INTRODUCTION TO CCS

An important and essential step in the reduction of global emission of greenhouse gases is the large scale application of carbon capture and storage (CCS). CCS is viewed as the required intermediate step to a less carbon intensive society and necessary to avoid or reduce the impacts of human activities on climate change during this transition period.

CCS consists of several steps, starting with the separation of carbon dioxide from streams emitted by industrial operation. The capture of CO_2 at the source is a well known technology already used for decades. Different technologies are available depending on emitter type and location of the capture technology in the chain. A lot of research is underway to lower the energy consumption of the capture processes to reduce the impact of the capture process on the efficiency of the chain.

The final goal of CCS is storage of the captured CO_2 in geological formations. These can be oil or gas reservoirs, but also water bearing formations like aquifers.

The advantage of oil and gas reservoirs in comparison with aquifers is the historical reservoir production data collected, making the storage more predictable. For aquifers more extended reservoir surveys are most likely required. The storage potential for aquifers is however very large. An application of CO_2 storage with an economical incentive is the application of CO_2 for Enhanced Oil Recovery (EOR).

The link between capture and storage is not included in the name CCS, but is very important and key to project success. Transport of CO_2 is done either at high pressure or as a refrigerated liquid, for which in both cases energy intensive handlings are required. Optimization of the transport chain will directly benefit the overall chain efficiency. The transport part of the overall CCS chain becomes more important as the total amount of CO_2 transported increases. Emitters and sinks are in most cases developed individually for the intended capacity, but the transport chain will have to accommodate the increasing flow rates over the years as CCS develops. A flexible and modular design of the transport system is required, providing the freedom to shift, direct and redirect the CO_2 flows to and from different locations.

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