

Carbon Capture and Utilisation (CCU) and EU ETS

Recommendations for the revision of the Monitoring and Reporting Regulation (MRR)

CO₂ Value Europe represents the CO₂ utilisation community in Europe aiming to develop CO₂ re-use as a feedstock for a new industrial sector making a significant contribution to Europe's low-carbon economy.

We call for a financial recognition of CO₂ emissions that are avoided through putting CO₂ to use in different applications - generally known as CCU (Carbon Capture and Utilisation). In so doing, business incentives will be created to close the CO₂ loop by re-using CO₂ in applications such as mineralisation and e-fuels.

- **Mineralisation** sequesters CO₂ in a permanent, stable form to make sustainable building materials (analogous to geological storage as the CO₂ is not released again);
- **E-fuels** transform CO₂ into gaseous or liquid fuels to make available and use renewable energy in traditional, well proven technology and avoid the release of new fossil CO₂.

The EU ETS is a core instrument for the EU to reach its climate objectives and therefore it is essential that the role of CCU is correctly recognised, in such a way as to ensure that the integrity of the EU ETS and its fundamental concept of reducing cumulative CO₂ emissions to the atmosphere by limiting availability of EUAs is maintained. Our proposed amendments to the Monitoring and Reporting Regulation are provided in Annex 1 of this paper.

CO₂ Value Europe requests that CO₂ from an ETS installation which is permanently stored through mineralisation is recognised as not having been emitted according to ETS (see Annex 2) and discounted from the installation's allowance obligations (see Annex 3). Put another way, if CO₂ from an ETS installation is ultimately not released in the atmosphere, either because it is transferred for geological storage or mineralisation, that amount should be subtracted from the emissions of the originating ETS installation. This is already recognised for a mineralisation product: precipitated calcium carbonate (PCC) following the case initiated by Schaefer Kalk (C-460/15, EU:C:2017:29).

Furthermore, CO₂ Value Europe requests that CO₂-based fuels (e-fuels) used in EU ETS installations be recognised as neutral in CO₂ when they fulfil certain conditions, in the same way as biomass and biogas. (see Annex 4). To avoid any loophole, CO₂ captured in EU ETS installations for conversion to e-fuels should continue to be treated as it is today – i.e. not discounted from the installations allowance obligations.

About CO₂ Value Europe

CO₂ Value Europe is the industry-driven European Association which is committed to coordinate and represent the CO₂ Utilisation community in Europe and to build up an integrated vision and action plan to develop CO₂ Utilisation into a new industrial sector making a significant contribution to Europe's low carbon economy. Some background on Carbon Capture & Utilisation can be found in Annex 2.

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ANNEX 1

Amendments required to the Monitoring & Reporting Regulation (COMMISSION IMPLEMENTING REGULATION (EU) 2018/2066 of 19 December 2018)

<u>COMMISSION IMPLEMENTING REGULATION (EU) 2018/2066 of 19 December 2018</u>	<u>Proposed amendment</u>
<i>Article 3</i>	<i>Article 3</i>
<p>(54) 'CO₂ capture' means the activity of capturing from gas streams CO₂ that would otherwise be emitted, for the purposes of transport and geological storage in a storage site permitted under Directive 2009/31/EC;</p> <p>(55) 'CO₂ transport' means the transport of CO₂ by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC;</p>	<p>(54) 'CO₂ capture' means the activity of capturing from gas streams CO₂ that would otherwise be emitted, for the purposes of transport, utilisation or geological storage in a storage site permitted under Directive 2009/31/EC;</p> <p>(55) 'CO₂ transport' means the transport of CO₂ by pipelines for utilisation or geological storage in a storage site permitted under Directive 2009/31/EC;</p> <p>New:</p> <p>(64): 'CO₂ utilisation' means the use of CO₂ for e.g. the production of energy carriers (e-fuels), chemicals and carbon-based materials, as well as the use as a technological fluid.</p> <p>(65) e-fuels include gaseous or liquid fuels produced from water, renewable electricity and captured CO₂.</p>
<i>Article 30</i>	<i>Article 30</i>
<i>Determination of calculation factors</i>	<i>Determination of calculation factors</i>
<p>2. [...]Where such an approach incurs unreasonable costs or where higher accuracy can be achieved, the operator may consistently report activity data and calculation factors referring to the state in which laboratory analyses are carried out.</p> <p>The operator shall be required to determine the biomass fraction only for mixed fuels or materials. For other fuels or materials the default value of 0 % for the biomass fraction of fossil fuels or materials shall be used, and a default value of 100 % biomass or fraction for biomass fuels or materials consisting exclusively of biomass. 31.12.2018 L 334/18 Official Journal of the European Union EN</p>	<p>2. [...]Where such an approach incurs unreasonable costs or where higher accuracy can be achieved, the operator may consistently report activity data and calculation factors referring to the state in which laboratory analyses are carried out.</p> <p>The operator shall be required to determine the biomass or e-fuels fraction only for mixed fuels or materials. For other fuels or materials the default value of 0 % for the biomass or e-fuels fraction of fossil fuels or materials shall be used, and a default value of 100 % biomass or e-fuels fraction for biomass fuels or materials consisting exclusively of biomass or e-fuels. 31.12.2018 L 334/18 Official Journal of the European Union EN</p>

