2nd ACT knowledge sharing workshop
Collaboration with/among funded projects and lessons learnt

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ACT – Accelerating CCS Technologies

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What ACT is about

Since the onset of the industrial era the level of carbon dioxide (CO_2) released into the atmosphere has increased significantly, and it is well documented that burning fossil fuels emits CO_2 with serious and mostly adverse impact on the climate. Carbon Capture and Storage (CCS) is part of a portfolio of technologies to combat climate change. CCS can help mitigate CO_2 emissions from electricity production and is a prerequisite for reducing CO_2 emissions from heavy industry such as steel, cement, chemicals and petrochemical refining.

ACT will be **A**ccelerating **C**CS **T**echnologies by making available funds for transnational research and innovation activities. CCS will have an important role to play in order to make the European transition to a low-carbon economy happen.

The CCS technology involves **capturing** CO_2 from large CO_2 emission point sources, such as fossil fuelled power plants and large, energy intensive industrial plants, compressing it for **transportation** and then injecting it deep into a rock formation at a carefully selected and safe site, where it is permanently **stored**. In addition CCUS projects where innovative and cost reducing **utilisation** of CO_2 is also in scope for ACT.

Figure 1: Geological storage of CO2

ACT is a collaboration of research and innovation funding organisations from nine European countries. Their collaboration takes the shape of an ERA NET Cofund under the Horizon 2020 program of the European Commission (EC).

The main activity of ACT is to establish joint transnational calls for CCS research and development projects.

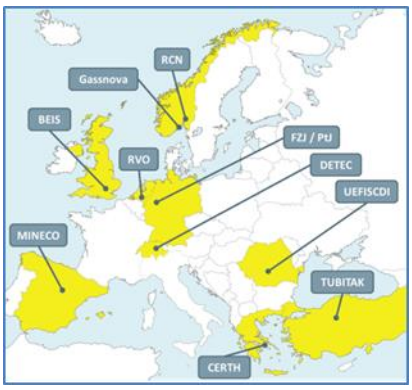

Figure 2: Partners of ACT

Ten partners from nine countries (Norway, Germany, Switzerland, Romania, The Netherlands, Turkey, Spain, Greece and the United Kingdom), have issued the first call for projects in 2016. ACT is led by Norway who is managing the budget of close to 41 million Euros.

The ACT calls ask for RD&D projects that can lead to deployment of CCS in Europe. Project proposals with high industrial relevance and industrial involvement will be prioritised.

Besides the organisation of joint calls, ACT cooperates closely with other CCS initiatives, primarily in Europe, but also in other parts of the world.

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Executive summary

After the 1st knowledge sharing workshop which took place 14 November 2016 in Lausanne (Switzerland), the ACT consortium organized the 2nd workshop 24 October 2017 in Bucharest (Romania). This workshop was dedicated to the 8 funded projects with three main objectives:

- more knowledge about the projects - their scope and ambitions
- intensifying possibilities for collaboration between the funded projects and their partners
- Learnings from the first call in order to provide improvements for the next call.

The topic of the workshop was **presentation of ACT funded projects and lessons learnt (**Annex 1 **-** the agenda). Brian Allison (BEIS) facilitated the workshop and managed to engage a substantial number of participants. All very well warmed up from an ice-breaking dinner the evening before.

The 8 coordinators from the ACT-funded projects were present, some also with a couple of their projects partners. Romania was highly represented by partners from the funded projects, representatives from the Ministry of Energy in Romania and from the Institute of Studies and Power Engineering. In addition 2 experts from New Mexico who have cooperation with GeoEcoMar in Romania were attending. The European Commission was also represented. (Annex 2 – participant list).

For each project a presentation in terms of partners, work packages, main results was done by the coordinator and in addition flipchart for every project were present in the meeting room.

The workshop was structured along 2 sections:

- Section 1: presentation of ACT funded projects
- Section 2: lessons learnt from 1st call.

All presentations are available at http://www.act-ccs.eu/library/

Opening of the workshop

The first part of the workshop was dedicated to welcoming and opening of the workshop, but also to a short introduction into the Romanian research landscape and Romanian CCS developments.

Welcome and opening of the meeting

- **Ragnhild Rønneberg** (ACT coordinator, RCN, Norway) addressed a warm welcomed to all participants. A brief description of ACT since the transnational call was launched in June 2016; the evaluation process, decision for funding and a brief overview of the 8 projects was presented. All countries are involved in one or more projects = a fair distribution of the projects between countries being reached.
- This is the 2nd knowledge sharing workshop, the first one being held in Lausanne in 14/11/2016; these workshops allow to identify and address issues within and outside Europe

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that can be of importance for acceleration of CCS in Europe and stimulate to transnational cooperation.
- Additional calls are planned in 2018 and 2020; the national contact point should be contacted if there are problems.

