

Accelerating CCS Technologies

Deep Dive Workshop at Manila
08 June 2018

Co-funded by the
European
Commission within
the Horizon 2020



Ragnhild Rønneberg
ACT coordinator
The Research Council of Norway
rr@rcn.no

Summing up – already from the start

- Carbon Capture, Utilisation and Storage (CCUS) is a valuable and natural part of the toolbox for combating climate change
- Knowledge sharing and international cooperation – necessary !
- ACT's goal is to stimulate to projects accelerating the deployment of CCS in
 - Energy sector
 - Energy intensive Industries



...but first some words about CCS in Norway

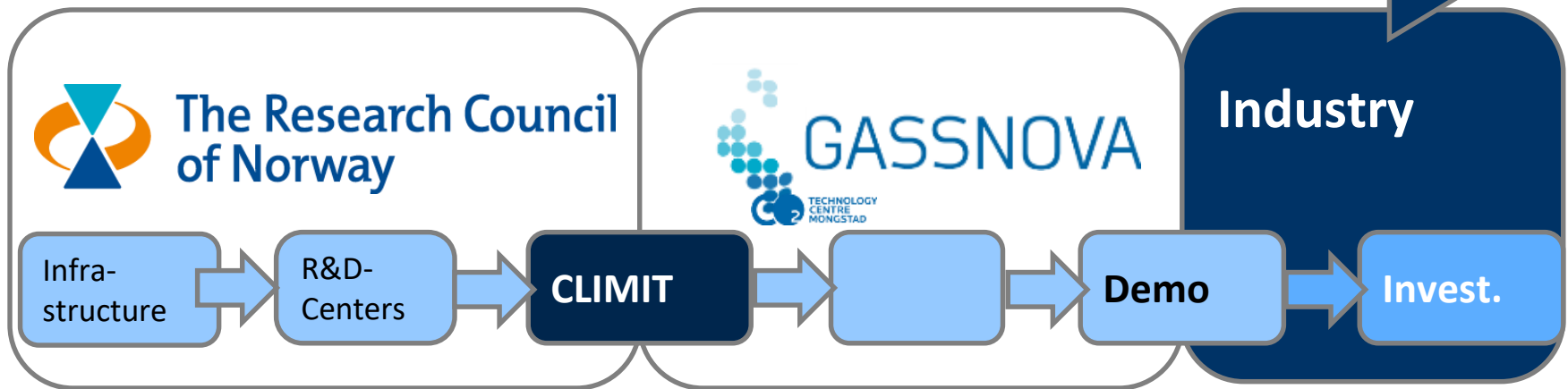
- The industry sector has made roadmap for CCS
- Full scale projects
- Climit program for R&D & Demo
- ACT – international cooperation



Policy Instruments for CCS in Norway



Accelerated development of CCS technology



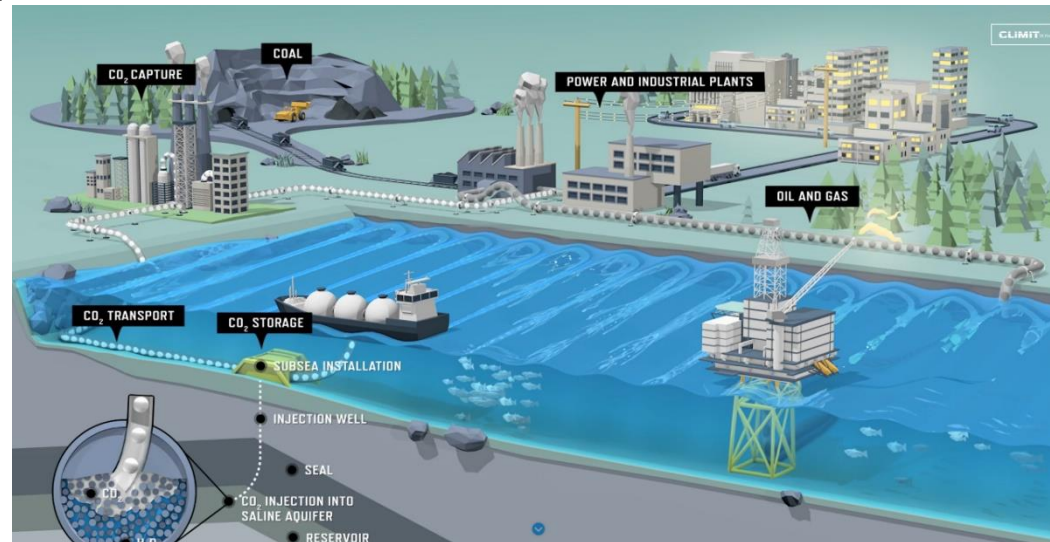
CLIMIT is the national programme for research, development, piloting and demonstration of CO₂ capture and storage (CCS) technologies for power generation and other industrial sources.

