Carbon Dioxide Removal: a robust definition and coherent terminology

To achieve the target of net-zero emissions by 2050 it is no longer enough to simply reduce emissions, we will also have to physically remove CO2 from the atmosphere. Bellona Europa is therefore increasing its efforts to facilitate and ensure a responsible deployment and regulation of practices with permanently remove CO2 from the atmosphere. The first step is to ensure the EU adopts a robust definition for Carbon Dioxide Removal and uses of the terminology coherently.

The 'Net' in Net-Zero

Net-Zero is the term which has come to represent the "balance between anthropogenic emissions by sources and removals by sinks" required by the Paris Agreement. Any strategy aiming for Net-Zero emissions generally assumes some degree of Carbon Dioxide Removal (CDR). For example, in the EU's 2050 Long-Term Strategy, the two scenarios aimed at carbon neutrality by 2050 both heavily rely on the large-scale availability of practices which remove carbon dioxide from the atmosphere. The scale of the EU's reliance on carbon removal is significant, yet much research is still needed to assess if such scales of carbon removal can be met. Equally concerning is the recent rise of private trading markets, dubious claims and general misinformation when it comes to CDR. A possible cause for this is that there is still no widely accepted definition for what constitutes a 'Carbon Dioxide Removal'.

The EU can step up to the plate, take leadership in this important discussion and set the international standard. This will alleviate confusion and foster clear and productive conversations between civil society, industry, academia and policymakers about the difficult questions of how to study, assess, incentivise, deploy and regulate Carbon Dioxide Removal.

For these discussions to provide the intended outcome of atmospheric CO2 removal, we must remain firmly grounded in science and reality. A solution which removes CO2 on paper but doesn't in reality will set us on a firm path towards climate breakdown. For this reason, Bellona Europa sees the urgent need for a coherent and robust definition for what constitutes Carbon Dioxide Removal, and what does not.

Carbon Dioxide Removal – 4 Key Principles

Simply put, Carbon Dioxide Removal seeks to take CO2 out of the atmosphere and store it away from the atmosphere, either through natural or technological means. Bellona Europa recommends that the below principles, adapted from Tanzer and Ramirez (2019), should be used when assessing projects and/or activities on the basis of their carbon removal potential:

1. *Carbon Dioxide is physically removed from the atmosphere*
   AND
2. *The removed carbon dioxide is stored out of the atmosphere in a manner intended to be permanent*

These 2 principles must **both** be respected for any CDR process. This is the first step to assessing any process which claims to qualify as CDR. If a process fails to meet one of the two principles, it is not a CDR process and further assessment is not necessary.

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3. *Upstream and downstream greenhouse gas emissions, associated with the removal and storage process, are comprehensively estimated and included in the emission balance*

If a process meets the first two principles, then a full LCA of upstream and downstream emissions must be performed to ascertain whether a process truly removes more CO2 than it emits. Most of the ways to remove CO2 from the atmosphere need some energy, transport, fertilisers, or other inputs, which tend to emit greenhouse gases. This third principle ensures these inputs and the ultimate fate of the product are considered.

4. *The total quantity of atmospheric carbon dioxide removed and permanently stored is greater than the quantity of carbon dioxide equivalent emitted to the atmosphere*

The 4th principle ensures the overall objective of reducing atmospheric CO2 concentrations remains the end goal of any CDR process.

Bellona recommends that any definition on Carbon Dioxide Removal must explicitly refer to these 4 principles.

Coherent Terminology – Avoiding confusion

Other terms exist to describe similar concepts to 'Carbon Dioxide Removal'. The most common are 'Negative Emissions' and 'Greenhouse Gas Removal'. All these terms are used regularly in the academic literature. However, approximately 70% of the academic papers reviewed were not in line with the above four principles, notably failing to specify the storage of removed GHG from the atmosphere, again highlighting the need for a definition.

The European Commission should continue to prioritise use of the term 'Carbon Dioxide Removal', since CO2 is the primary greenhouse gas which needs to be removed and the term is relatively self-explanatory. However, the Commission should keep the other terms in mind when working on related climate legislation, such as the Innovation Fund of the ETS. There has been confusion in the past where negative inputs have been misconstrued with 'Negative Emissions'. A potential outcome could be that a project which captures fossil CO2 could be misunderstood as 'Negative Emissions', undermining projects which actually remove CO2.

Bellona Europa recommendations:

1. Create and adopt a clear and robust definition for Carbon Dioxide Removal, incorporating the 4 principles above;
2. Ensure the consistent usage of the definition and term Carbon Dioxide Removal in internal and external communications, as well as tenders and studies intended to investigate and support Carbon Dioxide Removal;
3. