European Carbon Dioxide Capture and StoragE Laboratory Infrastructure

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European Carbon Dioxide Capture and Storage Laboratory Infrastructure

Enabling low to zero CO₂ emissions from industry and power generation

European Research Infrastructure Consortium:

Norway (Operations Centre at NTNU), France, Italy, United Kingdom and Netherlands

15 research facility owners

providing open access to

56 world class research facilities

(Continuously expanding with new members/partners and facilities)

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Upgrades and new builds in the range of 200 Million Euro until 2030

Close CCS knowledge gaps

Contribute to reduction of CO₂ emissions in accordance with the Paris agreement
1.5 – 2 degree target

Reduce global warming
Vision and Objectives

IEA 2 degrees low carbon path

- Nuclear 8% (8%)
- Power gen. efficiency and fuel switching 3% (1%)
- Renewables 21% (23%)
- End-use fuel switching 12% (12%)
- CCS 15 - 20%
- End-use fuel and electricity efficiency 42% (39%)

Reduction needed to keep global warming within 1.5 °C ??
Background

Keeping temperatures below 2°C requires reducing CO₂ emissions today...

...and carbon removal by mid-century

Climate Institute “Moving Below Zero” report

“Traditional” emission abatement approaches:
- Efficiency
- Renewables
- Nuclear
- Fossil fuels w/ carbon capture
- Avoided deforestation

Only carbon removal approaches can bring emissions “below zero.”
Vision and Objectives

ECCSEL vision:
Enabling low to zero CO\textsubscript{2} emissions from industry and power generation

Main objectives

- Establish, extend and operate a world class distributed CCS (CCUS) research infrastructure in Europe
- Integrate and upgrade existing research facilities and supplement with new ones
- Enhance European science, technology development, innovation and education in the field of CCS
- Enable spin-off activities and generation of new business
**ECCSEL timeline**

- **Preparatory phase**
  - PP1 (FP7)
  - PP2 (FP7)

- **Implementation**
  - INFRADEV-3 (H2020)

- **Permanent Operation**
  - ECCSEL ERIC

**Upgrades and new builds (200 Mill Euro until 2030)**

- 30.4.15 Sent ERIC Application Stage 1
- 12.1.17 Sent ERIC Application Stage 2
- 12.6.17 ECCSEL ERIC founded

**Key dates**

- 15.12.12 Assessment Expert Group reviewing maturity of projects on ERFR Roadmap
- 22.8.13 ESFRI Prioritization of existing Energy Research Infrastructures
- 11.9.13 ESFRI Assessment Expert Group (AEG) report (assessment of the projects on the ESFRI Roadmap)
- 22.1.14 ESFRI Assessment
- 26.3.15 2016 ESFRI Roadmap assessment
- 14.4.16 ESFRI project survey – International outreach of pan-European Research Infrastructures
- 28.4.17 ESFRI Landmark evaluation questionnaire
- 25.10.17 Long-term sustainability survey (ESFRI and ERIC RI’s)
- 5.11.17 2018 Roadmap update questionnaire
- 31.1.18 ESFRI – Hearing - ESFRI Roadmap 2018 - monitoring of 2008 ESFRI Projects
ECCSEL ERIC Inauguration, Trondheim June 12th 2017
ERIC: European Research Infrastructure Consortium

Wolfgang Burtscher, Deputy Director General, DG Research & Innovation
Ingvil Tybring-Gjedde, State Secretary, Ministry of Petroleum and Energy
Sverre Quale, Director ECCSEL ERIC
The ECCSEL ERIC Operations Centre

**Operations Centre (OC)**

- **Executive Director**
- **Administration**
  - Finance
  - Accounting
  - Legal
  - HR
  - HES & Q
  - IT
  - ...
- **Strategic scientific and technical planning and coordination**
- **Community building, Outreach, Promotion and Education**
- **Operations**
- **Development**

**Organisation growth from 2017 - 2022:**
- 3 - 6 employees
- Annual budget 400,000 - 850,000 EUR including in-kind contributions

**Location:**
NTNU/SINTEF Campus
Trondheim, Norway
Application for accessing a research facility is open to all interested researchers, engineers and students from anywhere in the world

Applications are submitted to the Operations Centre through the ECCSEL website (www.eccsel.org)

Selection of the applications is based on transparent criteria such as scientific merit, feasibility, relevance, dissemination of results, ethical perspective, and environmental impact
Investments

Gap analysis – main conclusions

Capture and transport:
Need for up-scaling promising solutions and testing at more severe experimental conditions (pressure, temperature, gas compositions, ..)

