

ECCSEL ERIC

Valentina Volpi  
ECCSEL – Italian Node



**Breaking boundaries in Science and Innovation**  
**The World's largest CCUS Research Infrastructure**



# General status

## About us

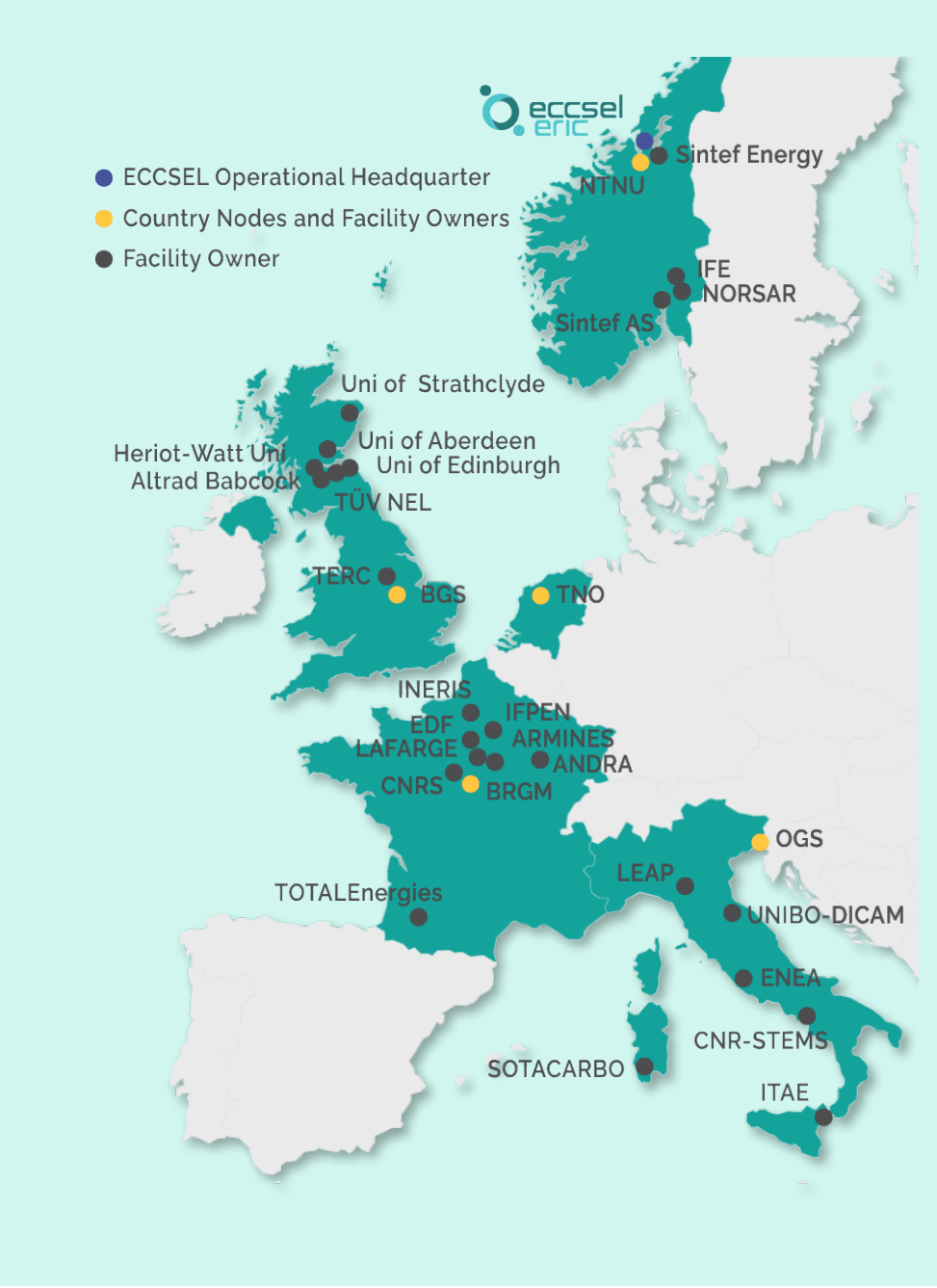
- ❑ Founded in 2017 on EU level, as an ERIC, HQ in Trondheim, Norway
- ❑ ECCSEL is the European Research Infrastructure for CO<sub>2</sub> Capture, Utilisation, Transport and Storage (CCUS) and Carbon Dioxide Removal (CDR)
- ❑ Our vision is to empower Research, Academia, and Industry to accelerate Research & Development to achieve net-zero CO<sub>2</sub> emissions across industrial sectors and power generation



- 5 Member Countries
- 28 Research Facility Owners
- 100+ Research Facilities

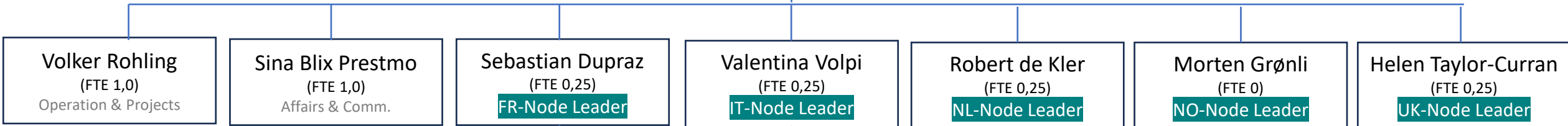


Photo: SINTEF



**Klaus Tobias Mosbacher**  
(FTE 1,0)  
Executive Director

**Debbie W. Koreman van den Bergh** (FTE 0,5)  
Admin & Assistance



**Facility Owners**  
**BRMG (2)**  
EDF (1)  
INERIS (2)  
TOTAL Energies (0)  
ARMINES (1)  
LAFARAGE (0)  
ANDRA (1)  
IFPEN (2)  
CNRS (7)

**Facility Owners**  
**OGS (7)**  
SOTACARBO (6)  
ENEA (1)  
Uni of Bologna (1)  
LEAP (1)  
CNR-ITAE (1)  
CNR-STEMS (6)  
POLIMI (1)

**Facility Owners**  
**TNO (6)**

**Facility Owners**  
**NTNU (4)**  
SINTEF Industry (13)  
SINTEF Energy (9)  
IFE (2)  
NORSAR (1)

**Facility Owners**  
**BGS (7)**  
Uni of Strathclyde (2)  
Uni of Edinburgh (5)  
Uni of Aberdeen (2)  
Uni of Shef/TERC (8)  
Heriott (5)  
ALTRAD (1)  
TUEV-NEL (1)

**Personnel / FTE**  
9/4,5

**Facility Owner/  
Facilities**  
31/106

9/16

8/24

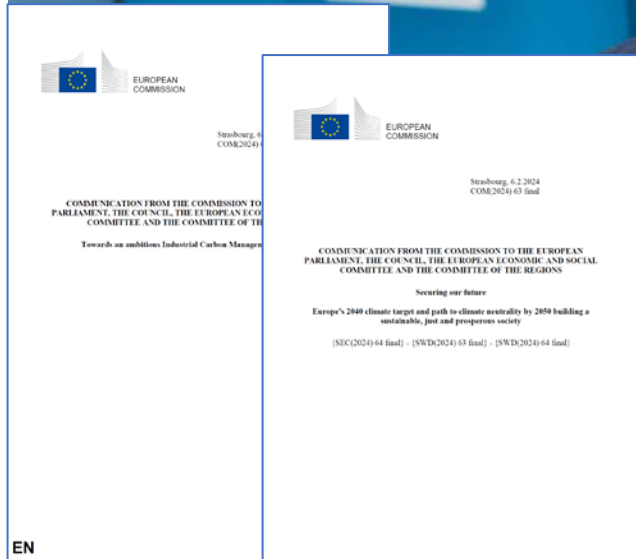
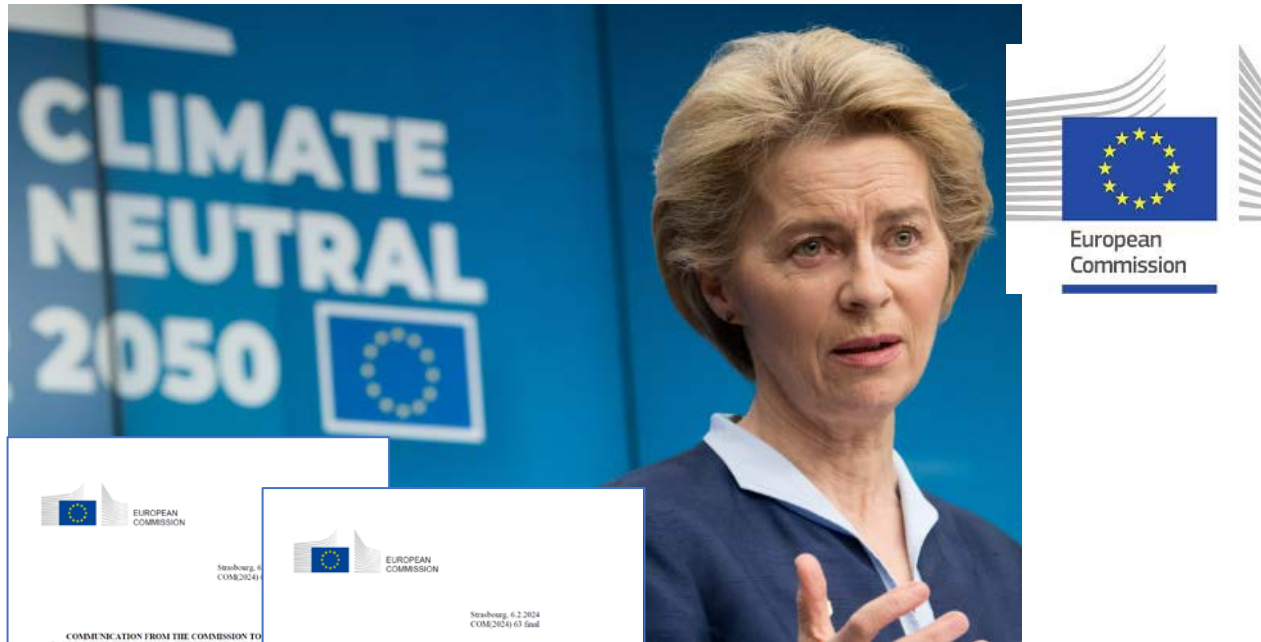
1/6

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8/31

Clear framework for ECCSELS strategic outlook, new opportunities

## EU Commission launch the EU Industrial Carbon Management Strategy and the EU CO2 Target 2040-2050



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## Berlin launches 'milestone' strategies to capture and remove CO2 permanently

Content-Type: News



Germany's Robert Habeck has presented "milestone" strategies on capturing and storing CO2. [EPA-EFE/HANNIBAL HANSCHKE]

 Euractiv is part of the Trust Project >>>

Germany will change its CO2 storage law to facilitate gas transport and is eyeing carbon capture in industry and the power sector while taking steps to become an emission-neg country past 2050.