Romanian Research Landscape

Nicoleta Dumitrache (UEFSCDI, Romania) gave an interesting presentation about the Romanian Research Landscape:

- A country of 20M people which became EU member in 01/01/2017; money flows into Romanian research institutes through the government to the various ministries; the budget is approx. 1 billion euro from structural funds;
- RDI National strategy 2014-2020 is focused on smart specialization; they fund from undergraduates to senior researchers;
- In 2016 they had 21 calls, where 6612 projects were submitted and 786 projects were actually funded;
- There are collaborations with Norway, France and Switzerland;
- They have started to create their own trademarks in order to attract students to come and study in Romania; ERRIS is a research infrastructure network to allow exchange; Brainmap is a platform where they extract experts to be used for national calls with details of CVs in there;
- Deeply involved in the ERA net scheme and in Horizon 2020 calls; they are in 33 different ERA NETs; between 2014-2016 they had 52 ERA NET calls for example;
- Romanian participation in ACT contributed with 1M Euros where 6 of the pre-proposals had Romanian participation; 4 projects with Romanian participation have been funded.

Status of CCS in Romania

Mr. Marian Dobrin (Institute of Studies and Power Engineering, Romania) gave an overview of the CCS situation in Romania.

- The production of the main primary energy carriers in 2015 was coal; technologies need to be improved in order to decrease CO_2 emissions from coal burning. Romania is ranked 48th in terms of CO_2 footprint at the global level;
- He also mentioned about the GETICA CCS Demo project in brief; this project focused on the Oltenia region and covered the whole CCS chain; the Oltenia region is the most energy-intensive region in Romania responsible for 40 % of the CO_2 emission production; the sponsor was Oltenia Energy Complex, TRANSGAZ and ROMGAZ; the current status concerns carrying out a feasibility study and completing permitting reports; GETICA CCS is important for ensuring the security and independence of energy supply;
- An overview of the CCS technology in Romania was also made; the current status of the national legal framework was presented which includes laws such as:
- GD no. 64/2011 and Law no. 114/2013 on carbon geological storage
- Decision no 5/2015 for approving the procedure on issuing exploration permits for carbon geological storage
- Law no. 114/2013 enforcement rules are underway

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Presentation of funded projects

Brian Allison (BEIS, UK) who was facilitating the session with the projects informed about the requests for each project presentations being presented by

- 20 minutes to present their work packages, partners, objectives, results;
- flipcharts produced and displayed on the room walls; they will be used at lunch time where post its will be added to suggest what and how things can be improved;
- the existence of the suggestion box where participants could place comments The presentations were undertaken in the following manner

ALIGN

This project was presented by Peter Van Os (TNO, NL). His involvement through the entire process of writing and submitting the proposal was explained. What ALIGN stands for was explained. ALIGN is a full chain project i.e. a CCUS project. It is about decarbonising industrial areas. The project addresses specific issues along the CCUS chain for industrial regions in ERA-NET ACT countries.

ALIGN will combine the results from each of these objectives to deliver actionable blueprints in ERA-NET ACT countries.

Key figures:

- 31 partners (GE, NO, RO, UK, NL)
- Approx. 23 M Euro project budget
- Sept 1st 2017-Sept 1st 2020
- 100 deliverables in the project

Why ALIGN CCUS?

- Testing at world class research facilities
- Multidisciplinary teams
- Exceptional industrial commitment
- Demonstration of FOAK full CCU chain.

It is a well integrated project with 6 WPs:

WP1: On Capture. Emission control, solvent management, dynamics and control and cost-reduction matters. Will enable near-term deployment of integrated capture facilities and cluster development. The challenges of post-combustion capture were presented. The pilot plants to be used in the project were also presented. e.g. Mongstad, Norway (TCM), Niederaussem, Germany, Tiller Trondheim, Norway and PACT facilities in the UK.

WP2: CO_2 shipping, batch wise injection. Pipeline and/or ship? Shipping temperature and pressure conditions? Expected results include the derivation of costs.

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WP3: CO_2 storage led by BGS. Standardising storage readiness. North Sea storage appraisal. There is vast potential of storage capacity beneath the North Sea. Prospective industry CCS operators require increased confidence in availability. Results include providing a classification framework for storage readiness levels that will be benchmarked.

WP4: CCU. It aims at accelerating the integration of CCU application into the energy system in different ways. It will assess the socio-economic value. They will make various fuels and a car more suitable on running on this fuel. This is a cleaner fuel than petrol.

WP5: About clusters in UK, GE, RO and NL, all where the heavy industry is. Legal aspects of industrial clusters.