....12 YEARS

- Annual budget approx. 22 million\$
- 500+ projects have received support

....last 5 YEARS international cooperation with

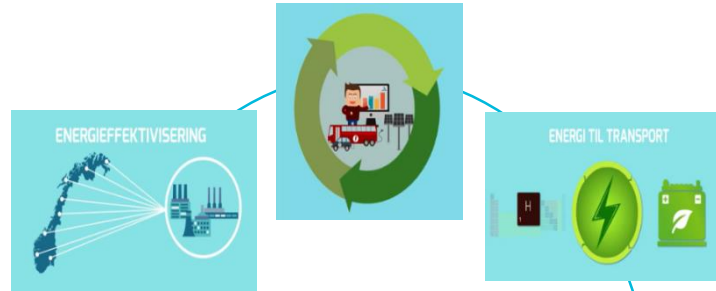
- US –DOE
- Canada
- Netherland
- Australia
- Germany
- UK



Centres on Environment-friendly Energy Research (FME)



Centre for intelligent electricity distribution – CINELDI



Centre for an Energy Efficient and Competitive Industry for the Future HighEFF

Mobility Zero Emission Energy Systems MoZEEs

Norwegian CCS Research Centre NCCS

Research Centre for Sustainable Solar Cell Technology SuSolTech

Norwegian Research Centre for Hydropower Technology HydroCen

Norwegian Centre for Sustainable Bio-based Fuels and Energy Bio4Fuels

The Research Centre on Zero Emissions Neighbourhoods in Smart Cities – ZEN Centre



Norwegian CCS Research Centre, NCCS



The ambition of the NCCS Centre is to overcome key barriers to implementation of a full-scale CCS chain, reduce the financial risk involved and make solutions more affordable.

The centre organises its activities into two main areas:

- CCS for Norwegian industry
- Storage of European CO₂ emissions in the North Sea basin

The NCCS centre will:

