



COREu

# CO<sub>2</sub> routes across Europe

## Objective

COREu aims to accelerate CCS deployment in Europe, by demonstrating safe and effective CO<sub>2</sub> transport and storage. During 4 years, a multidisciplinary consortium composed of emitters, technology providers, gas transport system operators, research institutes and universities, will demonstrate key enabling technologies in a CCS value chain and support the development of three new CCS routes in Central East Europe.

## Expected outcomes

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### Core Technologies

Various impurities present in CO<sub>2</sub> streams will be assessed, to propose representative CO<sub>2</sub> specifications for demo processes in COREu (capture plants, transport and storage infrastructure). COREu will also:

- Develop tool for safe design and operation of CO<sub>2</sub> transport networks
- Improve metering and analysis of CO<sub>2</sub> streams
- Enable multimodal transport and interoperability of CO<sub>2</sub>
- Develop tools to de-risk and optimize storage

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### Demonstrations

COREu will demonstrate the compression of CO<sub>2</sub> captured from a natural gas power plant, its transportation and underground storage in Greece. The CO<sub>2</sub> will be captured from an advanced, 10t/d pilot plant using Rotating Packed Bed technology and will be compressed and transported in high endurance containers. CO<sub>2</sub> leakage detection and seismic monitoring will be performed through an advanced autonomous underwater vehicle (AUV) and wireless subsea acquisition nodes (Seanapsys). An off-shore CO<sub>2</sub> transfer and injection system will also be demonstrated.

Figure: Power plant of ELPEDISON where the capture and compression will take place