WP6: Implementing CCUS in society. Reduction of non-technical risk CCUS in different ways

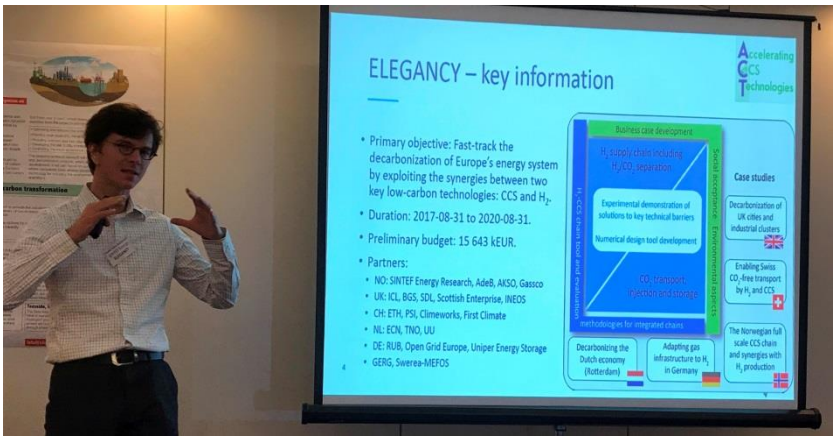
WP7: Management

Collaboration with other projects in ACT can include cooperation on cluster activities, social acceptance and combining dissemination activities.

A brief question and answer session was followed where participants asked clarifications about the project. e.g. how to keep track efficiently of all of these deliverables and milestones? What is ALIGN going to make differently to what has been done before concerning public acceptance of CCUS? (By moving towards the industry is a chance to convince the public that CCUS is a good method for CO_2 emissions reduction).

ELEGANCY

This project was presented by Svend Tollak Munkejord (Sintef, Norway). **ELEGANCY** stands for Enabling a Low Carbon Economy via Hydrogen and CCS.



Context:

- The low carbon economy needs hydrogen for industrial decarbonisation, heating, cooling and transport.
- The low carbon economy needs CCS to decarbonise industrial emissions.

Key information: Primary objective is to fast-track the decarbonisation of Europe's energy system by exploiting the synergies between the low-carbon technologies: CCS and H_2.

Duration: 2017-08-31 to 2020-08-31
Preliminary budget: 15 643 kEur

Partners: NO (Sintef, AdeB, AKSO, Gassco), UK (ICL, BGS, SDL, Scottish Enterprise, INEOS), CH (ETH, PSI, etc), NL (ECN, TNO, UU) DE (RUB, Uniper energy Storage etc), GERG, Swerea-MEFOS from outside the consortium.

The Objectives of the ELEGANCY project were briefly explained which include:

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- Develop and demonstrate effective CCS technologies with high industrial relevance.
- Identify and promote business opportunities for industrial CCS enabled by H_2 as a key energy carrier by performing 5 national case studies.
- Assess societal support of key elements of the CCS chain.

Work packages and chains: It is an integrated project. There are many but not too many interconnections that will allow the project to be handled in an efficient way. The world-class research infrastructure that will be involved was presented. A brief description of each infrastructure was made as well as its scale and to which partner it belongs.

The H2-CCS chain tool and evaluation methodologies for integrated chains were described further. It will be made in such way so as to link it in to the open source systems modelling framework for the H_2-CCS chain evaluation. This tool will have 2 modes: the design and evaluation mode.

WP1: ETH led. Enable efficient H_2 production and CO_2 capture at different plant sizes. The various ways to increase the efficiency and productivity of natural gas/biogas reforming was also presented.

WP2: SINTEF led. Develop an accurate property model for CO_2-brine in the presence of impurities. Mature and validate tools for the safe, efficient and cost effective design and operation of CO_2 pipelines and injection wells.

WP3: AdeB led (taken over by the University of Oslo). Business case development. It will assess the regulatory background.

WP4: ICL led. Develop a roadmap for decarbonising the Rotterdam industry.

A question and answer session followed where questions asked included e.g. How can we ensure that we collaborate effectively and not do the same thing twice? How do you plan to address the different actors that will use the competences that we are developing? What will be the system value of CCS in a hydrogen economy?

Pre-ACT

The project was presented by Peder Eliasson (Sintef, Norway). The pathway that was followed that led to the project was elaborated.

Discussions around ACT project related to monitoring started in late 2015. There is a wish to identify and address main storage related challenges for accelerated deployment of CCS led to early involvement of industry. Crucial storage challenges were faced.

Pre-ACT:

- Budget 5.2 M Euro aprox
- Duration 1/9 2017 – 31/08 2020
- Partners: Sintef, BGS, GFZ etc

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The approach was also elaborated. Various questions from industrial operators were adressed. Learning from demonstration pilot and field lab data was also mentioned. The deliverables will have a focus on industry uptake. Workshops and close communication with industry in the project will be priviledged.

Pressure management is crucial when addressing the main storage challenges. This wil be achieved by looking at the capacity, confidence and costs.

There are 5 WPs (Results from WP1-4 will be used in WP5: workflow demonstration)

WP1: Pre-injection modelling: Jim White from BGS is leader. The main topic will be to study optimal injection planning via effective pressure control.

WP2: Conny Schmidt from GFZ is leader. Establish novel concepts for quantitative monitoring of pore pressure saturation. Maximise cost by using passive-active monitoring strategy. This will serve as input to the WP3 on real-time conformance verification.

WP3: Led by Stefan Carpentier from TNO. Develop and evaluate approaches for verification of site performance. Establish detection limits and find measures of conformance.

WP4: Led by Alv-Arne Grimstad from SPR. Investigate options for an operator if a pressure-conformance tests fail.

WP5: Led by Ane Lothe from SPR. Demonstrate developed methodology for storage scenarios at realistic sites.

The various milestones were displayed. The presentation was wrapped up by providing a status and first results. All contracts are in place in early October 2017. Some activities started in September and for GFZ already in July. GFZ have initiated a stability study for coupled hydro-geophysical inversion. The upgrading of the Svelvik field lab has been initiated and this was mentioned.

Questions and answers session included discussion on the following topics e.g. How to deal or get rid of the brine that will be extracted and how to deal with social acceptance of this? The regulator might not be able to assess since they don't have the same level of understanding. How to deal with this? How do you consider the uncertainties inherent in the subsurface data?

3D-CAPS

Jaap Vente (TNO, NL) presented 3D-caps which is a project on Capture technologies based on adsorption via the use of pellets. A presentation was made of how to use more expensive elements to decrease costs in capture plants.

The overall objective presented is related to productivity increase by a factor of 10 of sorbent based capture technologies. This will be achieved by additive manufacturing and 3D-printing. The material used will be hydrotalcite and Amine Functionalised Silica.

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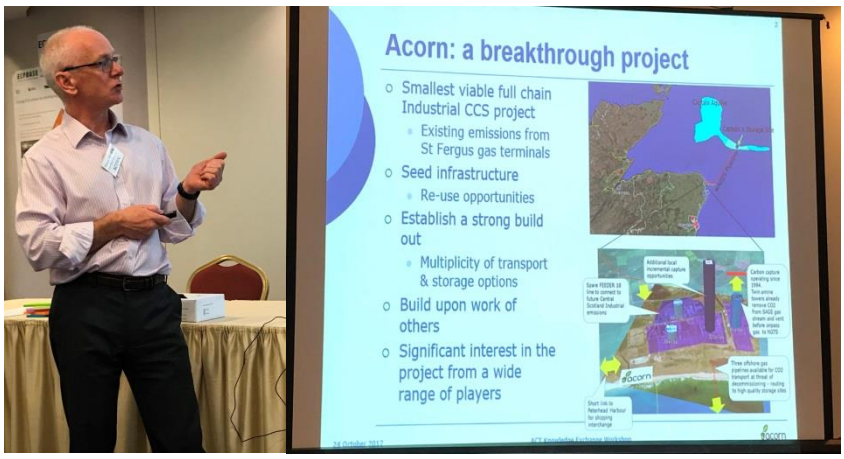
A more compact operation procedure was presented where structured sorbents vs conventional technologies was discussed. Key activities presented include designing tailored structures by CFD modelling. Also they intend to develop appropriate manufacturing procedures and test the performance under relevant conditions.

The 2 typical application areas were presented. The first one concerns SEWGS, where the medium temperature was (300-500 degrees C). The aim here is to decarbonise H_2 production for refineries together with natural gas combined cycle. The second one is ImmoAmmo where the temperature is low (40-130 degrees C). Heat management here becomes an issue. The 3 points to capture the CO_2 in H_2 production were shown. Options with different carbon loading and different pressures were presented. The influence of these on the shapes of the material was discussed.

The roles of each consortium partner were elaborated. For BP there will be a support in terms of a techno-economic analysis and preparation for TRL6 demonstration for example. Aker solutions will also provide support in the techo-economic analysis. Finally, the delays that have been accumulated already in the project have been presented and how they will be overcome was brief put forward. Some questions were addressed to the coordinator e.g. How reliable is this 3D technology on properties such as porosity and permeability? The interest of BP to reduce costs, in which area/sector will this take place? (Repeatability is well established when doing 3D printing).

ACORN

The coordinator, Steve Murphy, started by explaining how ACORN is not an acronym but a metaphor for how things start, grow and develop into something much bigger.



It's a breakthrough project corresponding to the smallest viable full chain industrial CCS project. Existing emissions and 3 existing redundant pipelines allow carrying gas and storing it in the captain aquifer which has good petro-physical characteristics. The existence of a redundant onshore gas pipeline was also mentioned. The utilisation option will also be considered.

The work programme presented aims at increasing the storage efficiency of the captain aquifer. How to engage with stakeholders to disseminate the lessons and encourage replication was discussed. The aims of the project were further discussed. The project will aim to overcome hurdles such as those related to subsurface science (understand storage efficiency, geomechanics and rock strength, site selection and evaluation), economic efficiency (minimum viable development, growth and build out and business models), policy recommendations and societal impact.

Knowledge exchange issues were discussed. Dissemination activities are scheduled (stakeholder workshops and interviews). Adhoc – GCCSI, CATO and others in the future. Sharing research outputs

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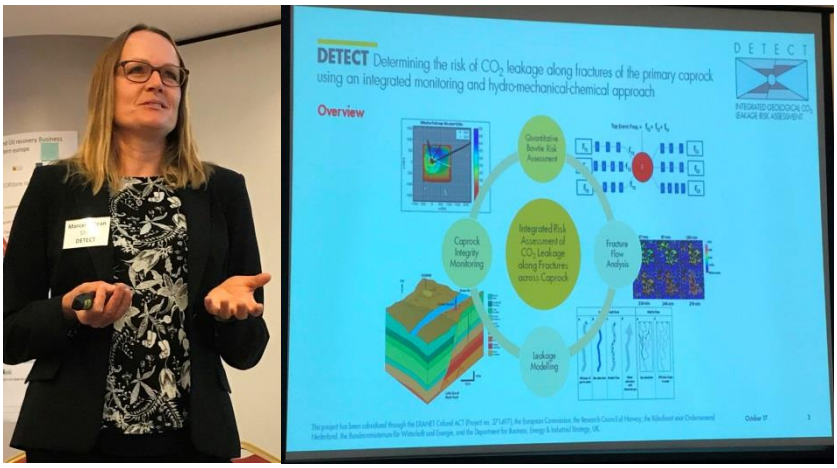
(e.g. various channels including a project website, video diary, newsletter, etc.).

Further collaboration opportunities with other projects were illustrated. E.g. storage site selection workshop, site risk assessment workshop, H_2 economy and CCS and societal acceptance.

Questions to Steve included e.g. What kind of research would you support after the end of the project? (The ideal outcome would be for the project to pass onto the development stage. Storage efficiency will also be crucial). Another question included if the project has received any support in terms of funding from Scottish institutions? Are you going to address the carbon pricing mechanism in the project? (The revenue model needs to be thought over better)

DETECT

Dr. Marcella Dean (Shell, NL) started her presentation by saying that the project is a focused small project which will tackle the specific problem of assessing geological risks across the cap rock.



The collaborators involved were presented (e.g. HW for the modelling, Aachen University for the laboratory work, Risktec solution.

Key targets:

Laboratory experiments: Determine the impact of reservoir stress changes, chemical reaction and swelling clays on fracture flow properties.

Project structure was focused upon presenting the WPs. There are interconnections between different elements.

WP1: project management.

WP2: fracture flow, mineralisation and clay swelling. Identify and analyse factors controlling fracture flow as a function of T, etc. The experiments that Aachen Uni wishes to carry out were also presented. This will provide the parameters that will be fed into the modelling and then into the laboratory experiments.

WP3: fracture characterisation and modelling. Bring it into a large scale reservoir including the monitoring technologies that we can use. Link it to geomechanical elements and to the Otway project.

WP4: containment monitoring for caprock integrity. Looking at efficiency and driving down costs.

WP5: qualitiative and quantitative risk assessment. The bowtie risk assessment network was discussed. Some examples of the subset of bowtie was done for the Peterhead CCS project and presented here.

Questions to Mrs Dean included: What remedial actions should be implemented to minimise the consequences? (Focus on the integrated risk assessment of the geological risk). How can we have this bowtie methodology to the whole complex of storage and address the public opinion? What ACT

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should think about? Which other containment failure mechanisms have you considered and why did you select this one? (Although we have focused through the years on this question, it is addressed here in a serious manner).

ECOBASE

EcoBase was presented by Roman Berenblyum (IRIS, Norway). The concept behind the project was presented. CO_2 EOR has the most significant commercial potential among utilisation methods leading to permanent storage. The objective of ECO-BASE is to develop a detailed and integrated roadmap for CCUS, including EORStore, in SE Europe.

The key technical milestones were presented and included making an inventory and mapping the sources and sinks in SEE and to establish the regional source-sink clusters and CCUS roadmaps. The goal is also to optimize EORStore methodology for the most promising cases.

The project structure was explained as well as the partners involved. In order to map the regional potential it is important to make an inventory of sources and sinks (from inventory to creation of database or expansion of existing ones). EOR roadmaps per country will be developed. EORStore case study definition will be made in order to optimize window and define the cases for an in-depth study.

EORSTore and business models connection was presented. Also knowledge transfer will be looked at a lot. Dissemination and outreach and internal meetings are part of the activities proposed for this knowledge transfer. Courses proposed to take place include the Sulcis summer school in Sardinia, a regulatory course in Romania in 2018 and a CO_2EOR course in Turkey in 2019.

Public awareness issues were also discussed. Public acceptance analysis for selected CCUS chains was proposed. Liaising with ENOS 2020 project and with ALIGN-CCUS project are important. Organising public events was another point that was raised. In the kick-off meeting in Athens we started work on making an inventory of sources and sinks. The report on data available will be completed by the end of October 2017. The inventory will go into each of the countries. Issues looked at including the status of CCS in each country.

