

Nordic CCS Summer School - August 18-23, 2013

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Attendees and Lecturers at the 2013 Nordic CCS Summer School. Here at the island of Munkholmen outside Trondheim.

Photo: Sithara

The NORDICCS consortium is a CCS Center of Expertise consisting of members from leading Nordic CCS research and industry partners. The aim of the Center is to develop **Joint Nordic Strategies** to promote **Widespread Implementation of CCS**, and effectively **Communicate** the strategies to the **Decision makers** and the **General public**.

In order to achieve long-term CCS deployment there is a need to integrate public information with education and outreach. Successful implementation will require hiring, training and retaining a large workforce of skilled professionals to design and operate facilities in order to enhance the Nordic competitiveness in the industry. Particularly in Norway the demand for skilled engineers is high due to a boom in the oil and gas related industries. It will be important to establish and nurture career networks and facilitate research opportunities in the area of CCS. The positive synergies and benefits from Nordic collaboration on CCS make the necessity of Nordic networking in the area even more important.

A very important part of the NORDICCS outreach program was therefore the arrangement of a Nordic CCS Summer school, which was held on August 18-23, 2013. The summer school was a one-week intensive course on CO₂ capture, transport and storage and legal and framework conditions necessary for implementation. It was intended mainly for Ph.D students and young CCS professionals new to the field. The course had a distinct

industrial focus that was ensured by involving lecturers from industry, as well as a one-day excursion to the CO₂ capture plant at Technology Centre Mongstad (TCM). The rest of the course was held on the NTNU campus in Trondheim. This allowed the students to obtain a good understanding of the size and complexity involved with industrial CCS projects as well as the theoretical knowledge of CCS. By covering the complete CCS value chain and addressing framework issues such as life cycle analysis, financing, HSE, public acceptance, political and legal issues and innovation, the students will develop knowledge on how CCS works in "real life". An important goal with the course was to develop a Nordic CCS network between the participants, so there was also focus on social events in the evenings in addition to the group work which brought the participants closer together.

A very positive sign from the start was the great interest from Nordic students of CCS in participating in the course. A total of 55 applications were received for the 30 participant spots at the course ensuring a high academic level among the participants. There was a much higher number of applications from Norway and Sweden than from the other Nordic countries so we ended up with 11 students each from Norway and Sweden, 3 from Denmark and Iceland and four from Finland.

Program

The Summer school started with an introduction meeting in Bergen on Sunday afternoon followed by a dinner at the "Fløyen folkerestaurant" with fantastic views of the City of Bergen. Here we were pleased to have the Mayor of Lindås Municipality, Ms. Astrid Aarhus Byrknes, Krf, attend the dinner to talk with the students and give her perspectives on the importance of CCS and the Technology Center Mongstad for her community and Norway.

The first full day of the course was spent at TCM the Technology Center Mongstad outside Bergen in the Lindås municipality. TCM is a large scale test center for commercial CO₂ capture technologies. Here the students were given introductions to the CCS capture technologies developed by Aker Clean Carbon and Alstom. Both technologies are amine-based. We then had the opportunity to tour the facility to see the CO₂ capture processes in operation.



Introduction to CCS capture technology at Mongstad (Foto: An Hilmo, SINTEF)



Students dressing up for a tour of the Mongstad Facility

Photo: Sithara

The summer school then moved on to Trondheim and the NTNU campus where 3 intensive days of lectures on all aspects of CCS followed. The lecture program can be found in this link: <xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx>



The Main Hall at the NTNU University, Trondheim, Norway



Professor Olav Bolland, NTNU was responsible for the academic part of the course.

Photo: Sithara



Dr. Nils Røkke, SINTEF giving an introduction to CCS

Photo: Sithara

The lectures were given by the leading university and industrial researchers in the fields of CO₂ capture, transport and storage as well as framework conditions, legal and political aspects, HSE and communication ensuring a complete knowledge of all aspects required to implement CCS projects.

Group Work and Final Exam

The students were able to receive 3 credit hours for attending the CCS summer school upon passing an oral Exam where they presented and answered questions regarding their group work on Nordic CCS Roadmaps.

Each group was challenged with the task of producing their own roadmap for implementation of CCS in the Nordic Countries. The five groups were put together with representatives from each country in all the groups as far as was possible. This was in order to ensure good network building for CCS between students from different countries, and to ensure that the opportunities and needs of each country was well represented. This was important as the degree of maturity with respect to CCS research and implementation differs significantly between the five Nordic countries.



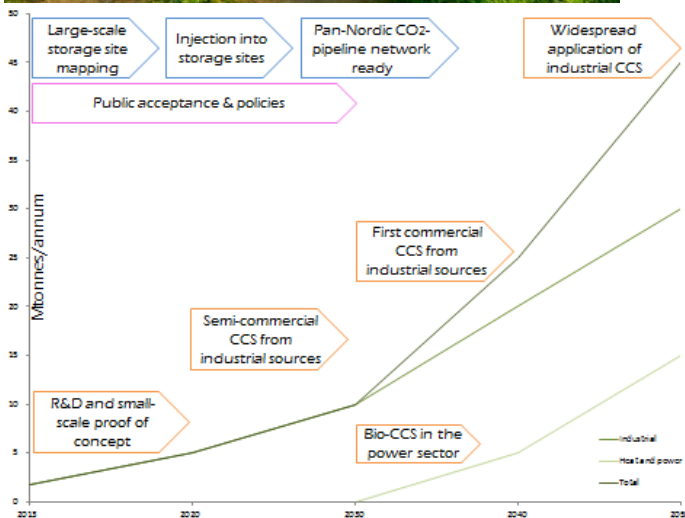
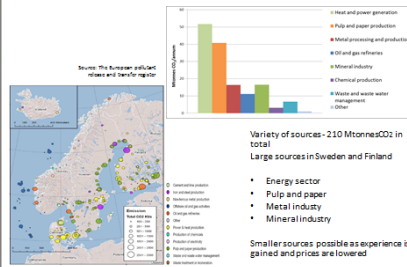
Presentation of Group Work A prize was awarded for the best Nordic CCS Roadmap
: Nordic CCS Roadmap

Photos: Marit Mazzetti, SINTEF

Excerpts from Nordic CCS ROADMAPS made by the Student Working Groups



CO₂-emission sources in the nordic countries



Photos: Excerpts from Students Nordic CCS Roadmaps

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http://www.sintef.no/Projectweb/NORDICCS/CCS_SummerSchool/

For further information, see the following web pages:

<http://www.nordicinnovation.org/>

<http://www.toppforskningsinitiativet.org/en>
<http://www.sintef.no/NORDICCS>
<http://www.sintef.no/SINTEF-energi-as/>