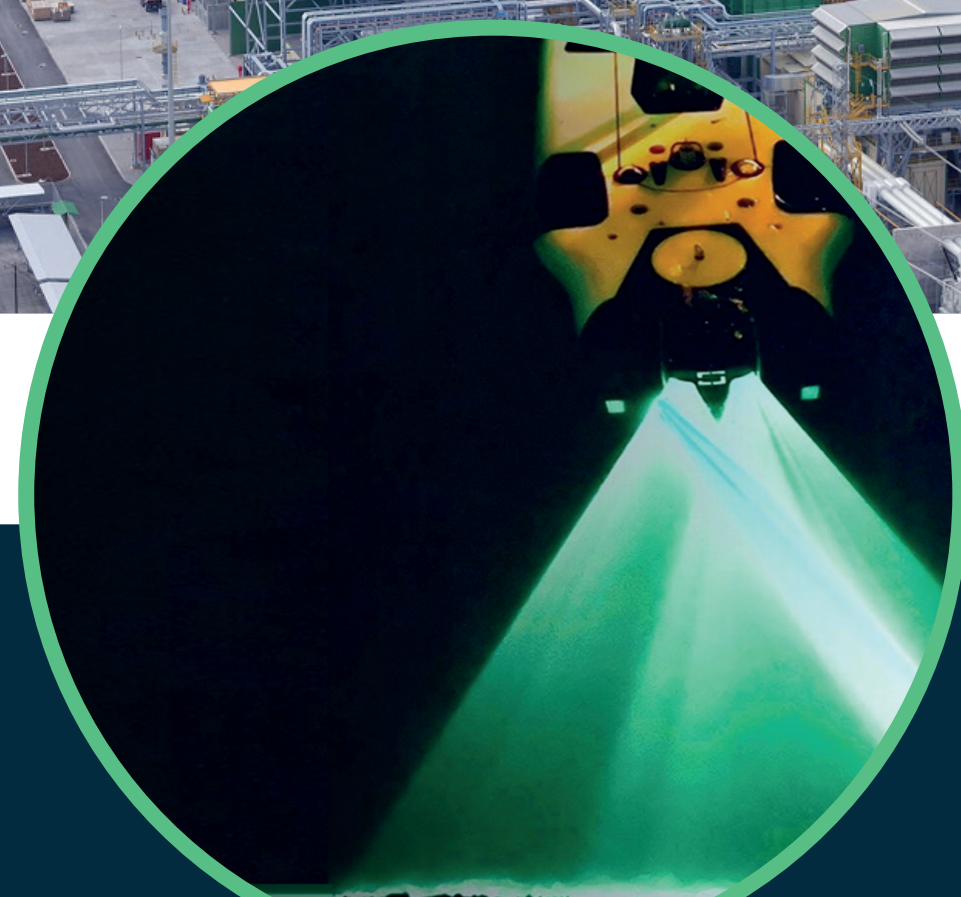
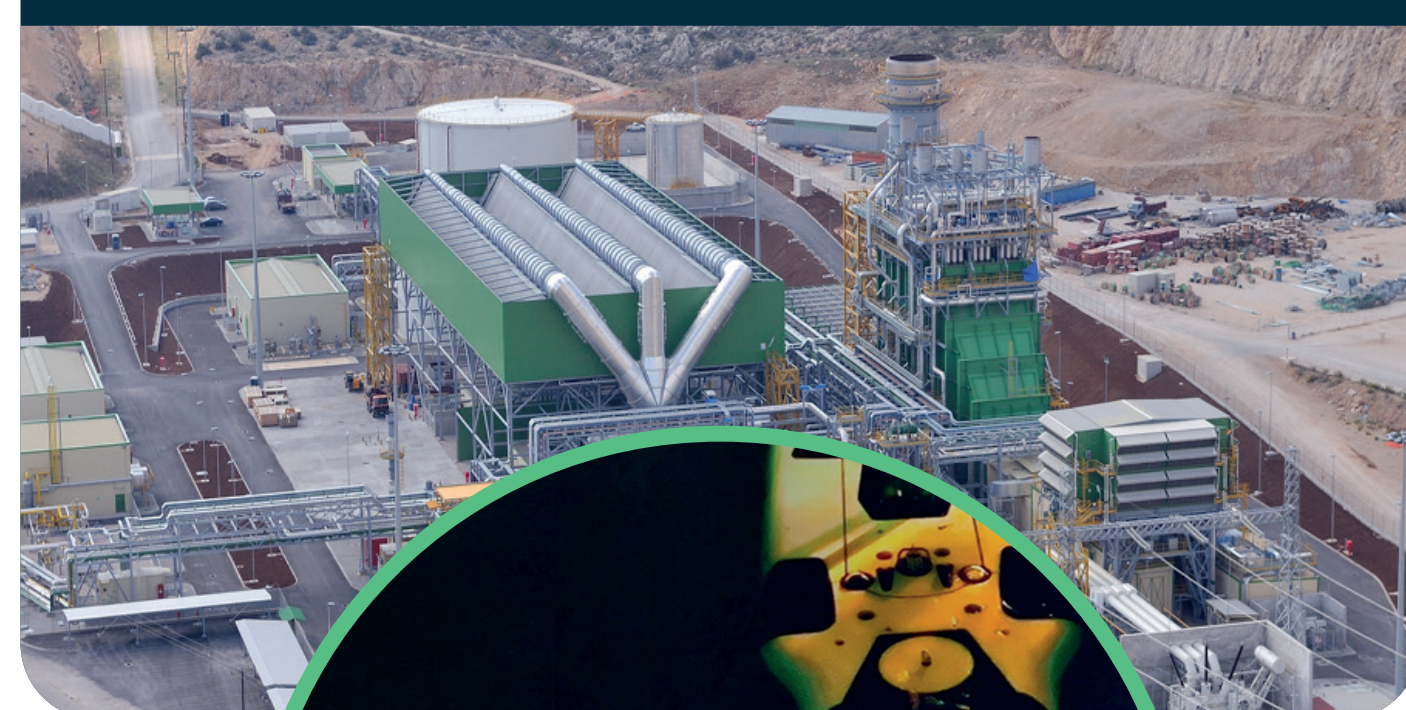


Figure: AUV for leakage detection

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### CO<sub>2</sub> routes

COREu will investigate techno-economic feasibility of CO<sub>2</sub> routes in South and Central-East Europe by considering for multimodal transportation (trucks, trains, ships, or pipelines) and potential reuse of existing infrastructure. Regional studies will assess the cost per tonne of CO<sub>2</sub> avoided (or removed), including carbon credits generation, and identify potential clusters and hubs for large-scale deployment of CCS in Europe. This can advise policy makers on public/private governance business models for CCS clusters roll-out.