<i>Article 39</i>	<i>Article 39</i>
<p>1. For mixed fuels or materials, the operator may either assume the absence of biomass and apply a default fossil fraction of 100 %, or determine a biomass fraction in accordance with paragraph 2, applying tiers as defined in section 2.4 of Annex II.</p> <p>2. Where, subject to the tier level required, the operator has to carry out analyses to determine the biomass fraction, it shall do so on the basis of a relevant standard and the analytical methods therein, provided that the use of that standard and analytical method are approved by the competent authority.</p> <p>Where, subject to the tier level required, the operator has to carry out analyses to determine the biomass fraction, but the application of the first subparagraph is technically not feasible or would incur unreasonable costs, the operator shall submit an alternative estimation method to determine the biomass fraction to the competent authority for approval. For fuels or materials originating from a production process with defined and traceable input streams, the operator may base the estimation on a mass balance of fossil and biomass carbon entering and leaving the process. The Commission may provide guidelines on further applicable estimation methods.</p> <p>3. By way of derogation from paragraphs 1 and 2 and Article 30, where the guarantee of origin has been established in accordance with Articles 2(j) and 15 of Directive 2009/28/EC for biogas injected into and subsequently removed from a gas network, the operator shall not use analyses to determine the biomass fraction.</p>	<p>1. For mixed fuels or materials, the operator may either assume the absence of biomass or e-fuels and apply a default fossil fraction of 100 %, or determine a biomass or e-fuels fraction in accordance with paragraph 2, applying tiers as defined in section 2.4 of Annex II.</p> <p>2. Where, subject to the tier level required, the operator has to carry out analyses to determine the biomass or e-fuels fraction, it shall do so on the basis of a relevant standard and the analytical methods therein, provided that the use of that standard and analytical method are approved by the competent authority.</p> <p>Where, subject to the tier level required, the operator has to carry out analyses to determine the biomass or e-fuels fraction, but the application of the first subparagraph is technically not feasible or would incur unreasonable costs, the operator shall submit an alternative estimation method to determine the biomass or e-fuels fraction to the competent authority for approval. For fuels or materials originating from a production process with defined and traceable input streams, the operator may base the estimation on a mass balance of fossil and biomass or e-fuels carbon entering and leaving the process. The Commission may provide guidelines on further applicable estimation methods.</p> <p>3. By way of derogation from paragraphs 1 and 2 and Article 30, where the guarantee of origin has been established in accordance with Articles 2(j) and 15 of Directive 2009/28/EC for biogas & gaseous e-fuels injected into and subsequently removed from a gas network, the operator shall not use analyses to determine the biomass or e-fuels fraction.</p>