Storage:
Need for a variety of test/pilot sites throughout Europe

Investments

Storage:
Need for a variety of test/pilot sites throughout Europe
Preparatory Phase (2011 – 2014)
- Norway (host)
  - NTNU, SINTEF, RCN
- France
  - IFPEN, BRGM
- The Netherlands
  - TNO
- Germany
  - Universität Stuttgart
- United Kingdom
  - BGS
- Switzerland
  - ETH Zürich
- Spain
  - CIUDEN
- Italy
  - OGS, ENEA
- Greece
  - CERTH, ISFTA
- Poland
  - PGI-NRI

- Norway (host)
  - NTNU, SINTEF
- France
  - BRGM
- The Netherlands
  - TNO
- United Kingdom
  - BGS
- Switzerland
  - ETH Zürich
- Spain
  - CIUDEN
- Italy
  - OGS, Sotacarbo
- Greece
  - CERTH
- Poland
  - PGI-NRI, GIG

ECCSEL ERIC (Summer 2017)
- Norway
  (Operations Centre)
- The Netherlands
- Italy
- France
- United Kingdom

Signed up final commitment as founding members of ECCSEL ERIC

Expansion plan (2018 – )
- Poland
- Switzerland (observer)
- Greece
- Spain
- Germany
- Czech Republic
- Hungary
- Romania
- Other EU member states
- Bilateral agreements with oversea states (Japan, Australia a.o.), institutions, industry

Signed Letter of Intent (LoI) to join ECCSEL ERIC

Promising contacts and discussions
Part of an European approved RI legal entity:
- International visibility and common marketing
- Cost sharing, saving and prioritisation
- Joint/coordinated funding applications
- Influence on international CC(U)S policies and development
- Partnerships with other EU initiatives

Increased funding:
- EC; Horizon 2020 ++
- Release national grants
- Joint industry investments
- Joint / coordinated funding activities

Increased facility utilisation:
- Attract users and projects
- Standardised and supervised access
- More operational activity
- Increased turnover
- High quality facilities, operation and services

New investments, activities and business:
- Research facilities implementation
- New research projects
- Capacity building/training and jobs
- Spin-off businesses and products
Fact sheets (web) for all 55 facilities

- Organisation name
- Installation name
- Location
- Category, Science area
- Contact person(s)
- Short description
- Pictures

➢ It is recommended to contact the facility owner before applying for access
**ECCSEL uniqueness**

**Detailed mapping and gap-analysis** were performed and reported, primarily focusing on the European landscape. Gap-analysis took in input from scientists who have overseas cooperation and knowledge about the gaps there.

**ECCSEL is seen as unique** (inside and outside Europe) in terms of:

- **Openness** (who, what and from where)
- **Public ownership** (by several countries)
- **Number of facilities** (from different countries)
- **CCS technologies** focus (Capture, Transport, Storage and Use)
- **Accessibility** (Single website, standardized contracts, 1 application form)
- **Range of TRL** focused on (technology readiness level: lab to pre-industrial demonstration)
ECCSEL Access

“ECCSEL ERIC RI is open to everyone”
Main target:
• European researchers/users (from Universities, Research Institutes, Industry, and SME)
• In- & outside of ECCSEL ERIC member countries
Secondary target: Countries outside of Europe

Offering:
• Mainly ‘in person’ but also research / testing on order, remote access (to simulations, computer modelling and facilities)
• Support of research cooperation
• Peer review and selection criteria (select from competing applications: Scientific quality, Relevance to the objectives, Uniqueness)
• User communities targeted (Industrial users, Universities & Research Institutes, SME’s with special offers (workshops, meetings, information exchange, community platform) designed for their needs
• Agreements with NCCS, ACT and other CCS initiatives
Scientific and technological impact

**ECCSEL**

**Knowledge and tools**

- State-of-the-art laboratories, test sites, tools, computer codes, archives, expertise, knowledge, resources etc.

**Longsighted operations**

- facilitating research only

**Shortsighted actions (campaigns)**

- Specific needs

**CCS research**

- Ideate research topics
- Establish objectives
- Apply for access
- Execute research actions
- Publicise results

**Access gate**

**Approval**

**Industrial uptake**

- Knowledge products
- Patents
- Regulations
- Workshops and conferences etc.

