

**EPPSA Response to European Commission Stakeholder Consultation
Guidance Documents under Directive 2009/31/EC on the Geological Storage of CO₂**

Directorate General for Climate Action

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EPPSA members, who are developing the CO₂ capture technology, welcome the European Commission's initiative to consult relevant stakeholders on guidance documents that seek to enable a coherent implementation of the Directive 2009/31/EC on the Geological Storage of CO₂.

While the development of a regulatory regime for storage was an essential complement to the development of CO₂ capture technologies its consistent execution should give the public confidence that Carbon Capture and Storage (hereafter CCS) is a safe and environmentally sound means of reducing CO₂ emissions.

EPPSA commends the European Institutions for the work and progress achieved up to this point and welcomes the opportunity to provide feedback as well as to offer expertise in a constructive dialogue with the institutions concerned.

The set of Guidance Documents elaborates on an overall methodological approach to assist stakeholders to implement the so-called CCS Directive. We comment below on those most relevant to EPPSA.

1. Guidance Document 2: Site Characterisation, CO₂ Stream Composition, Monitoring and Corrective Measures

1.1. Legal context and terminology

- Article 3 of the CCS Directive defines CO₂ stream as a “flow of substances that results from CO₂ capture processes.”
- Article 12 of the same Directive addresses the criteria for the CO₂ streams for geological storage stressing that:
 - a CO₂ stream must be composed “overwhelmingly of carbon dioxide”
 - a CO₂ stream may nevertheless contain *incidental associated substances* from the source, capture or injection process and *trace substances* added to facilitate monitoring and verification of CO₂ migration
 - Concentrations of **all** *incidental* and *added substances* must be below levels that would:
 - (a) adversely affect the integrity of the storage site or the relevant transport infrastructure;
 - (b) pose a significant risk to the environment or human health; or
 - (c) breach the requirements of applicable Community legislation.

1.2. Composition of CO₂ streams from different CO₂ capture processes

- The CO₂ stream composition cannot be dissociated from the CO₂ capture process selected by the plant operator.

- Bearing in mind **Table 3: Illustrative Calculated Examples of Composition of CO₂ Streams** displayed in pages 67-68 of Guidance Document 2, we consider that:
 - up to now no study covers all existing and emerging capture processes on a factual basis. It is therefore difficult to draw up overall conclusions. EPPSA insists on the fact that, for the moment, there are no irrefutable results on the performance of these technologies, which are not commercially available yet. Literature supporting any kind of results is therefore quite weak and we base our judgement on the findings and measurements achieved by EPPSA members. EPPSA strongly believes that no definitive technological statements on these three capture processes can be drawn up, risking otherwise to condemn them. This means also, that unnecessary low levels of impurities, which is not requested by the Directive, would condemn the next generation of more efficient and less energy consuming solvents, since they would less react with impurities (e.g. O₂, NO₂ and SO₂) and therefore their concentration could reach levels as indicated in this paper;
 - values for **oxyfuel** combustion and **pre-combustion** processes are very much in line with EPPSA findings;
 - for the **post-combustion** process, the values for sulphur oxides (SO₂) (0.84ppmv) are too low and propose a value smaller than 1 ppmv. The solvent most frequently encountered is monoethanolamine (MEA), an amine solvent developed more than 70 years ago. The chemical composition of this solvent easily breaks down when it gets in contact with SO₂ compounds in the flue gas stream. SO₂ compounds should therefore be avoided / reduced at any cost in the flue gas, meaning a higher energy penalty for the whole process due to the higher removal requirements. 2nd generation solvents are more resistant to SO₂ concentrations implying lower energy penalties and acceptable SO₂ values up to 1 ppmv;
 - for the post-combustion process, the values for NO₂ (1.5 ppmv) and O₂ (61 ppmv) are too low. More realistic values would be respectively 5 ppmv and 200 ppmv;
 - the values which are defined by the Commission for post-combustion should not, under any circumstance, hamper the development of future generations that will necessarily be more efficient and reduce the present exorbitant energy penalties. The reservoir damaging concept must be taken into account and the levels proposed in this paper are still so low, that they would not endanger a reservoir.

1.3. O₂ concentration limits

- With regard to the CO₂ stream transport, EPPSA believes that the values are again very low. The O₂ concentration of 0.001% = 10 ppm was based on a US typical pipeline infrastructure and its specification. This low value was necessary in order to enable the use of, some times less resistant, pipelines without damages. The necessary CO₂ infrastructure in Europe is currently under development and the quality standard in the EU should resist higher values of O₂. The only way to reduce the O₂ content in the CO₂ stream would require extremely high costs and energy demand or to have solvents to react to the O₂, making them less efficient. Therefore again, in order to reduce the energy penalty, the O₂ concentration should be 200 ppmv.

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