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CCU in the Renewable Energy Directive

Before regulatory changes are made to climate and renewable energy policy frameworks, ZEP strongly recommends that the European Commission should undertake detailed analysis of the permanence of CO_2 abatement for all types of CCU, including "low emission and renewable fuels" derived from anthropogenic CO_2.

Introduction

The European Commission in its revision of the EU Renewable Energy Directive (REDII) has proposed a 2030 target for 'low-emission and renewable fuels'. The proposed target includes so-called "renewable liquid and gaseous transport fuels of non-biological origin''. An example of renewable liquid and gaseous transport fuel of non-biological origin is a synthetic fossil transport fuel created by using H_2, which is acquired with the use of renewable electricity and CO_2. Collectively, this process is known as "Power to Liquid" (P2L) and is a form of Carbon Capture and Utilisation (CCU).

In the proposal for the REDII, the European Commission includes the following Article:

> ''/…/ renewable liquid and gaseous transport fuels of non-biological origin /.../ can contribute to low carbon emissions, stimulating the decarbonisation of the Union transport sector in a cost-effective manner, and improving inter alia energy diversification in the transport sector /…/ and reducing reliance on energy imports. The incorporation obligation on fuels suppliers should encourage continuous development of advanced fuels /…/.''

(Article 64, Directive on the promotion of the use of energy from renewable sources (recast))

Declarations of intent for other policy measures, e.g. the Strategic Energy Technology plan (SET Plan), also include such assumptions:

> ''Given the positive contribution to both energy security and climate mitigation goals, advanced renewable fuels can strongly justify the short-term high economic cost that their production implies /…/."

(Targets 6.1, SET - Plan – Declaration of Intent on "Strategic Targets for bioenergy and renewable fuels needed for sustainable transport solutions in the context of an Initiative for Global Leadership in Bioenergy")

Given the high policy relevance of such CO_2-based fuels in particular, and CCU in general, ZEP provides recommendations on the classification of CCU technologies and processes according to their climate benefit.

Classifying different types of CCU

Unlike CCS, where the CO_2 is permanently stored in geological formations, CCU is used to refer to a wide-variety of different technologies and processes where CO_2 is used. Some types of CCU are well-established and operating successfully today, for example the use of CO_2 in carbonating fizzy drinks or the use of CO_2 to enhance oil and gas recovery. Other types of CCU may be much more innovative and not yet commercially or technically viable.

Given the breadth of technologies and processes covered by the term CCU, it is necessary to evaluate different technologies, processes and projects on a case-by-case basis to determine their relative value in terms of CO_2 abatement and tackling climate change. A breakdown of CCU technologies into subsidiary

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types, technologies and processes is needed, supported by a robust assessment of the counterfactual in each instance.

A key component of the assessment of CCU classes will be the time period in which it is likely or even sure that the captured CO_2 will be released in the atmosphere. This is necessary to ensure that emissions reductions across the whole energy system, e.g. in relation to the EU's contribution towards the Paris Agreement, are delivered and that climate finance is not used to support technologies that do not lead to verified avoided emissions. ZEP recommends that a classification system is developed, incorporating a so-called "*Sink Factor*", to indicate the proportion of CO_2 that is permanently abated in line with climate objectives (climate effective storage).

As part of a robust assessment of each CCU project, careful consideration must be given to the counterfactual scenario and whether the CCU product substitutes a pre-existing CO_2 neutral product. In this context, special attention is needed for CO_2 that is used for producing food or feed. Some products of CCU will be used as food for people, or feed for animals, which can replace traditional bio-materials that are seen as CO_2 neutral, in some cases. It should be noted that, aside from CO_2 abatement, products derived from anthropogenic CO_2 can, in some instances, contribute to the replacement, at least partially, of the same or similar products made by a conventional process and therefore yield benefits in terms of the conservation of resources.

Table 1. Indicative applied sink factor to different types of CCU and CCS[1]

	Sequestration period of CO_2	Use of materials in which CO_2 is captured	Indicative Sink Factor	Examples
Bio-CCS	Permanent	Permanent storage, no use	>100%	Provided the biomass involved is sustainably sourced, the capture and storage of biogenic CO_2 from any industrial bio-conversion or combustion process can yield negative emissions
CCS	Permanent	Permanent storage, no use	100%	
Enhanced Oil Recovery	Depending on project	Can be permanent storage, depending on project	95 – 100%	
CCU				
• Long term	> 100 years	Building materials	40 – 75%	Olivine
• Medium term	10 – 100 years	Building materials	40 – 75%	Carbon8, Blueplanet, Solida, CarbonCure
• Short term	< 10 years	Fuels, feedstock, food, lightweight building materials, plastics	0 – 10%	Biofuels, methane, methanol, micro algaes, formic acid, bioplastics.

[1] The values in this table should not be taken as absolute. The table is designed to indicate what potential sink factor values may look like for different types of CCU and to illustrate the value of developing such an approach based on detailed quantitative analysis.

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