

**Carbon Capture, Utilisation and Storage:
Opportunities, challenges and pathways to Net Zero**
Thematic workshop - 17th September 2026 - Faculty of Civil and Industrial
Engineering, Sapienza University of Rome

**CNR-ITAE within ECCSEL-ERIC:
Research Capabilities for CO₂ Utilisation**

Serena Todaro, Mariarita Santoro, Fausta Giacobello, Catia Cannilla, Giuseppe Bonura*

CNR-ITAE, Istituto di Tecnologie Avanzate per l'Energia "Nicola Giordano"

Via Comunale Santa Lucia 5/B, 98126, Messina, Italy

* Corresponding author: giuseppe.bonura@cnr.it

The contribution presents the role of CNR-ITAE within the Italian ECCSEL-ERIC network, highlighting its research infrastructure and experimental capabilities for CO₂ utilisation and sustainable energy vectors. The facilities available at CNR-ITAE support complementary activities ranging from catalyst and functional material development to advanced physicochemical characterisation, catalytic and electrocatalytic testing, and laboratory-scale process validation.

Research activities focus on the conversion of CO₂ into renewable fuels and energy carriers, including methane, methanol and dimethyl ether, through thermocatalytic, electrochemical and hybrid process routes. Additional capabilities include the development and testing of structured and multifunctional catalysts, supporting innovative reactor concepts and process intensification strategies. The integrated experimental approach enables the correlation of material properties, reaction pathways and process performance, supporting the development and validation of technologies from fundamental studies to laboratory-scale demonstration [1].

Within the ECCSEL-ERIC framework, these facilities provide researchers and industrial stakeholders with access to specialised experimental infrastructure and multidisciplinary expertise. The CNR-ITAE facilities contribute to the Italian ECCSEL-ERIC network by supporting transnational access, scientific collaboration and the exchange of knowledge and experimental methodologies [2]. The contribution will also highlight the opportunities offered by the infrastructure to develop collaborative research activities and accelerate the advancement of innovative and sustainable CO₂ utilisation technologies.

Keywords: *CO₂ Utilisation; ECCSEL-ERIC, Research infrastructures, e-fuels.*

Acknowledgments

The inputs and outcomes from ECCSELLENT (IR0000020, NextGenerationEU, PNRR M4C2 - I. 3.1) and NICE-ITALY (MUR, PN-RIC 21–27, Act. 1.1.1, DD310, 18/03/2025) are gratefully acknowledged.

References

- [1] S. Todaro, G. Bonura, A. Cajumi, M. Santoro, F. Randazzo, G. Giacoppo, F. Frusteri, C. Cannilla, *Catalysts* **14** (2024) 101.
- [2] L.R. Smith, E.C. Kohlrausch, K.J. Aggett, M. Samperi, S. Ghaderzadeh, A. Weillhard, L.T. Norman, I.E. Gow, Y. Chen, G. Bonura, C. Cannilla, E. Besley, D.J. Morgan, T.J.A. Slater, A.N. Khlobystov, J.A. Fernandes, G.J. Hutchings, *Chem. Sci.* **16** (2025) 22554.

Organized by