COMMISSION IMPLEMENTING REGULATION (EU) 2018/2066 of 19 December 2018	Proposed amendment
<p style="text-align: center;"><u>Article 49</u> <i>Transferred CO₂</i></p> <p>1. The operator shall subtract from the emissions of the installation any amount of CO₂ originating from fossil carbon in activities covered by Annex I to Directive 2003/87/EC that is not emitted from the installation, but:</p> <p style="padding-left: 40px;">(a) transferred out of the installation to any of the following: [...]</p> <p style="padding-left: 40px;">(b) transferred out of the installation and used to produce precipitated calcium carbonate, in which the used CO₂ is chemically bound.</p> <p style="padding-left: 40px;">[...]</p> <p>4. For determining the quantity of CO₂ chemically bound in precipitated calcium carbonate, the operator shall use data sources representing highest achievable accuracy.</p> <p style="text-align: center;"><u>Annex IV</u></p> <p><i>21. Determination of greenhouse gas emissions from CO₂ capture activities for the purposes of transport and geological storage in a storage site permitted under Directive 2009/31/EC</i></p> <p>A. SCOPE</p> <p>[...] All parts of the installation related to CO₂ capture, intermediate storage, transfer to a CO₂ transport network or to a site for geological storage of CO₂ greenhouse gas emissions shall be included in the greenhouse gas emissions permit and accounted for in the associated monitoring plan. [...]</p> <p>$T_{\text{for storage}}$ = Amount of CO₂ transferred to a transport network or a storage site, determined in accordance with Article 40 to 46 and Article 49.</p> <p>[...]</p> <p style="text-align: center;"><i>22. DETERMINATION OF GREENHOUSE GAS EMISSIONS FROM THE TRANSPORT OF CO₂ BY PIPELINES FOR GEOLOGICAL STORAGE IN A STORAGE SITE PERMITTED UNDER DIRECTIVE 2009/31/EC</i></p>	<p style="text-align: center;"><u>Article 49</u> <i>Transferred CO₂</i></p> <p>1. The operator shall subtract from the emissions of the installation any amount of CO₂ originating from fossil carbon in activities covered by Annex I to Directive 2003/87/EC that is not emitted from the installation, but:</p> <p style="padding-left: 40px;">(a) transferred out of the installation to any of the following: [...]</p> <p style="padding-left: 40px;">(b) transferred out of the installation and used to produce a stable product through mineralisation (such as precipitated calcium carbonate), in which the used CO₂ is chemically bound.</p> <p style="padding-left: 40px;">[...]</p> <p>4. For determining the quantity of CO₂ chemically bound in mineralisation products such as precipitated calcium carbonate, the operator shall use data sources representing highest achievable accuracy.</p> <p style="text-align: center;"><u>Annex IV</u></p> <p><i>21. Determination of greenhouse gas emissions from CO₂ capture activities for the purposes of transport and storage via mineralisation or geological storage in a storage site permitted under Directive 2009/31/EC</i></p> <p>A. SCOPE</p> <p>[...] All parts of the installation related to CO₂ capture, intermediate storage, transfer to a CO₂ transport network or to a site for the mineralisation or geological storage of CO₂ greenhouse gas emissions shall be included in the greenhouse gas emissions permit and accounted for in the associated monitoring plan. [...]</p> <p>$T_{\text{for storage}}$ = Amount of CO₂ transferred to a transport network, a mineralisation site or a storage site, determined in accordance with Article 40 to 46 and Article 49.</p> <p>[...]</p> <p style="text-align: center;"><i>22. DETERMINATION OF GREENHOUSE GAS EMISSIONS FROM THE TRANSPORT OF CO₂ BY PIPELINES FOR STORAGE VIA MINERALISATION OR GEOLOGICAL STORAGE IN A STORAGE SITE PERMITTED UNDER DIRECTIVE 2009/31/EC</i></p>