# Strategic Outlook ECCSEL

There is finally an European-wide CCUS strategy  
.....and a quantified 2040 target and a path to climate neutrality by 2050



## Annual targets in the EU

- ❑ Capture **50 M<sub>t</sub>CO<sub>2</sub>** by 2030
- ❑ Capture approx. **280M<sub>t</sub>CO<sub>2</sub>** by 2040
- ❑ Capture approx. **450M<sub>t</sub>CO<sub>2</sub>** by 2050
- ❑ Minimum EEA injection capacity of **250M<sub>t</sub>CO<sub>2</sub>** in 2040



CO<sub>2</sub> emissions in EU from 1966 to 2022  
(in million metric tons)



### 4.3 Removing CO<sub>2</sub> from the atmosphere

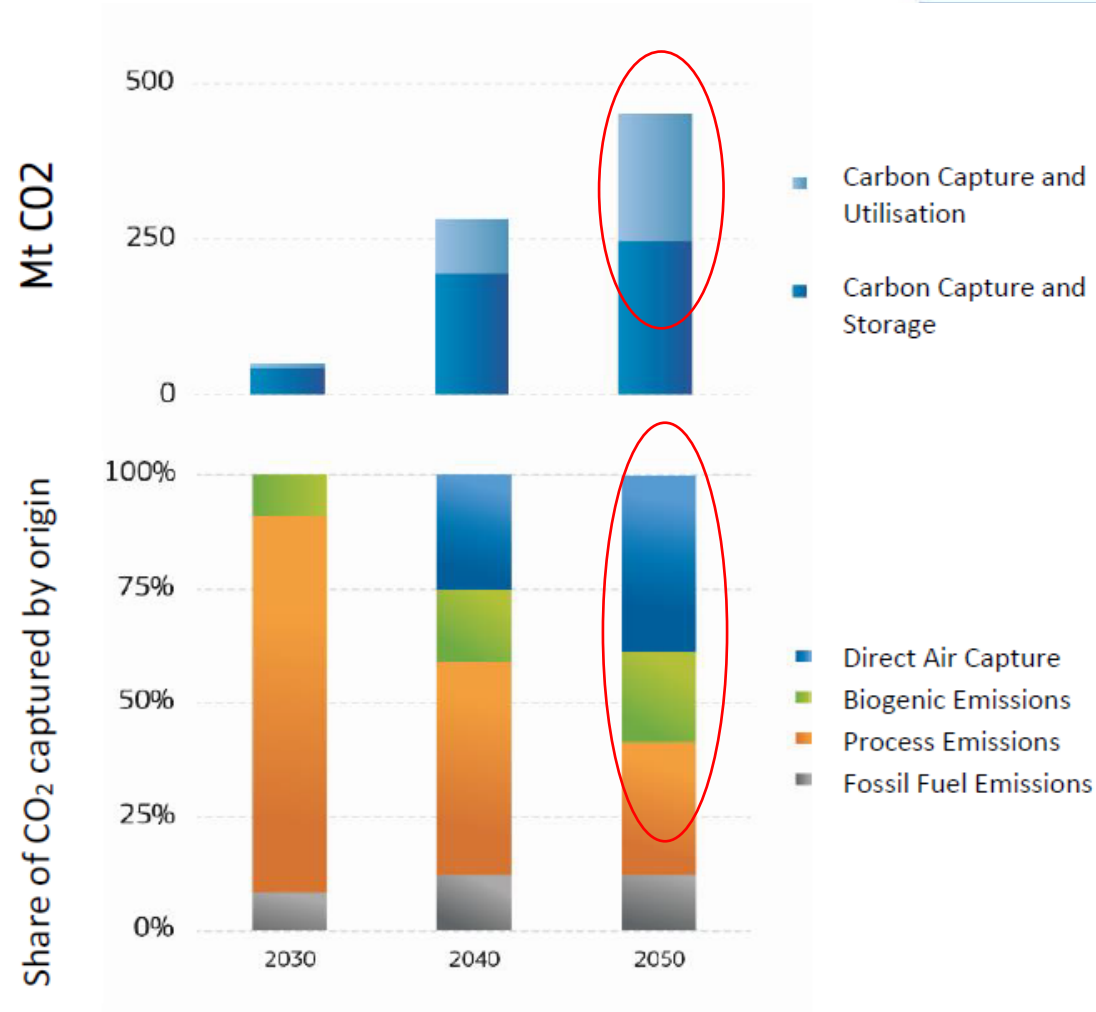
Industrial carbon removals value chains are key to achieving the carbon neutrality objective enshrined in the European Climate Law<sup>42</sup> To reach net-zero economy-wide GHG emissions by 2050, the EU could need carbon removals to balance out around 400 million tonnes CO<sub>2</sub> equivalent of residual emissions in hard-to-abate sectors such as agriculture, aviation and some industries.<sup>43</sup> Nature-based carbon removal solutions will play an essential role in this, but they will not be sufficient. Industrial carbon removals will also be needed to achieve this goal.