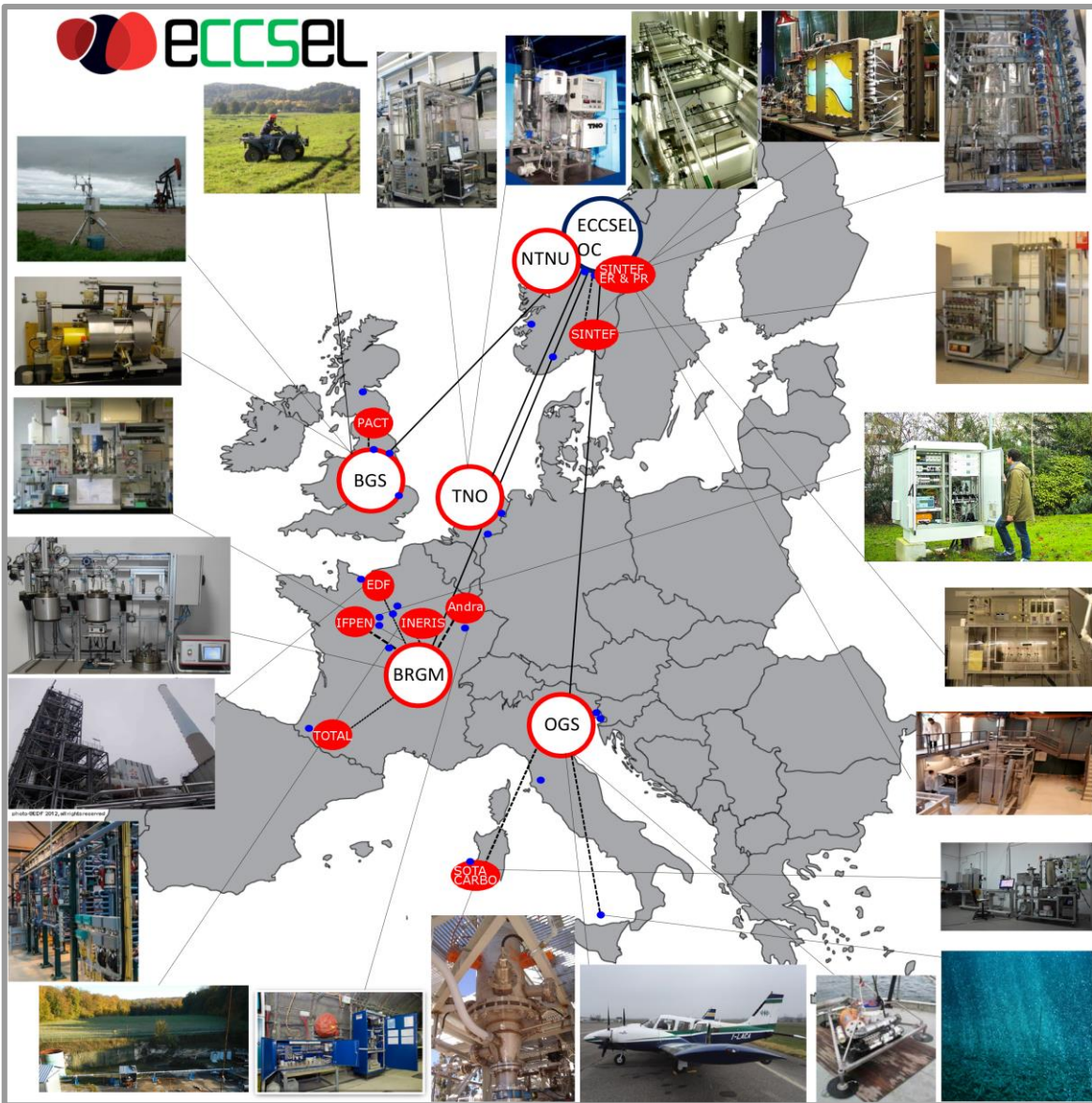
- develop new generations of CO₂ capture technologies
- develop solutions for more cost-effective and safe transport of CO₂
- refine methods for safe CO₂ storage and new monitoring techniques
- review the many possibilities available for storing large quantities of CO₂ in the North Sea



Host: SINTEF Energy Research

Website: www.sintef.no/projectweb/nccs/





European Carbon Dioxide Capture and Storage Laboratory Infrastructure

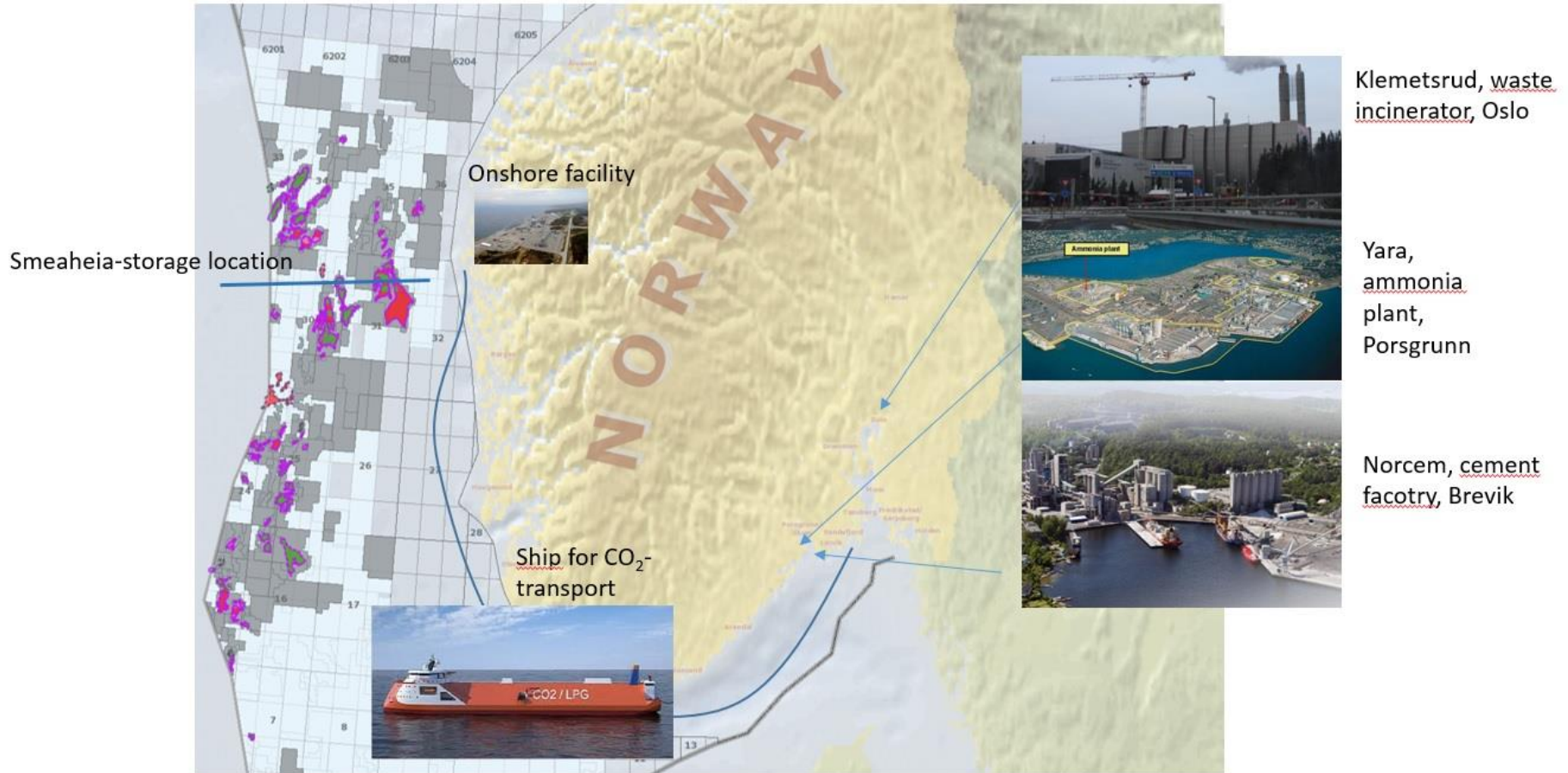
ECCSEL ERIC

- 5 countries
- 15 owners
- 54 research facilities

www.eccsel.org

E-mail:
info@eccsel.org

Norwegian full scale projects



effective solution for CCS in Norway, provided this results in technology development internationally.

ACT – Accelerating CCS Technologies

- Approved by The European Commission under Horizon2020
- Cooperation between Funding agencies/Ministries
- Transnational calls
- **1st call for proposals, June 2016:**
 - 10 partners from 9 countries cooperate, 1st call
 - Top up financing from European Commission for the
 - 8 new projects decided for funding in 2017 supported by € 36 M from ACT
- **2nd call for proposals, launched 4 June 2018**
 - 13 partners, now extended with France, US and an additional Greek partner



Ambition of ACT

International cooperation as a tool for accelerating implementation of CCUS in Europe (and other places)



ACT Kicked off in Madrid February 2016



Brian Allison, UK
signing the CA

ACT-partner countries at the ACT kickoff meeting at MINECO, Spain

Projects funded by ACT, 2017-2020

Project	Activities	ACT, M €	Norway	Netherlands	UK	Germany	Romania	Switzerland	Spain	Turkey
ALIGN	Chain integration, clusters	14,5	x	X	x	X	X			
ELEGANCY	Chain integration, hydrogen	8,9	X	x	x	X		x		
PRE-ACT	CO2 storage, pressure handling	4,5	X	x	x	X				
ACORN	Full chain CCS / infrastructure	2,0	x	x	X					
DETECT	CO2 storage, risk assessment	2,0		X	X	X				
ECOBASE	CO2-EOR SouthEast Europe	1,2	X	x			x			x
GASTECH	Gas switching technology	1,7	X	x			x	x	x	x
3D-CAPS	3D printed sorbents	1,5	X	X			x			