<p>A. Scope</p> <p>The boundaries for monitoring and reporting emissions from CO₂ transport by pipeline shall be laid down in the transport network's greenhouse gas emissions permit, including all ancillary plant functionally connected to the transport network, including booster stations and heaters. Each transport network shall have a minimum of one start point and one end point, each connected to other installations carrying out one or more of the activities: capture, transport or geological storage of CO₂.</p> <p style="text-align: center;"><u>Annex IX</u></p> <p>Operators and aircraft operators shall retain at least the following: [...]</p> <p>2. SPECIFIC ELEMENTS FOR STATIONARY SOURCE INSTALLATIONS: [...]</p> <p>(7) For CO₂ capture, transport and geological storage activities, where applicable, the following additional elements: (a) documentation of the amount of CO₂ injected into the storage complex by installations carrying out geological storage of CO₂; (b) representatively aggregated pressure and temperature data from a transport network; (c) a copy of the storage permit, including the approved monitoring plan, pursuant to Article 9 of Directive 2009/31/EC; (d) the reports submitted in accordance with Article 14 of Directive 2009/31/EC; (e) reports on the results of the inspections carried out in accordance with Article 15 of Directive 2009/31/EC; (f) documentation on corrective measures taken in accordance with Article 16 of Directive 2009/31/EC.</p>	<p>A. Scope</p> <p>The boundaries for monitoring and reporting emissions from CO₂ transport by pipeline shall be laid down in the transport network's greenhouse gas emissions permit, including all ancillary plant functionally connected to the transport network, including booster stations and heaters. Each transport network shall have a minimum of one start point and one end point, each connected to other installations carrying out one or more of the activities: capture, transport, storage via mineralisation or geological storage of CO₂.</p> <p style="text-align: center;"><u>Annex IX</u></p> <p>Operators and aircraft operators shall retain at least the following: [...]</p> <p>2. SPECIFIC ELEMENTS FOR STATIONARY SOURCE INSTALLATIONS: [...]</p> <p>(7) For CO₂ capture, transport and mineralisation or geological storage activities, where applicable, the following additional elements: (a) documentation of the amount of CO₂ permanently bound by installations carrying out mineralisation, or CO₂ injected into the storage complex by installations carrying out geological storage of CO₂; (b) representatively aggregated pressure and temperature data from a transport network; (c) a copy of the storage permit, including the approved monitoring plan, pursuant to Article 9 of Directive 2009/31/EC; (d) the reports submitted in accordance with Article 14 of Directive 2009/31/EC; (e) reports on the results of the inspections carried out in accordance with Article 15 of Directive 2009/31/EC; (f) documentation on corrective measures taken in accordance with Article 16 of Directive 2009/31/EC.</p>
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ANNEX 2

About Carbon Capture & Utilisation

CO₂ utilisation is a broad term that covers all established and innovative industrial processes that can transform CO₂ into a variety of value-added products such as chemical building blocks, e-fuels or building materials. Most reactions to transform the CO₂ molecule require an additional energy input (the exception is mineralisation – see below); this input must come from a renewable low-carbon source if the CO₂ conversion is to be a sustainable solution and bring a positive contribution to the climate change mitigation. CO₂ Utilisation is also sometimes called CO₂ Transformation or CCU (Carbon Capture and Utilisation). In this paper, we focus on how ‘CO₂ Mineralisation’ and ‘e-fuels’ should receive a fair recognition under the ETS.

The EU ETS is a core instrument for the EU to reach its climate objectives. In all cases, the integrity of the EU ETS and its fundamental concept – that the limited number of EUAs and the declining cap mean absolute reductions in cumulative CO₂ released to the atmosphere - is paramount. The changes proposed here preserve this tenet and therefore strictly aim to avoid loopholes.

Mineralisation is a natural phenomenon – for example in the case of concrete carbonation, where CO₂ is slowly absorbed on the surface of concrete elements, or in particular in crushed demolition concrete - but this natural reaction can be purposefully accelerated by using high CO₂ concentrations and optimised reaction conditions. Simply put, mineralisation is the reaction of calcium (or magnesium)-containing minerals with carbon dioxide (CO₂) to produce calcium (or magnesium) carbonate (CaCO₃ or MgCO₃) thereby strengthening the produced material. The reaction is exothermic, meaning that it releases energy as heat and leads to the creation of stable products in which the CO₂ is permanently bound. Through the mineralisation processes, CO₂ can thus be transformed from industrial flue gases into useful materials for a large variety of applications, in particular building products, using a simple and low energy demanding transformation process.

E-fuels generated from CO₂ and renewable energy are essential to de-fossilise the transport sector and a wide range of European industries and thereby achieve the goals of the European Green Deal and Paris Agreement. As gaseous or liquid energy carriers, these CO₂-based fuels provide an easily transportable and storable solution¹ to reduce or even neutralise CO₂ emissions in a variety of fields, including industry as well as long-distance road transport, shipping and aviation.

CCU in ETS

CCU has the potential to reduce CO₂ emissions to the atmosphere. CCU is an important element in the innovation challenges for a low-carbon and circular economy and should therefore logically be recognised by ETS. This will encourage technology development and investments enabling CO₂ avoidance.

¹ E-fuels such as e-methane and e-methanol present the important advantage of using existing technology, transport and storage infrastructure avoiding the cost to a) either increase the electricity grid required for additional renewable energy or b) to develop new hydrogen transport and storage infrastructure and c) develop and mature new technologies.