# Strategic Outlook ECCSEL

In 2050, CCS & CCU at almost same level, DAC and BECCS more than 50%



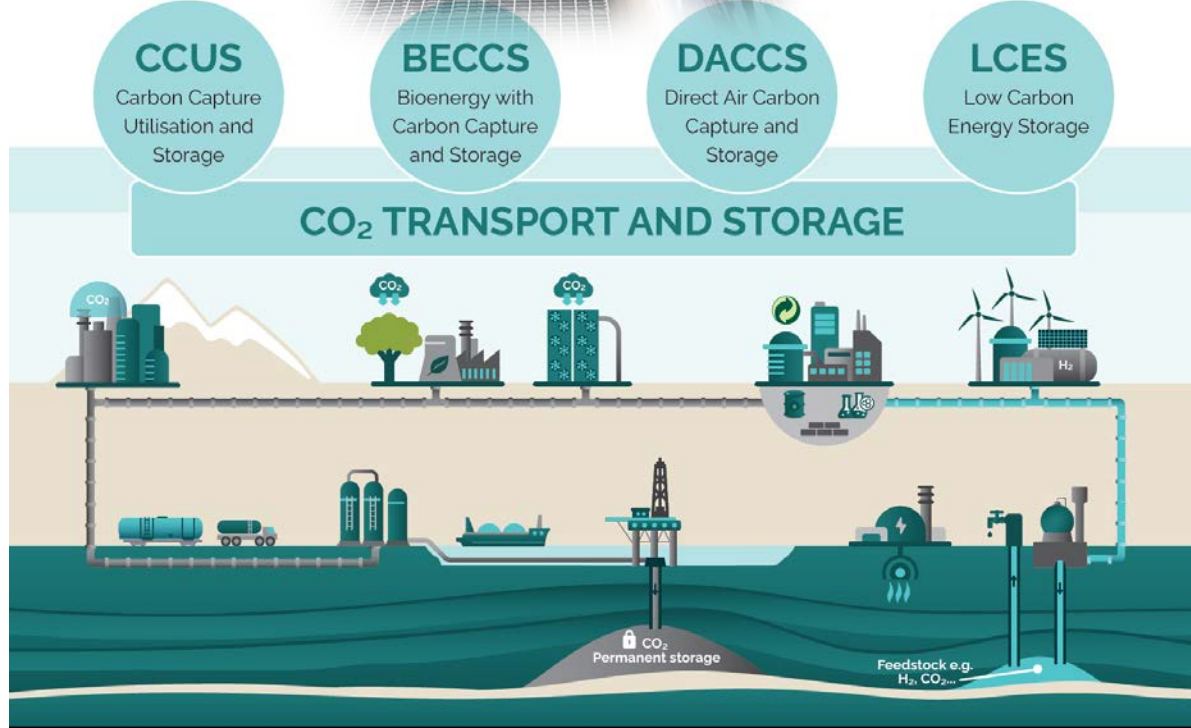
## Share of CO<sub>2</sub> captured by origin