Public awareness issues were discussed at the kick-off meeting. We were convinced that awareness comes before involvement and acceptance. The idea would be to involve students and create a questionnaire with a list of brief questions. Students will go around, interview people and gather data from across Europe. A database will become available publicly on request. Awareness actions will be based on solid user provided data.

Collaboration ideas were presented. The collaboration could include cooperation with the ALIGN project in order to expand the coverage and with EOS/CO2GeoNet in order to carry out a public awareness study to expand coverage.

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Questions to Roman included: What is the current business case for CO_2-EOR in Turkey? (In the workshop that will be held in Turkey this question will be further elaborated). How do we inform people and how do we formulate the questions in the surveys? (Survey design is an art in order to avoid manipulation). This project should make us aware of the narrative we are carrying in ACT. The narrative is different across the world. E.g. for Africa, they are more interested in creating jobs when considering CO_2-EOR, whereas for Northern Europe that is not primarily the case.

GASTECH

Shahriar Amini (SINTEF, Norway) presented this project and underlined that it is a project focusing on the capture side. The 2 degree C scenario was presented where the IEA projects European CO_2 prices of 20 Euro/ton in 2020, will be rising rapidly to 100Euro/ton in 2030. This rapid rise in CO_2 prices will generate great industrial interests in CCS. Whether this is a realistic policy scenario in order to prepare for or will CO_2 process remain at current levels was raised in order to be discussed further tomorrow (25/10/2017 ACT consortium meeting).

Sintef sources of funding were presented summing up to a Total of 3147 Million NOK. The partners of the consortium were also presented.

The background to the project that was presented focused on the gas switching technology which offers for highly efficient power or hydrogen production. The chemical looping combustion technology was presented. Here we have 2 reactors, an air reactor and a fuel reactor. In the gas switching technology the process has been simplified to only one reactor. The advantages here are that there is no external circulation of solids, easy to pressurize and scale up.

As far as the scope and budget are concerned, it is important to accelerate the development of switching technologies by further technology scale up through the various ways presented. 4 important concepts were presented (combustion, reforming, water splitting and oxygen production). Some technologies were then discussed e.g. gas switching reforming, gas switching water splitting and gas switching oxygen production and gas switching production. They will use different catalysts which will be tested inside a fluidised bed. An intensive cluster of reactors will be designed and build for a combustion site. The partner roles were then briefly exposed.

6 WPs: Ranging from material section to business case and management.

The project is expected to finish within the 3-year period.

Questions to Mr Amini: Which technologies from those presented will be used in the plant in Turkey? Which will be the mechanism for the prices that were presented in the initial 2 degree C scenario presented at the beginning of the presentation? (We expect that CO_2 prices will remain low).

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Panel Discussions with all the members

The panel discussion was facilitated by Amy Cutter and Brian Allison (BEIS, UK).
Questions that were agreed among the ACT members organizing the workshop (Nicoleta, Brian, Amy, Gerdi, Harry and Ragnhild) were put forward and the participants were kindly requested to answer.

The questions were:

1) **Is there anything that we can do to improve communication? What could have been improved? Relationship with the Secretariat?**
   - Very supportive nature and quick feedback of the Secretariat and very reachable.
   - Some kind of repository from ACT is needed. I.e. it is not very clear what we do with deliverables. Discussion is still needed in order to see how things could work better. The approval process needs to be strengthened. How does this work? (In each country the process is different so why should some countries get penalised if another country is lagging behind)
   - E.g. if A Dutch project is not delivering and this is affecting other projects then money could be withheld. We need to know what the interdependencies are and how this affects your partners.
   - An ACT consortium storage space should exist in order to have access to all the ACT family project members. This could include powerpoint presentations and posters but that should be kept within the ACT family only.

2) **What can we do in order to improve the communication between the National contact points and the projects**
   - Very supportive nature and very reachable

3) **Did you find the matchmaking process useful? Relationships with other organisations?**
   - In ALIGN the matchmaking page was used. They made sure that TNO was there as early as possible.
   - It was easier to get in touch with the national contact points to get the link rather than use this page for some partners.

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- The UK decided to not use this page due to political difficulties for the UK after the referendum.
- Sintef also didn't use the matchmaking process but made new contacts.

4) Would you have started a transnational collaboration without ACT?

- NO, for many.
- There are however collaborations through other networks. The financing of small scale projects available through ACT is a positive point. Financial reporting is done on a country level only so this is a relief compared to Horizon 2020 financial reporting.

5) Is it value of time and money compared to other processes?

- Yes, because they got the money. The effort was worth it.

6) Would you participate in a 2nd call?

- It's too early for this question.

7) Did you feel the call text provided enough guidance for you to put your publication in?

- Some things were ambiguous. Internal discussions took place at the beginning to understand. The wording in the very first document was slightly misleading. The text was also very extensive with many pages and not always very clear what the main thing and the impact expected was.
  E.g. the value of the national and transnational aspects was complex to grasp.
- There was quite a lot of ambiguity. Steep learning curve for some. With some contradiction in the text. So the call text should have been simplified.
- In the case of underspending of the budget on the Turkish side. Can we redistribute the budget within the country? This would be the decision of the top management.
- This is country dependant. In a 2 phase approach, some countries will be in the 1st phase whereas other countries will already be in the final phase.
- It is also consortium dependent. Since we do not know of the configuration of the individual consortia, so if we see that something changes and need to find new partners you need to contact the NCP (your national contact point).

