

Policy Recommendations to enable CCS / CCU in Luxembourg

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1 The Role of CCU/CCS in the Luxembourg Industry

Carbon capture is an evolving technology, with pilot projects and new industrial applications emerging as its readiness improves and costs decrease over time. Currently, each CCU/CCS solution requires a case-by-case assessment, often demanding tailored approaches based on the specific infrastructure of existing facilities.

- i. **Support Carbon Capture in Hard-to-Abate Industries:** Prioritize the implementation of carbon capture technologies in sectors with a high share of unavoidable process emissions in their production stage, such as cement production. These industries require carbon capture as the only viable pathway to align with national decarbonization goals and preserve the possibility for long-term competitiveness in Luxembourg and Europe. CCS is also a key technology for the steel sector and should, therefore, be facilitated and supported, particularly in the transitional phase of its decarbonization, both for the BF and DRI, until affordable hydrogen is available.
- ii. **For other sectors, encourage investments and infrastructure development to support CCU/CCS:** The technology may represent an opportunity to foster sustainable industrial activity by enabling lower carbon products. It may also help set new benchmarks in environmental friendliness, sustainability, and competitiveness in industries with hard-to-abate processes and/or high-temperature fossil fuel-related emissions (e.g., flat glass production). Additionally, establishing a CCU/CCS infrastructure will enhance Luxembourg's attractiveness as an industrial location, ensuring that future industries with unavoidable emissions can rely on a viable solution for carbon management. In the long term, industrial investors will prioritize locations with such solutions, making CCU/CCS a key factor in securing Luxembourg's role as a competitive and future-proof manufacturing hub.
- iii. **Incorporate Biogenic CO₂ in Climate Strategy:** Develop policies to integrate the capture of biogenic CO₂ into Luxembourg's decarbonization strategy to achieve negative emissions and support broader climate objectives.
- iv. **Enhance Luxembourg's Competitiveness:** Position Luxembourg as an attractive industrial hub by creating a supportive policy and investment environment, recognizing that most energy-intensive (i.e., capital-intensive) companies work within global corporate frameworks.

2 Infrastructure needs

- i. **Amend Legislation:** Revise [national laws](#) to permit options for Luxembourg's carbon capture and storage operations.
- ii. **Short term: Promote Onshore Storage** - Prioritize onshore storage solutions within Luxembourg or the Greater Region¹ to minimize costs, reduce logistics challenges, and ensure timely implementation.
- iii. **Mid-Term: Develop Pipeline Infrastructure** - Invest in pipelines to enable cost-efficient CO₂ transport and improve economic feasibility for hard-to-abate industries with large emission volumes.
- iv. **Address Energy Challenges:** Invest in energy infrastructure upgrades and ensure grid capacity can support the additional power demand from CCU/CCS technologies.

¹ For example in the French "Grand Est" region, see: [État des lieux et perspectives de déploiement du CCUS en France](#), page 28

- v. **Coordinate with EU Infrastructure Strategies:** Advocate for Luxembourg's integration into an EU-wide pipeline and storage networks while addressing the challenge of higher-quality CO₂ standards required for pipeline injection by identifying and promoting joint initiatives with companies' technical experts to define standards.

3 Timelines and Constraints to Overcome for CCU/CCS Implementation

- i. **Support Early Planning and Investment:** Provide clear guidelines and long-term policy commitments to reduce investment risks, ensuring the predictability that industries require to make informed investment decisions. A stable regulatory framework is essential for companies to plan and secure necessary investments to meet national and EU climate goals. The gradual strengthening of ETS emission reduction targets and the progressive phase-out of free allocation (2026–2034) offer a defined planning horizon, but further clarity on infrastructure development, financial support mechanisms, and regulatory conditions will be crucial to enabling timely industrial action.
- ii. **Facilitate Financial Support:** Establish funding mechanisms or incentives to offset the high upfront costs of CCU/CCS projects and help absorb increased operational costs to ensure economic feasibility.
- iii. **Address Logistical Challenges:** Collaborate with stakeholders to secure sufficient power, water, and land resources for CCU/CCS implementation while minimizing environmental and societal impacts.
- iv. **Integrate with Regional Infrastructure:** Develop policies to ensure compatibility of CO₂ logistics with regional and European infrastructure, enabling efficient transport and storage.
- v. **Foster Public Acceptance:** Engage in transparent and fact-based communication to inform the public about the role of onshore CO₂ storage in achieving climate goals and ensuring industrial competitiveness. Provide clear information on safety measures and address local implementation aspects to encourage constructive dialogue and informed decision-making.