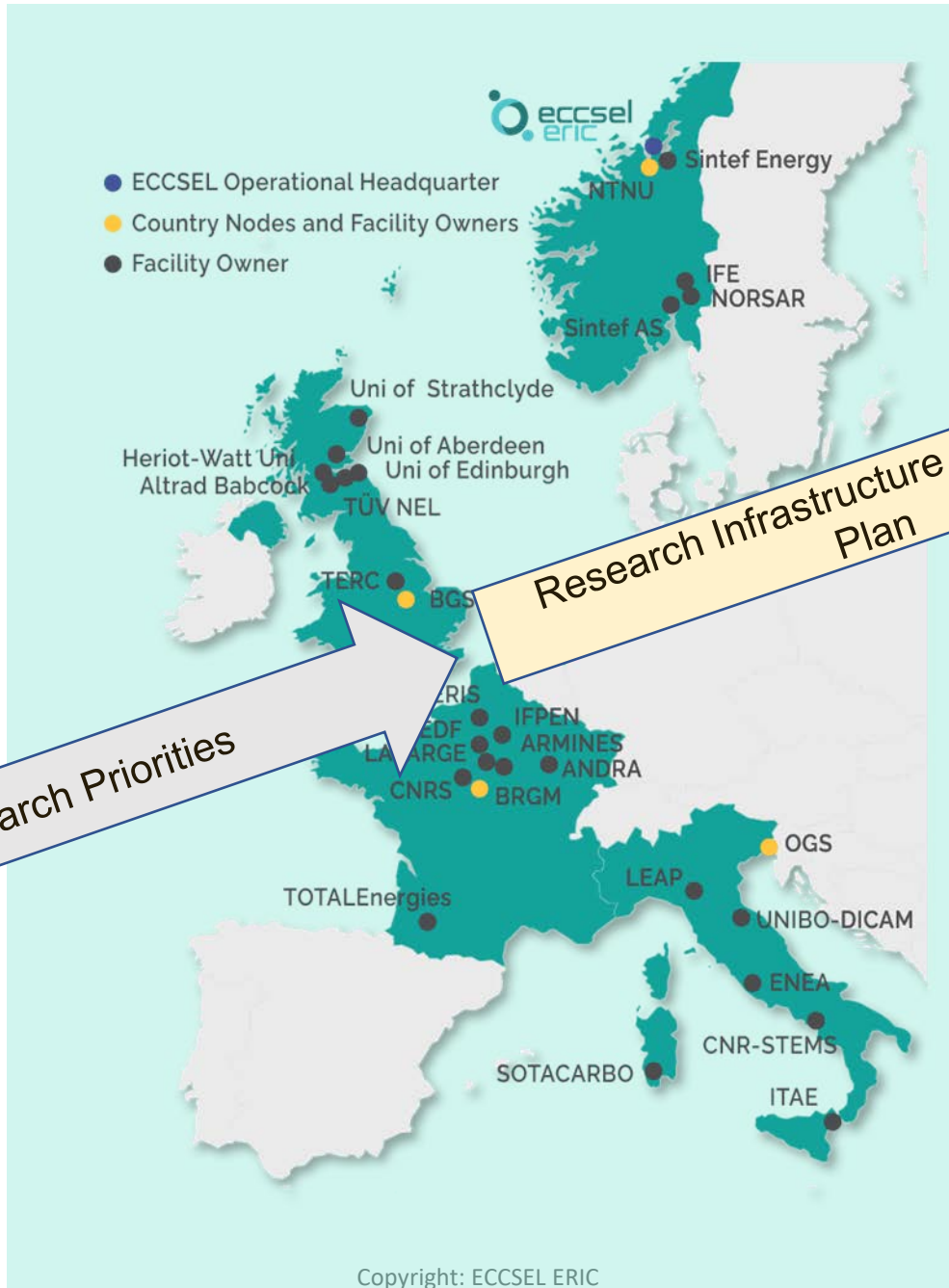
# General status

## Our Mission

- ❑ ECCSEL facilitates and coordinates open access to over 100 world-class CCUS & CDR research facilities across Europe, bolstering both national and EU Industrial Carbon Management Strategies.
- ❑ The research infrastructure actively engages with pertinent industry, academia, and research communities to address identified research needs across the TRL1 to TRL7 spectrum.
- ❑ Offering a comprehensive single-point open access of research and validation resources to accelerate the development and industrialization process, and eventual scaling up of the CCUS and CDR value chain to:
  - **Reduce costs** > Make CCUS & CDR commercially feasible
  - **De-risk Investment** > To ensure asset integrity
  - **Support safe operation** > To achieve societal acceptance



**Coordinated  
European  
Research  
Infrastructure  
Investments**



**Research Infrastructure Development Plan**

**Research Priorities**

From collaboration and workshops with industry valuable input on

- industrial research needs/services
- technology gaps
- and corresponding research infrastructure development needs

**Technology/  
Research  
Gaps**



- **ECCSEL website** ([www.eccsel.org](http://www.eccsel.org)) includes categorisation and factsheets for the research facilities



Sign up for ECCSEL newsletter

We use Mailchimp as our marketing platform. [Learn more about Mailchimp's privacy practices here](#) View the [ECCSEL Privacy Policy](#)

NEWS



**CAPTURE, STORAGE, UTILISATION, TRANSPORT**  
**ECCSEL presentation at Tekna CCS 2023**  
 ECCSEL ERIC is presenting at the Tekna CO2-conference 2023 "Green industrial growth" in Oslo, Norway  
 18 JAN 2023

EVENTS

08 Feb 2023 **CLIMIT SUMMIT 2023 - ECCSEL ERIC side event**  
 22-25 May 2023 **InterPore2023**

**CATALOGUE**  
 FIND THE BEST CO2 CAPTURE FACILITIES FOR YOUR PROJECT

Search tools

Studied CAPTURE Technology

Available TMs Involving CAPTURE Technologies

Research field that can be studied


Scale of research / facility

Countries   
 Italy  Netherlands  Norway  United Kingdom  France


Access provider

State of Access   
 Fully Accessible  Partially Accessible  Not Accessible


Forms of Access   
 In Person  Remote  Contract Research  Cooperative Research  Other




**COHYGEN (IT2.1)**  
 CO2 capture with liquid solvents  
 Solvents  
 SOTIACARBO Italy




**ZECOMIX (IT3.1)**  
 Zero Emission of Carbon with Mixed technologies  
 Membranes, Sorbents  
 ENEA Italy




**CO2\_BOX (IT5.1)**  
 "CO2\_box" composed by a phase equilibrium test rig and a single-phase test rig  
 Cryogenic, Thermodynamic, Properties of CO2 mixtures for Dry-fuel, compression, purification  
 LEAP Italy



**MEMLAB (IT4.1)**  
 Membrane Characterisation - Bench-scale unit for characterization of polymeric membranes - Characterization in terms of permeability, permance, diffusivity, selectivity  
 Sorbents, Membranes  
 UNIBO - DICAR Italy