- Make use of results

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**eric**

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Collaboration

Europe

- ECCSEL Industry Advisory Group (IAG): STATOIL, SHELL, Aker, TOTAL, EDF
- Test Center Mongstad (TCM) Letter of Intent
- ECCSEL Industry partners; TOTAL, EDF, Statoil considering to include CCS laboratory
- ECCSEL Industry Community Platform under preparation this year
- ECCSEL Partnership with NCCS FME – Industry driven innovation for fast track CCS deployment. 50 mill EURO incl 20 mill EURO Industry funding (2016 – 2024)

Outside Europe

- Expected collaboration with oversea States
- Promising meetings/contacts and opportunities in Japan, Australia, .....
NCCS FME – Industry driven innovation for fast track CCS deployment

A world-leading partnership

[Logos of various organizations]
RICC02-09 Highlights of Infradev-3 proposal

WP1
Extending the ECCSEL ERIC user base
WPL - TNO

WP2
Strategic development of ECCSEL ERIC
WPL - SINTEF

WP4
Developing national nodes and expanding ECCSEL ERIC membership
WPL - BRGM

WP5
Positioning ECCSEL ERIC
WPL - BGS

WP3
Enhancement of global access to the ECCSEL ERIC
WPL - OGS

WP6
ECCSEL ERIC Business Plan and long-term sustainability
WPL - OC

WP7
Project management
WPL - OC

WP8
Transnational Access Pilots
WPL - OC

ECCSEL ERIC Operations Centre
Early full stage of operations (on-going)
ECCSEL Industry Workshop

Date: June 17  
Time: 15:00 – 17:00  
Location: NTNU, Department of Energy and Process Engineering (Kolbjørn Hejes vei 1B, Trondheim).

- Interactive workshop
- Aims to identify the vision and needs from industrial partners regarding CCUS and ECCSEL
- Also for anyone involved in Industrial CCUS
- Has five break-out sessions (capture technologies, storage, infrastructure and transport, investment barriers and legislation, system integration).
- In addition, we discuss the latest developments in the field of CCUS.
ECCSEL has established and provides access to a world class research infrastructure (RI) in Europe for CO₂ capture, transport and storage (CCS) technologies research.

The mission of ECCSEL is “Opening access for researchers to a top quality European RI, devoted to development and test of next generation CCS technologies in an efficient and structured way, to help enabling low to zero CO₂ emissions from industry and power generation to combat global climate change.”

ECCSEL teams up selected Centres of Excellence on Carbon Capture, Transport and Storage research (CCS) located in 5 countries across Europe: Norway, the Netherlands, Italy, France and the UK. The Operations Centre of ECCSEL is based in Trondheim, Norway. ECCSEL is financed by those above listed partner countries. The implementation of ECCSEL was supported with funding from the European Union’s HORIZON 2020 programme.

The ECCSEL facilities are provided by the following institutes in the partner countries:

- NTNU (Norway)
- TNO (The Netherlands)
- BGS (United Kingdom)
- UKCCS RC-PACT (United Kingdom)
- SINTEF (Norway)
- SOTACARBO (Italy)
- OGS (Italy)
- SINTEF Energy (Norway)
- BRGM (France)
- IFPEN (France)
- EDF (France)
- INERIS (France)
- Andra (France)

About ECCSEL:
ECCSEL has been established as a robust and financially sustainable legally independent entity: ECCSEL ERIC (European Research Infrastructure Consortium) with long-term funding commitment by the partner countries.

ECCSEL has implemented and is operating a distributed, integrated European Research Infrastructure (RI) based on a selection of the best research facilities in Europe for CO₂ capture, storage and transport research. A number of those facilities are planned to be upgraded in the future. Also new facilities are planned to be constructed.

Goals of ECCSEL:
• Provide easy access to a CCS Research Infrastructure helping to respond systematically to the most urgent R&D needs in CCS at a Pan-European level, in a short and long term perspective
• Maintain Europe at the forefront of the international CCS scientific community

• Make the European Research Area more attractive for both European and international scientists
• Increase cooperation between research institutions
• Optimise the value of financial investments and support -by the European countries and the EU- through better utilisation of new and existing research facilities

Foundations and Operation of ECCSEL
Carbon Dioxide Capture and Storage (CCS) is identified as a future key technology for reducing emissions from fossil fuels used for power generation as well as from industrial processes. Global demand is large, in particular from emerging economies. However, further research and technological development is urgently needed if CCS is to become a fully viable and cost-effective technology.

The ECCSEL Research Infrastructure is available for research now. You can apply for access anytime using the ECCSEL website www.eccsel.org.
Thank you for your attention!

www.eccsel.org