Figure: Largest emitters in 2021

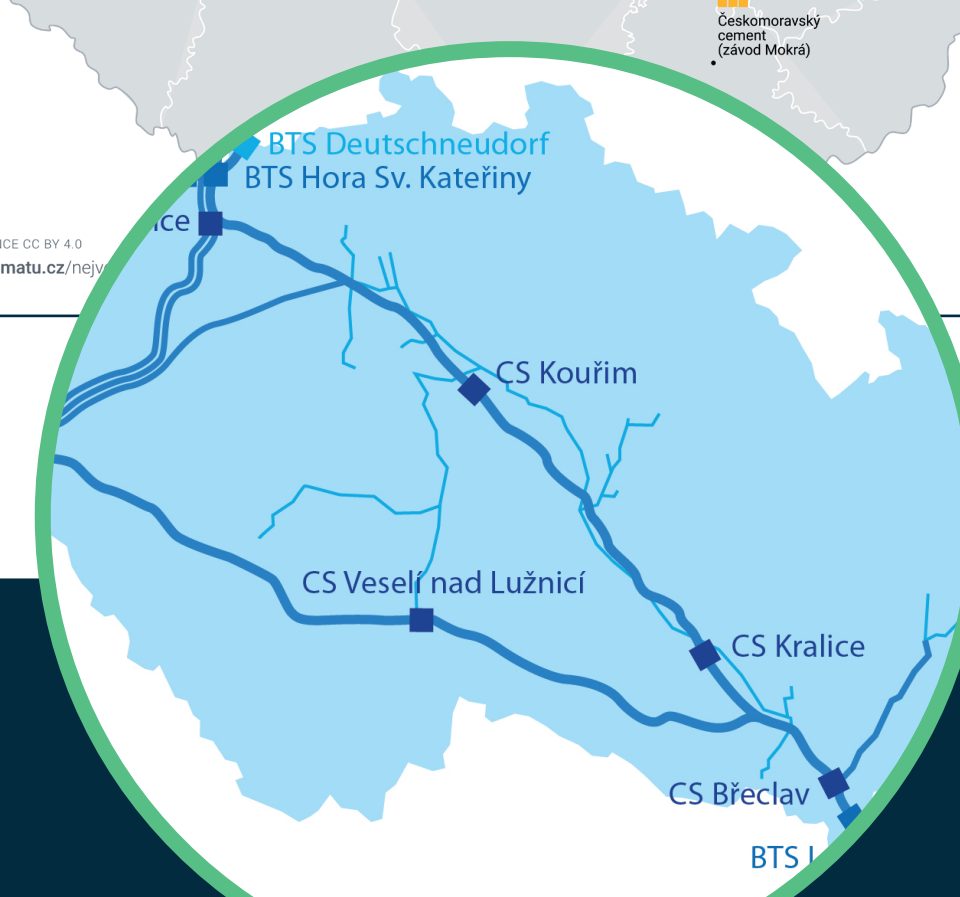
