



## 5<sup>th</sup> ACT Knowledge Sharing Workshop

16-17 November 2020

Virtual meeting

**ACT is an international initiative aiming to accelerate and mature CCUS technology by funding transnational research and innovation projects.**

ACT is a global collaboration of research and innovation funding organisations. The first two calls for projects in 2016 and 2018 resulted in 20 international projects within CO<sub>2</sub> Capture, Utilization and Storage (CCUS), funded with € 67 M by ACT.

A new ACT Call is open now with due date for submitting pre-proposals 10 November 2020. The [call text](#) is available at the ACT web site.

The ACT consortium will organise the 5<sup>th</sup> ACT Knowledge Sharing Workshop as a virtual meeting 16-17 November 2020. The aim is to ensure fruitful knowledge sharing and increase collaboration between the ACT funded projects and other CCUS initiatives.

The program is given at the following pages. It is also available at the [ACT web site](#) together with information on how to register for the workshop.

The workshop will highlight ongoing projects from the second ACT call. Projects from the first ACT call will finalise by the end of 2020 and key messages will be highlighted at a separate workshop in 2021.

## CO<sub>2</sub> Storage

**Program Monday 16<sup>th</sup> November 2020 – 14.00 CET – 16.15 CET**

*Chair: Gunter Siddiqi, DETEC*

### **Introduction**

- 14.00 Welcome  
*Ragnhild Rønneberg, ACT Coordinator*
- 14.05 Impact and added value of ACT  
*Vassilios Kougionas, the European Commission*

### **CO<sub>2</sub> Storage session**

- 14.15 SENSE – Ground surface monitoring techniques to ensure storage integrity  
*Bahman Bohloli, Norwegian Geotechnical Institute*
- 14.30 DigiMon – New technologies for cost effective monitoring of CO<sub>2</sub> storage sites  
*Arvid Nøttvedt, NORCE*
- 14.45 ACTOM – Offshore CO<sub>2</sub> storage monitoring based on advanced mathematic  
*Guttorm Alendal, University of Bergen*
- 15.00 REX-CO<sub>2</sub> – Re-using Existing wells for CO<sub>2</sub> storage  
*Jan Hopman, TNO*
- 15.15 Break
- 15.25 Synergetic Utilisation of CO<sub>2</sub> storage Coupled with geothermal Energy Deployment  
*Sevket Durucan - Imperial College London*

### **Closing session**

- 15.40 Interactive session. The ACT project leaders will answer questions from the audience  
*Discussion chaired by Mark Ackiewicz, US Department of Energy*

### **Closing session**

- 16.10 Wrap up and key messages by meeting chair *Gunter Siddiqi, DETEC*

# CO<sub>2</sub> Capture and Utilisation

Program Tuesday 17<sup>th</sup> November 2020 – 14.00 CET – 16.45 CET

Chair: Gerdi Breembroek, RVO

## Introduction

- 14.00 Welcome  
*Ragnhild Rønneberg, ACT Coordinator*
- 14.05 Keynote presentation - Large-scale CO<sub>2</sub> capture from the AVR waste-to-energy plant in Duiven, the Netherlands  
*Hans Wassenaar, AVR*

## CO<sub>2</sub> Storage session

- 14.15 AC2OCEM – Oxyfuel technologies for CO<sub>2</sub> capture at cement plants  
*Jörg Maier, Universität Stuttgart*
- 14.30 ANICA – Carbonate looping technologies for CO<sub>2</sub> capture at lime and cement plants  
*Jochen Ströhle, Technische Universität Darmstadt*
- 14.45 NEWEST-CCUS – Waste handling plants with no CO<sub>2</sub> emissions  
*Romain Viguiet, Scottish Carbon Capture & Storage (SCCS)*
- 15.00 FUNMIN – Mineralisation of CO<sub>2</sub> to create valuable products  
*Devis Di Tommaso, University of London*
- 15.15 Break
- 15.25 LAUNCH – More effective amines for CO<sub>2</sub> capture  
*Peter van Os - TNO*
- 15.40 MemCCSea – Towards a Carbon Neutral Ship  
*Georgios Skevis, CPERI/CERTH*
- 15.55 PRISMA – Molecular science to design new CO<sub>2</sub> capture solutions  
*Susana Garcia, Heriot-Watt University*

## Interactive session

- 16.10 Interactive session. The ACT project leaders will answer questions from the audience  
*Discussion chaired by Mark Ackiewicz, US Department of Energy*

## Closing session

- 16.40 Wrap up and key messages by meeting chair *Gerdi Breembroek, RVO*

## This is ACT

ACT is an international initiative with ambition to accelerate and mature CCUS technology by making available funds for transnational research and innovation projects.

ACT, coordinated by The Research Council of Norway, is a collaboration of research and innovation funding organisations.

The ACT partners are funding agencies from Alberta (Canada), Denmark, France, Greece, Germany, India, Italy, The Netherlands, The Nordic countries (Nordic Energy Research), Norway, Romania, Spain, Switzerland, Turkey, United Kingdom, and USA.



## Why ACT?

- Carbon Capture, Utilisation and Storage (**CCUS**) is a valuable and necessary part of the toolbox for combating climate change
- Knowledge sharing and international cooperation are necessary ingredients for success

**ACT's goal is to stimulate projects accelerating the deployment of CCUS in the energy sector as well as in energy intensive industries**

## ACT projects

The two first ACT calls in 2016 and 2018 resulted in 20 projects funded by ACT. Details for each project is available at the ACT web site, <http://www.act-ccs.eu/overview>

A brief description of the projects are listed below.

### *Projects from the first ACT call 2016*

Project	Activities	Coordinator
<b>3D CAPS</b>	Targets a productivity increase of an order of magnitude in two sorbent-based technologies for CCS. This will be achieved using the latest available techniques for materials production: additive manufacturing, commonly known as 3D-printing.	<b>TNO</b>
<b>ACORN</b>	The project has delivered a re-usable blueprint for the decarbonisation of NE Scotland, including an appraisal of subsea CO <sub>2</sub> storage sites and options to re-use gas distribution assets. ACORN has been identified as a potential EU PCI project.	<b>Pale Blue Dot</b>
<b>ALIGN-CCUS</b>	A joint industry-led research initiative to accelerate the demonstration and implementation of the next-phase of European CCUS projects by addressing specific R&D gaps across the CCUS chain.	<b>TNO</b>
<b>DETECT</b>	Aims to significantly improve our ability to evaluate risks of leakage across faulted and fractured caprocks, so as to better inform operators, regulators and other stakeholders in their risk mitigation strategies.	<b>Shell</b>
<b>ECOBASE</b>	The project will develop revenue streams and business models for CO <sub>2</sub> -EOR in South-Eastern Europe and therefore supporting large scale CCUS deployment.	<b>NORCE</b>
<b>ELEGANCY</b>	The project addresses large-scale CCS infrastructure combined with infrastructure for the rapid introduction of H <sub>2</sub> as an energy carrier. Focus on decarbonisation of heat and transport, commercial models, and public awareness.	<b>SINTEF Energy</b>
<b>GASTECH</b>	Investigate four gas switching technologies: combustion, reforming, water splitting and oxygen production. Accelerate the development of gas switching technologies by developing a business case for further technology scale-up.	<b>SINTEF Industry</b>
<b>PRE-ACT</b>	Develop pressure-driven decision support protocols which will be a cost-efficient system for reservoir monitoring that helps the operator maximize CO <sub>2</sub> storage capacity and quickly turn monitoring data into corrective action.	<b>SINTEF Industry</b>

## *Projects from the second ACT call 2018*

<b>Project</b>	<b>Activities</b>	<b>Coordinator</b>
<b>AC2COM</b>	Conduct pilot-scale experiments and analytical studies to advance key components of oxyfuel cement plants with the aim of reducing the time to market of the oxyfuel technology in the cement sector.	<b>Universität Stuttgart</b>
<b>ACTOM</b>	Advance offshore monitoring of stored CO <sub>2</sub> by building a unique web-based toolkit designed to optimize monitoring programs for offshore geological storage sites.	<b>University of Bergen</b>
<b>ANICA</b>	Develop a novel indirectly heated carbonate looping (IHCaL) process for lowering the energy penalty and CO <sub>2</sub> avoidance costs for CO <sub>2</sub> capture from lime and cement plants.	<b>Technische Universität Darmstadt</b>
<b>DIGIMON</b>	Develop and demonstrate an affordable, flexible, and intelligent digital monitoring early-warning system, for monitoring any CO <sub>2</sub> storage reservoir and subsurface barrier system receiving captured CO <sub>2</sub> .	<b>NORCE</b>
<b>FUNMIN</b>	Optimise the process of CO <sub>2</sub> mineralisation into Magnesite (MgCO <sub>3</sub> ) by combining simulation and experimental techniques to identify the key factors for catalysing the formation of MgCO <sub>3</sub> under mild, non-hazardous, and non-toxic conditions.	<b>University of London</b>
<b>LAUNCH</b>	Accelerate CO <sub>2</sub> capture technologies by establishing a faster and more cost effective method to predict and control the degradation of next generation solvents.	<b>TNO</b>
<b>MemCCSea</b>	Develop hyper compact membrane systems for cost-effective and flexible operation of post-combustion CO <sub>2</sub> capture in maritime applications such as on floating vessels used by the offshore oil and gas industry.	<b>CPERI/CERTH</b>
<b>NEWEST-CCS</b>	Accelerate the deployment of CCS in the European Waste to Energy (WtE) sector and develop guidelines for the selection of robust, fuel flexible technologies resistant to Municipal Solid Waste (MSW) impurities. The project will also and assess the size of the WtE CCS market to create regional roadmaps.	<b>University of Edinburgh</b>
<b>PRISMA</b>	Integrate molecular science and process engineering to develop a technology platform that allows for customized carbon capture solutions to optimal separation for a range of different CO <sub>2</sub> sources and CO <sub>2</sub> use/destination options.	<b>Heriot-Watt University</b>
<b>REX-CO<sub>2</sub></b>	Develop procedures and tools for evaluating the re-use potential of existing hydrocarbon wells for CO <sub>2</sub> storage to help stakeholders make informed decisions on the potential of certain wells or fields for CO <sub>2</sub> storage.	<b>TNO</b>
<b>SENSE</b>	Utilise new technologies and optimized data processing to develop reliable and cost-efficient monitoring programs based on ground movement detection combined with geomechanical modelling and inversion techniques.	<b>Norwegian Geotechnical Institute</b>
<b>SUCCEED</b>	Research and demonstrate at pilot scale the feasibility of utilising produced CO <sub>2</sub> for re-injection in a geothermal field to maintain and enhance reservoir pressure and improve performance, while also storing the produced CO <sub>2</sub> that would typically be vent to the atmosphere under standard geothermal operations.	<b>Imperial College London</b>

## Ambitious Plans

With two successful Calls and projects underway, the ACT partners have established themselves as a new multilateral funding scheme for research and innovation dedicated to CCUS.

ACT is a fit-for-purpose, partner-driven, flexible, and an easy-to-join multi-national funding scheme that serves our ambition to make CCUS a commercially viable climate mitigation technology.

New ACT calls are open and details are available at the ACT web site: <http://www.act-ccs.eu/calls>

Funding agencies from new countries are welcome to join ACT!

**The ACT Calls addresses the technological, environmental, social and economic challenges required to accelerate CCUS**

## Stay informed – make contact

Information on Calls and projects being funded are available at the ACT web site [www.act-ccs.eu](http://www.act-ccs.eu)

Questions can be addressed to the ACT coordinator at the Research Council of Norway:

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