8) Do you feel that the requirements to meet both national and ACT-related eligibility criteria were adequately explained in the text?

- The messages were mixed coming from the Secretariat
- It could be clearer. What is eligibility anyway? This should have been explained clearer.
- Different experiences exist depending on the country.

9) The time given between call publication and time of contract signature i.e. one year? Was there enough time?

- Time was fine but some were hit by the vacations.
- Time was fine for small projects.
- A bit more time for the contracts to be signed would be needed.
- In terms of the deadlines it would be nice to have them in line with the different calls for some partners.

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10) Did you find the 2 stage application process helpful?

- Yes, for all partners.

11) What are your views of the RCN submission system?

- The whole RCN system was based on the Norwegian approach and how the Norwegians where doing things. But for the other partner countries it wasn't straightforward because they didn't know the system. It was a surprise for them. So if not sure contact the national contact points for help and advice.

12) What are your views on the split of funding between the large and the small projects? How happy are you with large/small projects?

- We need a clearer definition of what a larger project is.
- It has been difficult to make sure to provide the right information on the right time. We are focused on doing that. It became reality that when we go to stage 2 would it be harder to get the funding in the right place?
- It has nothing to do with the size of the consortium but it was related to the 3M Euro cut off point. Below 3M it was considered a small project Ragnhild explained.

13) Did you feel that both stages of the evaluation process were fair and transparent enough?

- Non question

14) How did you find the communication of the results?

- Non question

15) Any feedback on the monitoring procedures?

- The reporting has to be simplified.

16) Have you found the monitoring guidelines helpful?

- They were very clear and straightforward.

17) Would you have liked to see a wider audience in such a knowledge sharing workshop, as the one held today?

- If you make it public people will withhold back information. So that's not the right solution for some.
- Arrange ACT next to big events with special sessions so that ACT can share information with the outside. E.g. final workshop in end of 2020 so see what big event will take place at that time so to run them at the same time.
- Aim for a special session for European ACT initiative, but which requires some preparation.

18) Would you think about having a workshop focusing on capture or only on storage?

- Different sections of the workshop could be dedicated just to one area, but they shouldn't be addressed separately in a workshop.

19) What would you do to collaborate with other ACT projects?

- They already collaborate;

20) What should we be focusing on in call 2?

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- More international cooperation to make a worldwide CCS programme.
- We need to address seismicity. A lot of learnings should be incorporated from the US.
- The lack of business cases is a problem. So economists and political experts are needed to address this.
- It will be also nice to see that the consortium is not dominated only by Norway and the Netherlands. By having smaller consortia then we would allow for other, less dominant countries, to get more involved.

21) What countries would you like to see included in the future?

- Mission Innovation countries were addressed by the presentations in Houston for ACT 2. E.g. US, Australia, Canada, France, Saudi Arabia, China. If US come in this, it would pull other countries in.

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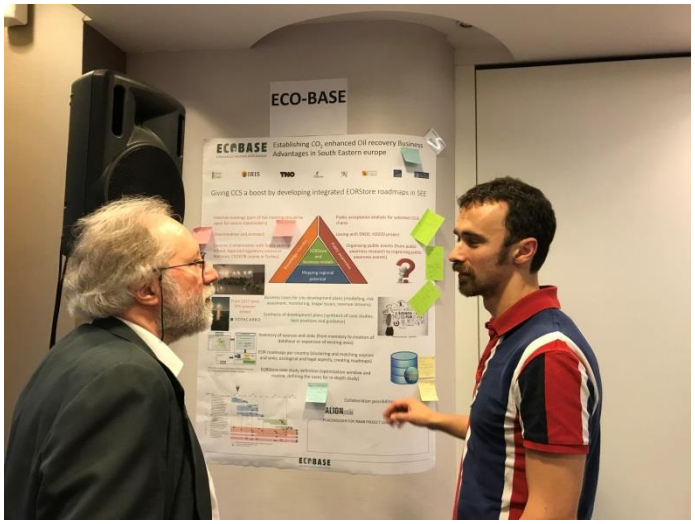
Poster session

The poster session was organised so that all participants could visit the posters throughout the full day, but during the owner of the poster was there in the afternoon discussing with the visitors and exchange knowledge with other poster owners. Post-its were used for putting up questions and for connecting projects in terms of mutual interest, co-work and/or possibilities for cooperation.



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Wrap up-conclusions of the day

- Brian, Ragnhild and Nicoleta thanked all the participants.
- Invitation to further engage in contact between the project leaders and those that have placed posters to the project flipcharts.