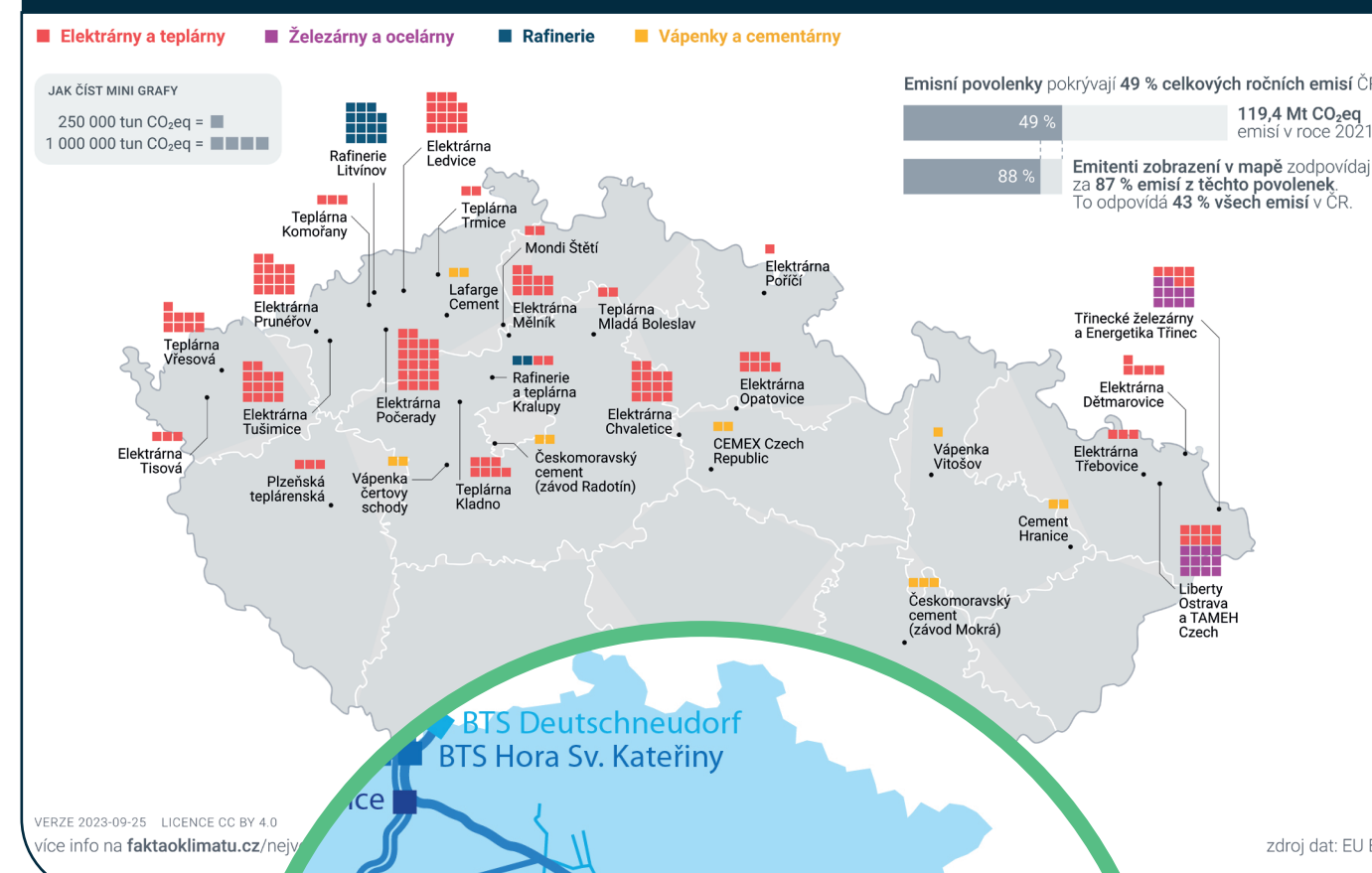