- Total budget for 8 projects: € 50 M
- ACT supporting: € 36 M

more info at www.act-ccs.eu

ACT – additional activities



- Knowledge sharing workshops
- Alignment with European CCS RD&D activities
- Collaboration with European CCS/CCUS initiatives
- Strengthen R&D collaboration with Mission Innovation
- Closer cooperation with industry
 - Address industry specific needs in the CCS field
- **More countries/partners are welcome to join ACT !**



Knowledge Sharing

- ACT is more than just the single projects
- The projects can learn from each other
- The projects should together with the ACT consortium lead to accelerated CCS deployment in Europe
- Everyone should focus on communication of results to CCUS stakeholders, industry, and decision makers
- Knowledge Sharing Workshop in Romania 24 October 2017 for funded projects
- Next Workshop in Germany, 13 November 2018
- ...and in Greece in 2019



Partners of ACT



- Ministries or funding agencies
- All partners pay a fee to RCN (The Research Council of Norway) for coordination and management of ACT
 - Partners at the first call spend parts of their top-up funds from the European Commission for coordination at RCN
 - New partners joining the 2nd call pay € 6 800 pr. year (no top-up funds for this call)
- National funds stay within the respective countries unless otherwise agreed/explicitly expressed
 - Example: funds committed from Germany goes to German institutions/industry partners, Norwegian funds to Norwegian institutions etc.
 - The different national requirements are expressed in the call text - examples
 - US has specified 1 mill USD for capture and 1 mill USD for storage
 - MINECO in Spain does not fund industry



The 2nd ACT call, 4 June 2018



- Total budget: 22-30 M€ (no Cofund from EC)
- Partners with funding from Germany, Greece, France, The Netherlands, Norway, Romania, Switzerland, Spain, Turkey, UK and USA
- Call text – please visit www.act-ccs.eu
- Due date for proposals, two stage evaluation:
 - September 2018 (phase 1, pre-proposals)
 - March 2019 (phase 2, full proposals)
- The budget includes a new activity: **Open call** for industrial driven projects (no fixed application date, more flexible approach)



Clean up



Scope of the 2nd ACT call

- ACT will address the technological, environmental, social and economic challenges required to accelerate CCUS.
- Projects that incorporate or address the **Priority Research Directions** (PRDs) identified at the Mission Innovation CCUS Challenge Workshop (Houston 2017) will be particularly welcome.
- Projects are also encouraged to address one or several of the research and innovations activities in the **SET-Plan CCS and CCU Implementation Plan** endorsed by the SET-Plan Steering Group in September 2017.



Mission Innovation (ACT-partners)

Goal: Accelerating clean energy innovation is essential to limiting the rise in global temperatures to well below 2°C

-  Australia
-  Brazil
-  Canada
-  Chile
-  China
-  Denmark
-  European Union
-  Finland
-  France
-  Germany
-  India
-  Indonesia
-  Italy
-  Japan
-  Mexico
-  Netherlands
-  Norway
-  Republic of Korea
-  Saudi Arabia
-  Sweden
-  United Arab Emirates
-  United Kingdom
-  United States



ACT welcomes MI countries to join forces for CCUS implementation



ACT has created a momentum



- **8 high level projects were decided funded in 2017 – they run for 3 years - The projects in total cover CCS/CCUS chains**
- **New projects will be funded in 2018 – high expectations to the CCS community to come up with excellent proposals!**
- Brings together expertise from several countries - knowledge sharing
- ACT is a tool for achieving the targets set out in the EU SET-Plan CCUS Implementation Plan and in the Mission Innovation Priorities of CCS Research
- Big interest for ACT outside Europe, including USA and Asian countries
- Industry shows interest:
 - Hydrogen production coupled with CCS
 - Pressure management during CO₂ storage



Thank You for Your Attention!



Ragnhild Rønneberg, PhD, coordinator of ACT rr@rcn.no
Welcome - visit us at www.act-ccs.eu