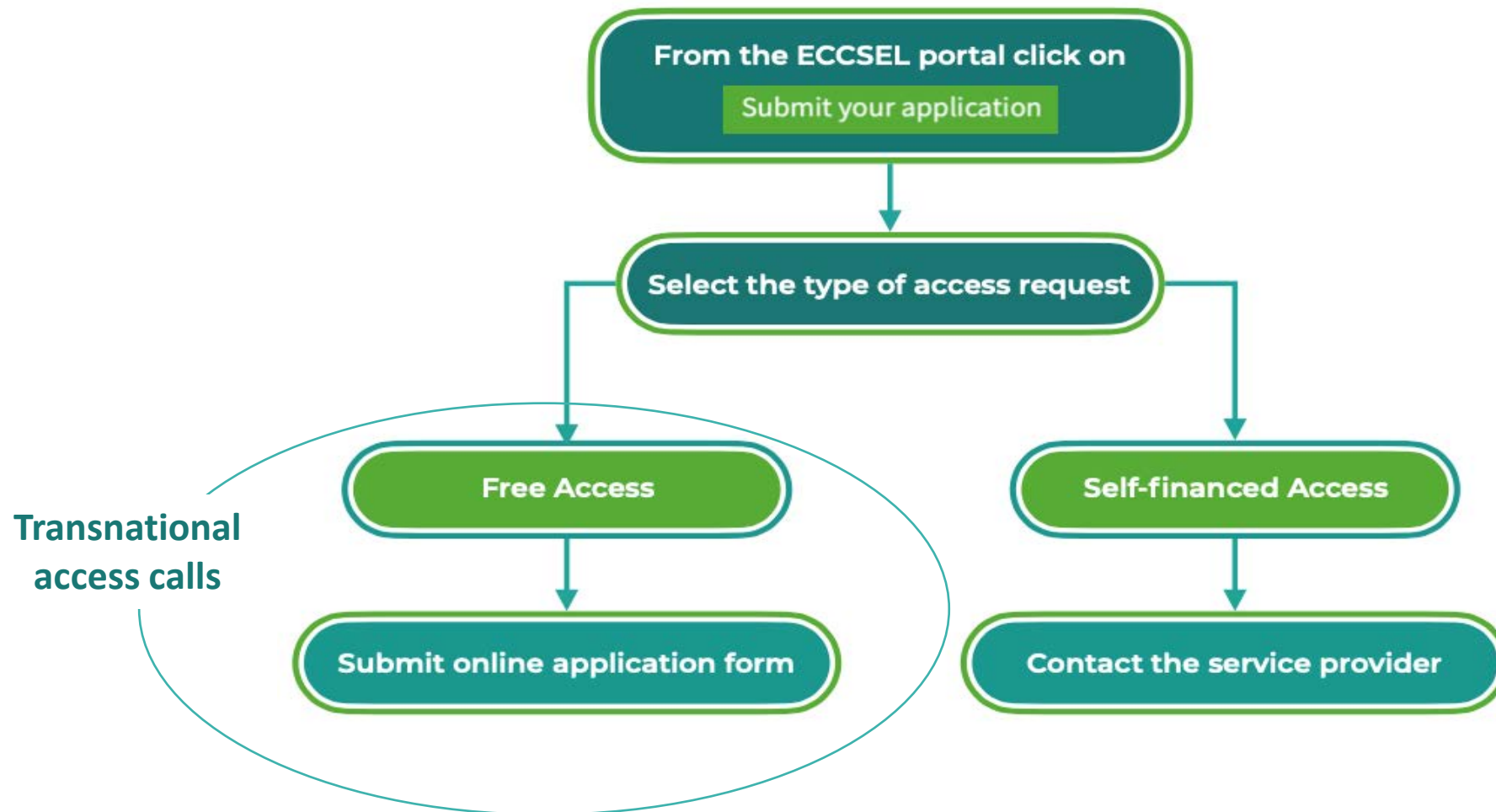


**XTL PILOT PLANT (IT2.3)**  
 X-to-Liquids (XtL) plant  
 Systems  
 SOTIACARBO Italy



**ATCM (NL1.6)**  
 Aerosol Test and Counter Measure  
 Aerosol control, Solvents  
 TNO Netherlands

# Access to ECCSEL research facilities



# Information Packs available, including 3 RP mind maps for Capture Transport and Storage

### Join ECCSEL (Facility Owner)

The information provided below is aimed towards institutions with research facilities that could be included in ECCSEL (for more information see [ECCSEL](#) - link). Else, if you are representative from an EU Member State or an EU Associated Member go to [Join ECCSEL State](#) ([ECCSEL](#) - link).

**Why join ECCSEL as a Facility Owner?**  
By choosing ECCSEL, you are choosing to partner leading research institutes worldwide committed to facilitate fundamental and applied research for advancement in CCUS deployment in Europe.

**Benefits for facility owners**  
As part of a European approved RP legal entity

- International visibility and common marketing
- Increased opportunities for external cooperation
- Cost sharing and savings
- Influence on international CCUS policies
- Partnerships with other EU institutes

**Facility owner commitments**


- Contribute to the Member national node according to Member decision
- Provide minimum of one research facility
- Support integration of national facilities in own and other Member States

**How to add new facilities?**  
If the facility is within an ECCSEL member country follow the procedure below, otherwise contact [info@eccsel.org](mailto:info@eccsel.org)

National Nodes propose New facilities

### What is CCUS?

Carbon capture, utilisation and storage (CCUS) is a cross sector solution essential to mitigate carbon emissions in many sectors, including power and industry. CO<sub>2</sub> is captured at a source of emission and either used to create valuable products (CCU) or to be stored (CCS).



Source: <https://ourworldindata.org/emissions>

### WHY CCUS?

**Why do we need CCUS?**  
CCUS is identified as a future key technology for reducing emissions from fossil fuels to be consistent with the goals of the Paris Agreement. In the so-called 'Emission Scenarios' which are consistent with the Paris Agreement, CCUS is needed in almost all of them to help:

- Reduce direct emissions from the burning of fossil fuels or from industrial processes, and
- Create negative emissions, such as in combination with bioenergy (BECCS)

### Why invest in CCUS research?

If you are a company gaining the future competitive edge. In some hard-to-abate sectors, CCUS is the cheapest carbon mitigation technology. Future pricing on CO<sub>2</sub> emissions is expected to grow fast in order to reach the Paris Agreement goals.

### Join ECCSEL (State Representative)

The information provided below is aimed towards national representatives from an EU Member State or Associated Member that could partner ECCSEL (for more information see [ECCSEL](#) - link). Else, if you are a Facility Owner, go to [Join ECCSEL](#) ([ECCSEL](#) - link).

**Why join ECCSEL as a member?**  
By choosing ECCSEL, you are choosing to partner leading research institutes worldwide committed to facilitate fundamental and applied research for advancement in CCUS deployment in Europe.


**Benefits**  
As part of a European approved RP legal entity

- International visibility and common marketing
- Increased opportunities for external cooperation
- Cost sharing and savings
- Influence on international CCUS policies
- Partnerships with other EU institutes
- Common strategies increase cooperation and facilitate synergies
- Access to ECCSEL ERIC resources/services
- Participate in ECCSEL ERIC events (training, conferences, etc.) at preferential rates
- Use ECCSEL ERIC branding
- Increased dedicated funding through EU Research and Innovation programmes, e.g., ERA-CTE, Horizon Europe, etc.
- National grants and joint industry investments
- Joint / coordinated funding applications
- Increased facility utilisation
- European strategy to fill gaps of services not yet provided
- Standardised access process

**ECCSEL Members commitments**

- Pay annual fee
- Provide a minimum of one facility
- Support/initiate integration of national facilities in own and other Member States
- Operational costs of facilities are recovered from facility users, subject to funding via research projects, grants and industry.

