

CO₂ VALORISATION

DESCRIPTION:

The utilisation of CO₂ and CO as an alternative carbon source can contribute to a more sustainable production of chemicals, materials, fuels, with significant CO₂ emission avoidance compared to current production pathways. CO₂ valorisation technologies can also provide solutions for large scale renewable energy storage.

An appropriate, coherent and supportive policy and regulatory framework is essential to enable the deployment of CO₂ valorisation technologies that can effectively contribute to sustainable development in and from Europe.

Type of barrier: **THEMATIC**

Sectors involved: **CHEMICALS, CEMENT, LIME, STEEL**

Challenges

CO₂ valorisation is recognised in a number of Communications from the European Commission as an innovative process with potential to contribute to the circular economy. It is also referred to in some regulations such as the revised EU ETS directive. Although the utilisation of CO₂ as an alternative feedstock in the process industry is mentioned in the Circular Economy Communication from 2015 and in the European Strategy for Plastics, from 2018, CO₂ valorisation is currently not incentivised by any specific policy measure as part of the Circular Economy package.

In the framework of the revision of the [Directive on the promotion of the use of energy from renewable source](#), CO₂/CO valorisation options are considered for the production of two types of fuels for transport: 'renewable liquid and gaseous transport fuels of non-biological origin' and 'recycled carbon fuels'. For both types of fuels, the Commission shall adopt delegated acts by 31 December 2021, to specify the methodology for assessing greenhouse gas emission (GHG) savings, which shall ensure that no credit for avoided emissions be given for carbon dioxide whose capture already received an emission credit under other legal provisions. Appropriate minimum threshold for GHG savings of recycled carbon fuels shall be defined by the Commission at the latest by 1 January 2021, by means of delegated act. For carbon recycled fuels which cannot be counted towards the overall EU target for energy from renewable sources Member States will have the option to consider them or not in the obligation of fuel suppliers. For the production of renewable fuels of non-biological origin, if the electricity is taken from the grid, a methodology will also be developed by the European Commission to ensure that there is a temporal and geographical correlation between the electricity production unit, which the producer has a bilateral renewables power purchase agreement with, and the fuel production.

On the other hand, the revised [EU ETS Directive](#), which sets the framework for the next trading period 2021-2030, provides for the establishment of the ETS Innovation Fund. Through this Innovation Fund, 400 million allowances will be reserved from 2021 onwards to accelerate the commercialisation of low-carbon technologies.

This includes to support innovation in low-carbon technologies and processes in sectors listed in Annex I of the EU ETS Directive, and environmentally safe carbon capture and utilisation (“CCU”) that contributes substantially to mitigating climate change. The Delegated Act defining the rules on the operation of the Innovation Fund are currently under preparation by the EC and should be adopted by the end of 2018.

While the deployment Carbon Capture and Utilisation could benefit from the Innovation Fund in the future, the issue of ETS allowances for CO₂ emissions which are avoided through CO₂ valorisation technologies still needs to be addressed. Currently, the ETS system does not foresee a clear mechanism enabling companies investing in CCU not to surrender CO₂ emissions that have been avoided. Such mechanism expected to be developed under the upcoming revision of the ETS Monitoring and Reporting Regulation would be an important incentive for the market deployment of these technologies.

Overall, in order to ensure that CO₂ valorisation technology developments can be transformed into real benefits for Europe, it is critical to develop a common understanding of how the impact of CO₂ valorisation technologies should be evaluated, and ensure this potential impact is considered in the development of all relevant policies and regulations.

Potential solutions

As with any other technology, the environmental impact of CO₂ valorisation technologies requires an appropriate evaluation based on a qualified Life Cycle Analysis. All contributions to the carbon footprint have to be taken into account in order to quantify avoided CO₂ emissions by conversion of CO₂ as an alternative carbon source as compared to conventional production pathways. System boundaries for the evaluation have to be carefully defined for each case. Furthermore, the environmental impact of technologies goes beyond climate mitigation potential, it includes the utilisation of sustainable raw materials and energy services. Finally, in addition to a suitable evaluation of the environmental impact, economic and social aspects of these technologies should also be considered.

For a chemical product, the net CO₂ emissions avoidance can be evaluated on a cradle-to-gate basis by comparison of CO₂-based production to the standard production, since the emissions during the use phase and end-of life of the product is independent from the source of carbon feedstock.

Last but not least, the storage potential of mineralisation and recarbonation should be acknowledged.

To sum up, major solutions to be adopted include:

- Define common methodology and guidelines to evaluate the impact of CO₂ valorisation technologies based on an appropriate life-cycle approach.
- Recognize the environmental benefits of CO₂ valorisation technologies including in the revised EU ETS Directive-which will apply for the period 2021-2030- through an appropriate revision of the Monitoring and Reporting Rules.
- Risk sharing options to enable deployment of CO₂ valorisation with net GHG emission reduction, through appropriate funding measures at higher TRL (TRL>6).



List of related legislation

Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC – last modified by Directive (EU) 2018/410

Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council

Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments. **Decision (EU) 2015/1814** of the European Parliament and of the Council of 6 October 2015 concerning the establishment and operation of a market stability reserve for the Union greenhouse gas emission trading scheme and amending Directive 2003/87/EC

Renewable Energy: Interinstitutional File: 2016/0382 (COD) – COM/2016/0767. **Directive 2008/98/EC** of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (Text with EEA relevance).

Relevant communications include: COM(2015) 614/2, COM(2018)28, Commission Regulation (EU) No 601/2012, Directive (EU) 2018/410.

TCs and standardisation

ISO/TC 265 Carbon dioxide capture, transportation, and geological storage

