the CCSU technologies, and to lead by example.

## Financing CCSU

In predominance the cities are finding it difficult to clarify financial models for CCSU, as the economic incentives for investing in CCSU currently are lacking, especially with CCU technologies not yet being commercially mature, which in the long term could accelerate a more circular economy and circular use of resources. Moreover, the cities express concern of how the price of pollution in the CO<sub>2</sub> quota system is less costly than reducing emissions, or does not cover the waste industry, and hence does not provide any direct economic incentives. The cities therefore stress how investing in greener technologies and renewable energies not always is the obvious choice from an economic perspective, which for energy utilities is a crucial part of their terms of operation.

Looking into financial models such as higher prices on energy and waste incineration is a measure that the cities have considered, however it is a general opinion that the citizens are already paying enough, and that consumer pricing may create increased market competition, which will further challenge the incentives for choosing the currently more expensive green solution. An increased consumer payment is thus not perceived as an ideal model for financing CCSU in these cities.

State support through subsidies are by the cities considered as the most crucial element in establishing a financial model for CCSU investments and as the main driver, as the perception is that the market is not ready to pay more for green energy, and as the current market demand for buying CO<sub>2</sub> does not match the supply that carbon capture would provide, a clear business model is averted.

From a national perspective, storing carbon for other countries could be part of a financial model for those with storage capacities. Storage does however not provide a business case for energy utilities looking into invest in new capture facilities. Creating a storage for international captured carbon could potentially create an incentive for creating state subsidies in countries with storage possibilities. The conclusion stressed by the 5 cities is however clear, as they emphasise that without financial support or an identification of new financial models, it is difficult to realise CCSU in the near future.

### Political acceptance

The governments in these 5 countries are in general supportive of CCSU in the sense that the technology is increasingly being discussed as a solution to climate change and is included in strategic papers. Especially IPCC's statement on the need for CCSU, and an increased pressure on governments to take more drastic actions to meet their climate goals, have encouraged governments to start exploring the opportunities for CCSU. The level of development in the political arena however differs in the 5 cities, and while some have CCSU included in their strategic papers and in political discussions as well as are sponsoring research in the field, others have just initiated the political debate of CCSU. Earlier CCSU has been a matter that several of the cities have been advised by politicians to stay out of, however the field is moving towards a higher political acceptance.

Despite the increasing political interest in the CCSU technologies, the 5 cities see a number of areas, where political structures may complicate the feasibility of realising CCSU.

Some cities point out the concern, that politicians often want to see results in the very short-term, and therefore may not look beyond 5-10 years out in the future. Despite the cities' interest in having CCSU to deliver rapid results, the concern is that a short-term perception of CCSU may complicate the realisation of CCSU, as it should be perceived and invested in in a long-term perspective. This is due to the high investments that constructing carbon capture, storage and usage facilities as well as transportation, storage sites entails, as well as preparing the technological market may not be economic efficient in the beginning but is expected to follow an economic of scale development. The perception in the cities is moreover that the start-up costs of CCSU is a barrier for full political acceptance and action, as the cheapest emission reducing method often is preferred. The prospects of CCSU leading to negative emissions is however believed to increase political support and action for change, why there is a need to further develop the technology for carbon utilisation as well as to intensify investments in biomass.

### Public acceptance

#### *Increased public attention to climate change*

The awareness of climate change and the importance of finding adequate measures has in general been of increasing interest in the public, and the public are today more involved in the climate debate than earlier. However, the public in these 5 cities have limited or no knowledge of CCSU, as the technology is often accessed at an expert level rather than considered as common knowledge. The cities are therefore in general not fully aware of how the public opinion is stemmed towards CCSU, and there is therefore an uncertainty associated with public acceptance or resistance. As the technology has been exercised in Norway, there in Oslo is a confidence that public opinion will not pose an issue for establishing CCSU, as there is a public trust in the country's know-how. Unawareness can however potentially lead to public resistance as a result of an uncertainty of how the technology works and what impact it may have on its surroundings, especially in combination with the proximity of the CCSU facilities.

#### *Not in my backyard*

The 5 cities all agree that if a storage site were to be located near the public, resistance would be expected. The cities that are planning to transport the carbon to other countries due to lack of storage capacities, are not expressing any concerns in terms of carbon storage and public involvement. There is a general belief that public concern arises if CCSU projects are to be established close to the public sphere, and thus storage far from the coast or in other countries are of minor concern. Public resistance could therefore potentially create a barrier for the establishment of CCSU, as there is a mismatch between accept of climate enhancing technologies and implementation. Similar opposition is however seen when locating other industries or wind turbines close to the public.

#### *Public funding of industry emissions*

Other matters mentioned as potential triggers of public resistance are if carbon were to be stored in oil fields to enhance oil production, as such a process will lead to emissions released at a later point as well as accelerate an emission-heavy industry. Also, there is a concern that the public would oppose against tax funded finances flowing to companies and large industries to pay for CCSU facilities, which could enable business as usual as well as slow down the development of other sustainable solutions. Some cities therefore would expect resistance if large CO<sub>2</sub> emitting industries were funded based on public taxes, which would be the case of subsidies.

One view is furthermore, that waste incinerations will not be part of the future energy system due to the forthcoming of circularity, why investing in CCSU could delay the progress of finding other sustainable solutions.

### *Financing CCSU through public taxes*

Economics are not just a concern at city level and for the energy utilities but is likewise mentioned as a public concern that could potentially lead to resistance against investing in CCSU. Some argue that the resistance could be based in the economic costs associated with being first-movers, while other concerns are that those not passionate or concerned about climate change would oppose that public finances are used to invest in CCSU. Increased support is however expected if investing in CCSU were a less expensive method to reduce emissions, compared to other sustainable solutions for generating energy.

### **Storage and transportation**

The expected barriers for storing carbon varies a lot in the 5 cities. For some storage is not considered to be an issue, as the carbon is either stored under sea level (far from the public and homes) or is transported to storage sites in other countries such as in Norway. Others are expecting public and potentially political/legislative resistance towards storing carbon within own borders.

Local transportation is on the other hand not expected to cause any problems or worries, as this would be done easily by ship, road or through pipes and at rather inexpensive rates.

The largest obstacle may therefore exist in creating a legal agreement between the countries of capture and storage, as the plans for storage should be clear before investing in a CCSU project, which currently may act as a barrier for investing in CCS. It should therefore be clear how CO<sub>2</sub> is transferred between EU countries and between EU and Non-EU countries, as well as the price for storage should be identified before investing in CCSU.

Storing of CO<sub>2</sub> moreover requires that any potential effects on the surrounding environment constantly are monitored, which is associated with continuous expenses throughout the life expectancy of the site as well as after the closure of the storage site.

The North Sea however has capacity to store carbon from the entire Europe, and hence has a large potential for CCS.