Workshop dinner

Delicious Romanian food in a very cosy atmosphere and many thanks to the organizing committee at UEFSCDI: Nicoleta Dumitrache, Mihaela Manole and Gina Cimpoeru.

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Acknowledgements

This workshop has been organized very well by Nicoleta Dumitrache and her colleagues at UEFISCDI and has been planned and executed in cooperation with ACT's national research and innovation program owners and managers.

The ACT consortium was very pleased that Wolfgang Schneider, representing the European Commission – Directorate-General for Research and Innovation, Advanced Energy Production, took active part in the meeting.

So were also pleased to have Dr. Calin Radu Vilt from the Ministry of Energy in Romania participating. And we hope that the two guests outside Europe became interested in ACT for their future collaboration with CCS initiatives in Europe.

Very much appreciated is also the two get-together-dinners organized by UEFISCDI the 23 and 24 October, respectively where tasty Romanian food were offered.

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Annex 1: Agenda for the workshop

Accelerating CCS Technologies

ACT 2nd Knowledge Sharing Workshop

Venue: Hotel Minerva, Hila room
(Gheorghe Manu street, no. 2-4, District 1, Bucharest)
Date: 24 October 2017, 9-17:30

Agenda

08:30-09:00	Walk-in & Registration
09:00-09:10	Welcome and opening of the meeting
09:10-09:30	Status of CCS in Romania Daniela Galateanu - Ministry of Energy Marian Dobrin - Institute for Studies and Power Engineering
09:30-09:40	Introduction to presentation of ACT-funded projects
09:40-10:40	Presentation of ACT funded projects: ALIGN and ELEGANCY
10:40-10:50	*Small break for a fast coffee/tea/water*
10:50-12:20	Presentation of ACT funded projects continues: PRE-ACT, 3D-CAPS and ACORN
12:20-13:00	*Lunch, including first round flipchart discussion*
13:00-14:30	Presentation of ACT funded projects continues: DETECT, ECOBASE and GASTECH
14:30-14:45	*Break (and re-arrange tables)*
14:45-16:00	Panel with coordinators from ACT- funded projects Discussions and lessons learned so far
16:00-17:15	*Coffee/tea/soft drinks* *Free gathering around flipcharts, one-to-one discussions*
17:15-17:30	Wrap-up, conclusions
19.00	Dinner at *La mama* ("At your mother"): Street Episcopiei no. 9 (near Romanian Atheneum)

Welcome and looking forward seeing you !

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Annex 2: List of participants

Name (name in blue = ACT members)	Organisation	Project / Country / ACT partner
Aage Stangeland	RCN	Norway
Alexandros Tasianas	CERTH	Greece
Amy Cutter	BEIS	UK
Andreea Burlacu	Club CO2	ECOBASE
Brian Allison	BEIS	UK
Calin Cormos	UBB CLUJ	GASTECH
Calin Radu Vilt	Ministry of Energy	Romania
Conny Schmidt-Hattenberger	GFZ	PRE-ACT
Constantin Stefan SAVA	GeoEcomar	ECOBASE
Corneliu Dinu	Club CO2	ALIGN
Cristian Dinca	Club CO2	ALIGN
Diana-Maria Cismaru	SPSPS	ALIGN
Gerdi Breembroek	RVO	Netherlands
Gunter Siddiqi	DETEC	Switzerland
Hans Jørgen Vinje	Gassnova	Norway
Harry Schreurs	RVO	Netherlands
Heiko Gerhauser	FZJ/PtJ	Germany
Hiroshi Kakihira	Asahi Kasei Europe GmbH	ALIGN
Jaap Vente	ECN	3D-CAPS & ELEGANCY & ALIGN
Leonor Gómez García de Vinuesa	Mineco/Fetyc	Spain
Marcella Dean	Shell	DETECT
Marian Dobrin	Institute for Studies and Power Engineering	Romania
Marvin Deonisia	RVO	Netherlands
Mihai Chiran	Pic Oil	ALIGN & ECO-BASE
Mihaela Manole	UEFISCDI	Romania
Nicoleta Dumitrache	UEFISCDI	Romania
Peder Eliasson	SINTEF Petroluem Research	PRE-ACT
Peter van Os	TNO	ALIGN
Pierre Cerasi	SINTEF Petroluem Research	PRE-ACT
Ragnhild Rønneberg	RCN, coordinator of ACT	Norway
Robert Balch		
Roman Berenblyum	IRIS	ECOBASE
Severino Falcon Morales	MINECO	Spain
Shahriar Amini	SINTEF	GASTECH
Sofia Stamataki	NTUA	Member of ACT Scientific Com.
Steve Murphy	Pale Blue Dot LTD	ACORN
Svend Tollak Munkejord	SINTEF Energy	ELEGANCY
Titus Ispirescu		
Tom Mikunda	TNO	ALIGN & Pre-ACT
Ufuk Atay	TUBITAK	Turkey
Xavier Montagne	MESRI	France, possible new ACT member
Wolfgang Schneider	European Commission	

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