Figure: Transport pipeline system

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### Sustainable Development & Consensus Management

COREu will develop socioenvironmental sustainability CCS guidelines, identify sociopolitical issues and manage stakeholder consensus, and conduct baseline environmental monitoring at multiple sites and develop an associated best-practices document.

Figure: Environmental monitoring with continuous and discrete measurements

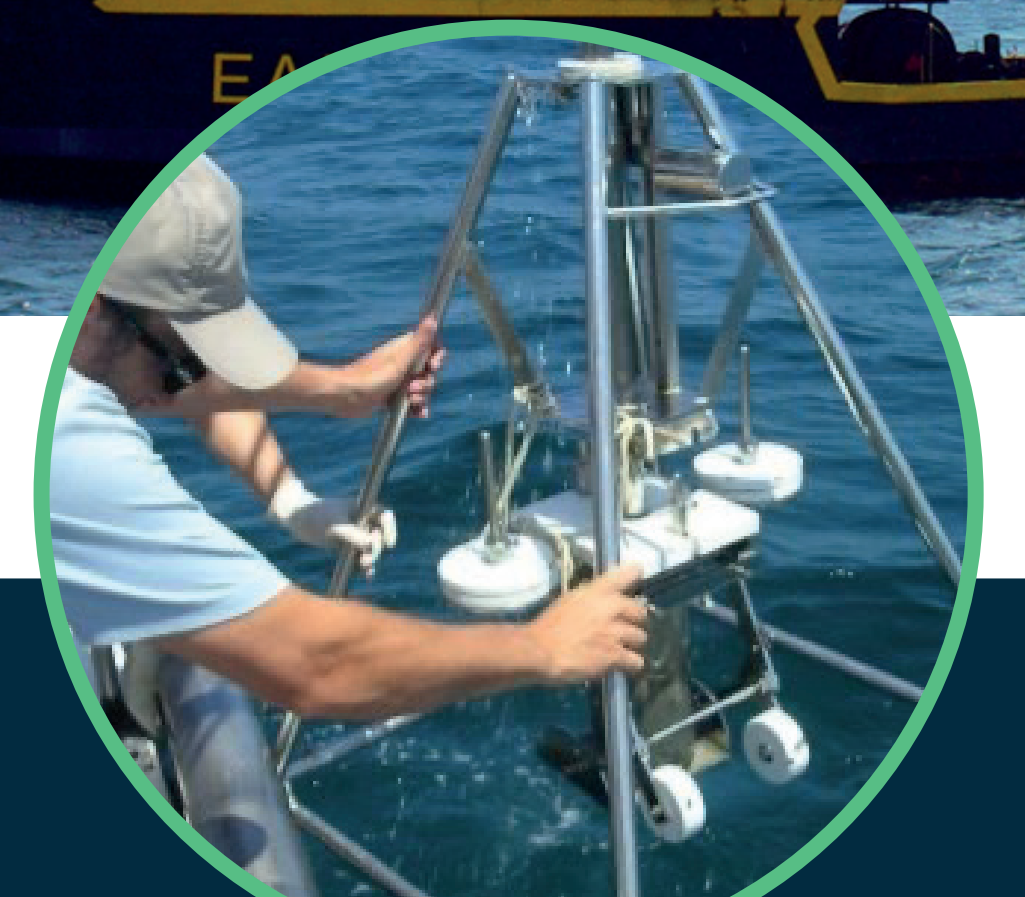


Figure: Environmental monitoring with continuous acontinuous and discrete measurements

## COREu expected results:

- Demonstration of full CCS value chain and enabling technologies paralleled by development of three novel CCS routes in Southern, Central, and Eastern Europe.
- Demonstration of safe operation of full CCS value chain, by measurement, monitoring & verification of CO<sub>2</sub> leakage during transport and storage.
- Experimental data for engineering model validation and tool development.
- Engineering tools for safe design, risk management, safety assessment and environmental monitoring.
- Expert reports on technical, environmental, financial, and regulatory risk mitigation for sustainable CCS scale-up.
- Developed business cases for three novel CO<sub>2</sub> routes in Southern, Central, and Eastern Europe.

## References

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- Vitali M, Corvaro F, Marchetti B, Terenzi A. Thermodynamic challenges for CO<sub>2</sub> pipelines design: A critical review on the effects of impurities, - water content, and low temperature. Int. J. Greenh. Gas Con. Vol 114, 2022. DOI: 10.1016/j.ijggc.2022.103605.
- Zero Emissions Platform (ZEP), A Trans-European CO<sub>2</sub> Transportation Infrastructure for CCUS: Opportunities & Challenges, June 2020.



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