**How to join?**  
Contact [info@eccsel.org](mailto:info@eccsel.org)



Research Institutes (national nodes) (via facility owner)

Recommended General Access based on the EC Directive

General Access based on the EC Directive

Users and services (training, data rates, etc.) in marketing of own research programmes, e.g., ERA, industry investments applications

of services not yet available

See also: What is CCUS? What is ECCSEL? Access ECCSEL

### Access ECCSEL

**Access services**  
Services open for a global market

- Full physical personal access (upon training and approval)
- Remote virtual access
- Indirect access (experiments by facilities' staff)
- Technical advisory and training in a wide range of experimental, data analysis, and modelling topics
- Comprehensive services within CO<sub>2</sub> capture, transport, utilisation, storage, and cross-cutting CCUS topics
- Experimental planning
- Experimental support
- Technology testing and / or phenomena investigation in high quality facilities
- Data processing, analysis and modelling

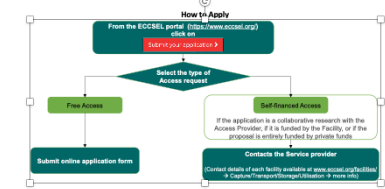
**Confidentiality & Intellectual Property**  
Applications for access are not disclosed.

- Access to results and data is agreed prior to access via:
  - ECCSEL IP policy and ECCSEL dissemination policy <https://www.eccsel.org/en/About-us/General-EN/FAQ/General-EN-FAQ-2020-2026>
  - Particular terms on confidentiality, disclosure, and IP rights are part of the facility user Access Agreement.

**Access Opportunities**  
Funded by the EU Horizon 2020 program

- Transnational access funding opportunities and list of facilities at <https://www.eccsel.org/en/Access>
- The selection criteria are included in the calls for transnational access.

**How to Apply**



Compared to other kinds of application it was quite easy to apply and certainly we didn't have any issue. At the end of the project, we simply sent back a short form and everything went through quickly and easily

Audrey, RMP/1 facility owner, British Geological Survey

See also: What is CCUS? What is ECCSEL? Access ECCSEL

### Why is CO<sub>2</sub> deployed?

CCUS is still an early technology but it can be reduced by 50% by 2050. The ECCSEL infrastructure consists of over 100 research facilities, fully viable and on-line.

- Capture: membranes, sorbents, solvents, combustion, pre-combustion, integrated CO<sub>2</sub> system
- Storage: pre-combustion, migration, geological (deeply), leakage, mitigation/ventilation, micro-synthetic, seawater/mineralisation, sulphur, monitoring, clean-mixing, dynamic modelling
- Transport: Storage, Security/Mineralising, Audit characterisation, New characterisation, material testing, CO<sub>2</sub> pipeline transport and storage, Abandon CO<sub>2</sub>
- Utilisation: thermochemical conversion and hydrogenation of CO<sub>2</sub>, electrochemical and photochemical conversion of CO<sub>2</sub>, CO<sub>2</sub> conversion to solid carbonates, small scale plants with carbon capture and re-use into valuable products

### What is ECCGSEL?

European Carbon Dioxide Capture and Storage Laboratory Infrastructure

- ECCGSEL is the European Research Infrastructure for CO<sub>2</sub> Capture, Utilisation, Transport and Storage (ECCUS)
- ECCGSEL is a distributed, integrated research infrastructure encompassing international nodes and facilities.
- The ECCSEL infrastructure consists of over 100 research facilities.
- ECCGSEL covers research infrastructure across the CCUS value chain, such as:
  - Capture: membranes, solvents, sorbents, combustion, pre-combustion, integrated CO<sub>2</sub> system
  - Storage: pre-combustion, migration, geological (deeply), leakage, mitigation/ventilation, micro-synthetic, seawater/mineralisation, sulphur, monitoring, clean-mixing, dynamic modelling
  - Transport: Storage, Security/Mineralising, Audit characterisation, New characterisation, material testing, CO<sub>2</sub> pipeline transport and storage, Abandon CO<sub>2</sub>
  - Utilisation: thermochemical conversion and hydrogenation of CO<sub>2</sub>, electrochemical and photochemical conversion of CO<sub>2</sub>, CO<sub>2</sub> conversion to solid carbonates, small scale plants with carbon capture and re-use into valuable products

### WHY ECCGSEL?

**How does ECCSEL fit with...?**  
European Energy Research Alliance - ERA  
Climate Deal - ERA CCUS Joint Programme provides European strategic research direction. ECCSEL ensures transnational facilities are available.

**ERA Pillars**  
Development of CO<sub>2</sub> storage technologies to 2030 and beyond and ongoing available research work under ERA umbrella

ECCGSEL plays a key role in the pillar as specified in the SET-Plan (2018) on CCS and CCU (Implementation Plan)

ECCGSEL is a world-class research infrastructure featuring ambitious R&D activities, European industrial initiatives, and clusters of specialists for the new CCUS industry!

**Mission Statement**  
ECCGSEL is devoted with the implementation of the Innovation Challenge "CC" (Carbon Capture) to enable the development and testing of new and novel technologies.