4 Framework Conditions for Enabling CCU/CCS Adoption

- i. **Amend Legislation on CO₂ Storage:** Repeal or modify [the law of 27 August 2012, Art. 33](#), to permit options for geological storage of CO₂ within Luxembourg and enable the development of necessary infrastructure. Create a legal framework for CO₂ transport.
- ii. **Align National Strategies with CCS Deployment:** Incorporate CCS into Luxembourg's national energy and climate plan (PNEC) to ensure coherence between objectives and measures and provide a clear framework for infrastructure development and industrial decarbonization.
- iii. **Level the Playing Field for Utilization:** Revise EU-ETS rules to fully recognize the carbon reduction potential of utilization technologies (CCU) and engineered removal technologies (DACCS, BECCS). These should receive equal consideration alongside storage solutions (CCS) and be granted the same economic benefits, including reductions in verified emissions and corresponding EUA surrender requirements for captured CO₂.
- iv. **Establish a Regulatory Framework and Infrastructure Planning for CCS:** Implement a straightforward and efficient regulatory framework to facilitate CCS operations' permitting, licensing, and monitoring. Develop a comprehensive network plan for CO₂ transport and storage, including cross-border cooperation, to

ensure seamless integration with regional decarbonization efforts and support industrial investment in CCS.

- v. **Provide Financial Incentives:** Develop funding mechanisms, such as direct government investments in infrastructure, fixed pricing for captured CO₂, CCfDs (Carbon Contracts for Difference), tax incentives, off-take or volume guarantees to de-risk CCU/CCS projects and encourage private investment. Examples:
 - a. [Germany is rolling out CCfDs](#) to support decarbonizing its energy-intensive industries, including CCS.
 - b. [Norway launched the Northern Lights project](#), a component of its full-scale CCS initiative, Longship. The project's first phase is 80% funded by the Norwegian government.
 - c. [Netherlands' Porthos project](#) is a collaboration between the government, private companies (PPP), and port authorities to create CO₂ storage infrastructure in the North Sea.
 - d. [Denmark's Greensand project](#) benefits from government-backed infrastructure investment for offshore CO₂ storage.
 - e. The [UK has invested £20 billion over 20 years in CCS](#) clusters like the East Coast Cluster, showcasing how targeted funding can create industrial decarbonization hubs.
- vi. **Ensure Competitive Energy Supply for CCU/CCS Deployment:** Facilitate affordable and reliable access to low-carbon electricity by investing in renewable energy generation, flexibility capacities, and grid upgrades. Establish targeted electricity pricing and grid fee allocation mechanisms to support the energy-intensive needs of CCU/CCS technologies and enhance industrial decarbonization.
- vii. **Integrate CCU/CCS into Industrial Policy:** Ensure that CCU/CCS is a core part of Luxembourg's industrial decarbonization strategy, aligning with national and EU climate goals.

5 Technological Readiness for CCU/CCS in Industry

- i. **Support R&D for Emerging Technologies:** Establish funding programs to advance the development of key CCU/CCS technologies, particularly for energy-intensive processes, such as those in the cement and glass sectors.
- ii. **Encourage Industry-Academia Collaboration:** Facilitate partnerships between industries, research institutions, and regional initiatives to drive innovation and improve technology readiness. (f.ex. TRL 3-6 for the cement sector, TRL 5-7 for the glass sector)
- iii. **Promote Pilot Projects:** Provide financial and regulatory support for pilot projects in both sectors to test and refine emerging technologies under real-world conditions.

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