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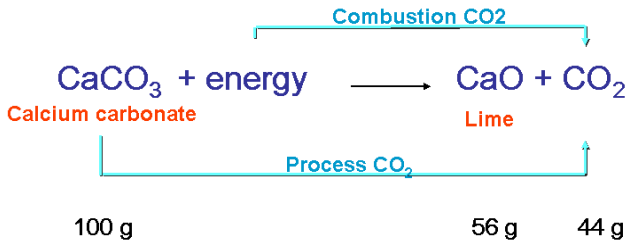
Future of Carbon Capture and Storage (CCS) in Europe

1. CCS may be a solution for fossil fuel emissions, but it is also relevant for industrial installations with a significant share of chemically determined process emissions.

The European Council has confirmed at several occasions that the EU is aiming at a reduction of Greenhouse Gas emissions of 80-95% by 2050 compared to 1990.
In the lime industry, 68% of the total CO2 emissions are so-called "process emissions": they originate from the decarbonation of the limestone when it is transformed into lime, which is illustrated in the picture below. These GHG emissions are inherent to the lime production process and cannot be avoided without changing the quality of the final lime product. Process emissions are significant and seriously impede the potential of the lime industry to further reduce its GHG emissions.



In theory CCS could be a solution for coping with "process emissions" – but only under certain conditions which are further elaborated below. EuLA regrets that the Commission's Communication on the Future of Capture and Storage in Europe mainly sees CCS as "*one of the key ways to reconcile the rising demand for fossil fuels, with the need to reduce greenhouse gas emissions".* CCS should not only be stimulated for the compensation of fossil fuel emissions, but also for the compensation of process emissions in several industries, including lime.

2. Capturing CO2: The current costs of capturing CO2 emitted by a lime plant are far beyond what is economically reasonable.

In 2012, TNO (Netherlands Organisation for Applied Scientific Research) has made a techno-economical evaluation for EuLA of post combustion CO2 capture in lime production plants (TNO, 2012). For the state-of-the-art solvent (MEA) costs to capture CO 2 were €94 per ton of avoided CO2. The cost to capture CO2 would more than double the production costs of lime, to around €60/ton lime.

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This would create a serious impact on the sector's competitiveness (local production compared to imports).

In case waste heat can be used for solvent regeneration, these costs would be reduced. Also, further innovations may provide the potential to reduce the cost associated with capturing CO2, but the quick uptake of the technology which is needed to accelerate innovation has not taken place yet.

EuLA therefore recommends that further research is undertaken to lower the costs of capturing CO2 emissions from small to medium-sized installations.

3. Need for investments in the right infrastructure for transporting and storing CO2

Storage involves transporting the CO2 to a geographically suitable location and storing it underground. Currently, lime plants are typically located right next to the limestone quarry, not clustered in large industrial agglomerations.

Transport costs – to overcome the distance between the lime plant where it is captured and the location where it is stored – as well as any additional piping infrastructure can add significantly to the capture costs, especially since CO2 emissions from lime plants are relatively small (in comparison with major industrial sites/power plants), and the lack of nearby CO2 transport infrastructure for lime plants at remote locations.

Appropriate planning of CO 2 transport infrastructure leading to the availability of a transport infrastructure to tie in to could reduce CCS costs for the sector. Storage locations would need to be developed and maintained and public and regulatory acceptance of CO2 storage still needs to be overcome.

However, given the already high price for capturing CO2, EuLA questions the economic feasibility of completely passing on the costs of CCS infrastructure to its users. CCS transport and storage should be offered in the first place as a public service.

4. Recognize the potential of products that capture CO2 and permanently store it

Several lime-based products absorb CO2 during their lifetime. This reaction has been quite well examined in the case of lime-based mortars. EuLA estimates that around 70% to 90% of the CO2 emitted during the calcination of the limestone is sequestrated again by the lime-based mortar in the short term. This gives a total potential CO2 reduction of around 416.500 tCO2/year in the EU-27. Some further research would be required however to exactly characterize this process.

EuLA recommends that the Commission recognizes the capacity of products (like lime-based mortars) to *permanently* capture and store CO2 emissions.

5. Utilizing CO2: a way forward for research?

The business case for capturing carbon could be improved in case where the captured CO2 could be used, rather than stored. Storage costs could be saved, and it might get a financial value. The lime industry itself will not be able to use it, but the business case to capture the CO2 could benefit from others using it.

A lot of research is currently devoted to developing new uses of CO2, including:

- Using it to produce fuels/hydrocarbons.
- Transforming CO 2 into inert carbonates, to be used, for example, as construction material.
- Using it as a feedstock for the production of polymers.
- Applying CO 2 to enhance recovery of fossil fuels (oil, gas).

Many of these applications are, however, only at research stage for the moment.