Annex 3

EU ETS and the case of CO₂ mineralisation into products

CO₂ mineralisation is a way to permanently sequester CO₂, in the same way that geological storage is recognised as permanent. As a consequence, CO₂ Value Europe recommends that the Monitoring and Reporting Regulation should take this reality into account. Commission Regulation 2018/2066 of 19 December 2018 already states that CO₂ that is transferred for the production of precipitated calcium carbonate (PCC) and ends up chemically bound in it should be recognised as not released into the atmosphere. PCC is just one example of mineralisation, but other CO₂ mineralisation processes have the same properties in terms of permanently sequestering CO₂ and should thus be recognised as not released into the atmosphere.

For clarity, below is an explanation of the cases in which CO₂ is used or transferred from an ETS installation, and how it should be dealt with in EU ETS to ensure no double counting and maintain the integrity of the system. The cases focus on 'in-situ CO₂ mineralisation' and 'CO₂ mineralisation by capturing (i.e. purification) of the flue gases with transport'.

- Case 1: In-situ CO₂ mineralisation at an ETS installation: CO₂ captured by mineralisation should be recognised and discounted from the installation's allowance obligation.
- Case 2: CO₂ capture of the flue gases at ETS installation with transfer of CO₂ to:
 - o Case 2A: Permanent geological storage, which is already recognised by MRR
 - o Case 2B: Independent ETS installation for CO₂ mineralisation. Here the transferring installation should be recognised in the MRR as transferring CO₂ for permanent storage for all types of mineralisation, as already recognised in the case of geological storage and PCC. In its annual emissions report, the operator of the transferring installation shall provide the receiving installation's installation identification code and the quantity of CO₂ transferred shall be determined by a calculation-based methodology (Article 49 of the Monitoring & Reporting Regulation). The receiving installation shall also report the transferring installation's installation identification code in its annual emissions report.
 - o Case 2C: Non-ETS installation for CO₂ mineralisation. Here the transferring installation should be recognised in the MRR as transferring CO₂ for permanent storage for all types of mineralisation, as already recognised in the case of geological storage and PCC. In this case, the operator of the transferring installation shall provide in its annual emission report the name, address and contact information of a contact person for the receiving installation and the quantity of CO₂ transferred shall be determined by a calculation-based methodology (Article 49 of the Monitoring & Reporting Regulation).

Annex 4

EU ETS and CCU-based fuels (e-fuels)

Apart from recognising GHG avoidance from CO₂ mineralisation, ETS should also take into account the avoidance of CO₂ through the use of e-fuels.

E-fuels are gaseous or liquid fuels produced from water, renewable electricity and captured CO₂ and result, e.g. in e-methane, e-methanol and e-kerosene. The renewable character of e-fuels should be based necessarily and exclusively on the renewable character of the hydrogen used as raw material, i.e. renewable electricity must be the energy source under all circumstances. E-fuels will always be produced with captured CO₂, since indeed CO₂ is already abundantly available – both from atmospheric as well as industrial sources.

CO₂ Value Europe believes that in order for Europe to benefit from the full potential of the e-fuels to achieve its emission targets, it is crucial that a level playing field between CO₂ neutral, low or zero emissions energy carriers exists. Only with technological neutrality on all renewable energy carriers, climate-beneficial and economic solutions will be maximised. Indeed, CO₂ based fuels provide the advantage of being used, transported and stored in existing infrastructure while reducing or even neutralising CO₂ emissions in a variety of fields.

Today in EU ETS, e-fuels used as an energy source in ETS installations are considered as fossil fuels: CO₂ that is captured and reused is treated equally to CO₂ that is emitted by combustion of fossil fuels. On the other hand, biomass, as well as biogas, as an energy source is considered to be carbon neutral by Commission Regulation 2018/2066.

If a fuel meets the definition of an e-fuel – i.e. it is based on renewable hydrogen produced with renewable electricity – the CO₂ emitted during fuel combustion should be counted as zero. If the CO₂ source of the e-fuel is from industrial flue gas capture, it has already been accounted for as emission under ETS in the installation emitting it and should not be counted again when the e-fuel is burnt in the ETS installation. If the CO₂ source of an e-fuel is derived from Direct Air Capture then the CO₂ resulting from burning the e-fuel should be considered as zero because it was already removed from the atmosphere.

To ensure the ETS integrity and avoid loopholes, an ETS installation capturing CO₂ for use in e-fuels shall continue to monitor, report and submit allowance obligations, as is currently the case under the MRR rules.