**What does ECCSEL offer?**


- Access to leading research facilities for users worldwide
- Single control point for the facilities included in the ECCSEL Research Infrastructure
- Facilitation of fundamental and applied research leading to commercial applications that help advance CCUS deployment in Europe and worldwide
- Coordination of ECCSEL Research Infrastructure in Europe, creating synergies and opportunities to increase efficiency in research investments
- Increased researcher mobility
- Improvement of the competitiveness of the European industry and SMEs by raising their CCUS TRILs

**Who pays for ECCSEL?**  
ECCSEL is a non-profit organisation with a legal status. As an ERIC, ECCSEL is funded through the European Union FP7 and Horizon 2020 research and innovation programmes.

The operation of the ECCSEL Research Infrastructure is managed by its Member countries through a single fee.

Each Member country is represented by a National Node.

ECCSEL is made up of leading CCUS facilities provided by over 20 European institutions.



### What does ECCSEL do?

**ECCSEL integrates, updates and controls**

- Facilitates and coordinates requests to access to facilities within the ECCSEL Research Infrastructure
- Responsible for research facilities and research communities to determine their research infrastructure needs to enable full-scale deployment of CCUS in Europe
- Coordinates European development of facilities and their services to meet identified needs
- Represents European Research Infrastructure for CCUS in relevant fora

**What is the future of ECCSEL?**  
ECCSEL is still a national project with a legal status. As an ERIC, ECCSEL, ECCSEL ERIC is a legal entity with an ERIC status.

ECCSEL ERIC will address infrastructure needs identified in its Research Pillars through its Infrastructure Development Plan.

**ECCSEL ERIC Pillars** leads the way to CCUS technologies and power generation to combat global climate change, as well as CO<sub>2</sub> reduction in the infrastructure.

Find out more about facilities and how to access them: [www.eccsel.org/en/Access](https://www.eccsel.org/en/Access)

My experience with ECCSEL widened my horizons both scientifically and personally. The program granted me the opportunity to collaborate in a multicultural environment with experts in CCUS and access state-of-the-art methods and equipment!

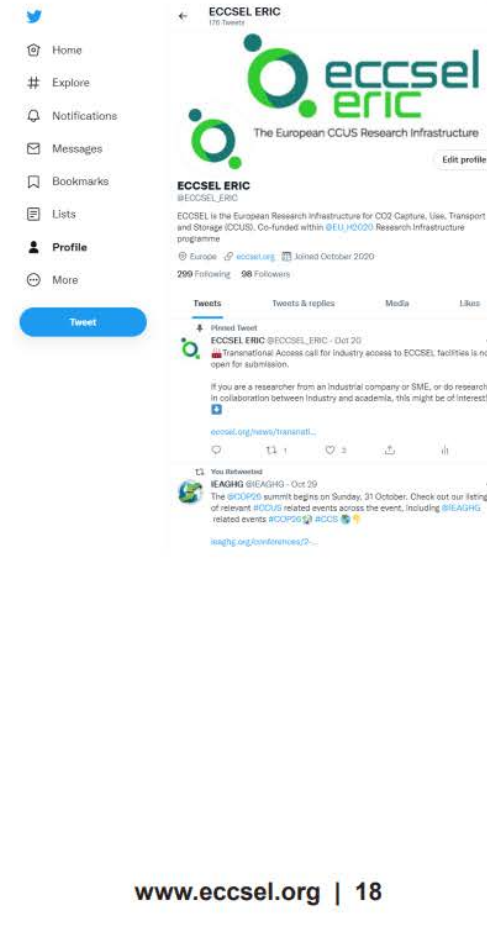
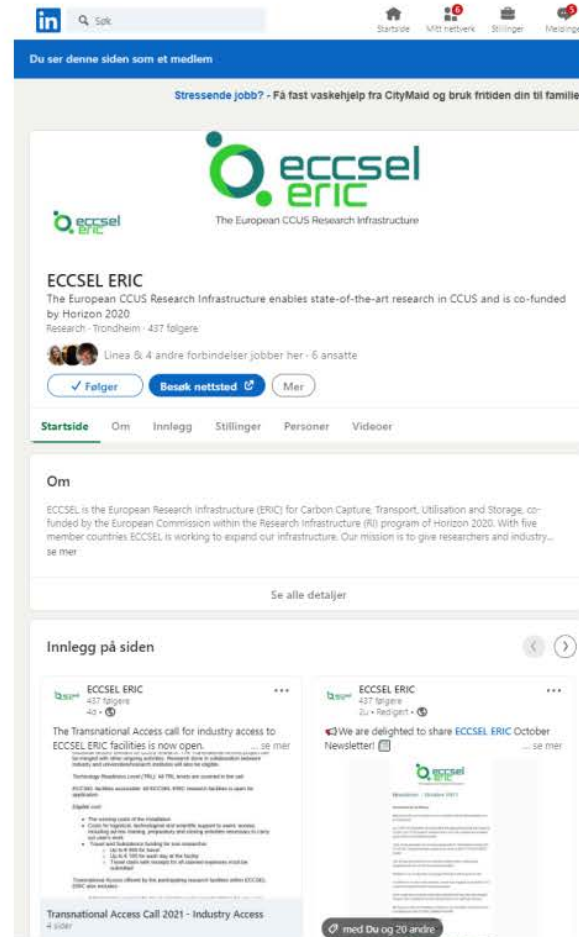
Erini, Transnational Access Facility User, National Technical University of Athens

See also: What is CCUS? Access ECCSEL Join ECCSEL

# ECCSEL website – center for information and single-point access

## ECCSEL – how to stay informed

- ECCSEL Website
- ECCSEL Newsletter (3-4 per year) – subscribe
- ECCSEL LinkedIn
- ECCSEL Twitter
- ECCSEL Facebook
- ECCSEL YouTube channel



www.eccsel.org | 18

# JOIN US IN ADVANCING RESEARCH in industrial carbon management solutions for a sustainable future!



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