Benefits of CCUS technology (carbon capture, use and storage)

Carbon capture (sequestration) and storage is a set of technologies aiming to safely capture, transport and permanently store CO2 that would otherwise be released into the atmosphere. Carbon capture and utilization (CCU) technologies allow reusing captured carbon, increasing its circularity and potentially reducing its emissions to the atmosphere.

For Romania, CCS technology has come to the forefront, given the EU's ambitious climate commitments imposed by the NZIA regulation. According to the NZIA provisions, from 2023 onwards, out of the 50 million tonnes of CO_2 to be captured and stored by the EU per year, Romania is obliged **to ensure the storage of approximately 9 Mtpa.** In terms of this storage obligation, the cement industry alone needs a storage capacity of about **8 million tonnes of CO_2 / year.**

Carbon Capture, Utilization and Storage (CCS) technology can play a key role **in achieving carbon neutrality,** in addition **to maintaining the productivity and competitiveness of Romanian industry,** especially **in energy-intensive** and hard to decarbonize sectors. CCS can also contribute to the development of a platform for blue hydrogen as an alternative energy source.

The initial costs of developing these projects are significant, so it is essential to ensure their financial feasibility and acceptance by all stakeholders.

Romania, with its tradition in oil and gas exploration and exploitation, has a unique opportunity to implement and use the best practices and know-how available. The oil and gas sector has long experience in geology, reservoirs, in conducting drilling operations and in operating oil and gas facilities and infrastructure, **and this unique expertise can easily be transferred to the implementation of CCS projects.**

Carbon dioxide storage

Geological sequestration is a proven method of storing CO_2 underground, where it is **injected into deep rock formations for long-term storage.** In this way, operators can prevent the release of CO_2 emissions into the atmosphere, supporting the decarbonisation of energy-intensive industries.

Geological structures suitable for storing CO_2 may be present both onshore (aquifers, depleted deposits) and offshore. These projects take on average 7 to 10 years to develop.

Romania has significant geological storage capacity for CO_2, with estimates of the theoretical storage potential amounting to 22.6 gigatons. Oil systems are present in 9 basins in Romania as well as on the continental shelf in the Black Sea. All these deposits could serve as potential CO_2 storage reservoirs, but extensive technical feasibility studies need to be carried out.

All CO_2 capture and storage initiatives require a comprehensive investigation: geological (subsurface) and laboratory studies, engineering and facility safety studies, environmental impact assessments and feasibility studies, which require significant financial and human resources. The main transmitters are located in the areas of Gorj, Galati, Ploiesti, Constanta, Targu Mures and Bucharest.

Legislative and social acceptance

The main European regulations related to CCS are the CCS Directive and its accompanying Guidelines for safe CO_2 storage operations, the Emissions Trading Scheme, the EU Net Zero Industry Act Regulation.

While the EU framework provides a basis for the development of CCUS, addressing implementation challenges is vital to Romania's success in this area. Romania needs further regulatory **adjustments and a national strategy for CCUS implementation,** including **identifying potential sites, engaging stakeholders and ensuring social acceptance.**

CCS projects have become commonplace in North America and Europe, supported by strong policy regulation and higher carbon prices. There are currently 41 plants in operation worldwide. However, the level of development of geological storage resources is outstripping potential future demand, even in jurisdictions such as Europe.

According to studies, in Romania, CCUS is most cost-effective when **applied to large CO_2 sources such as power plants and steel mills.**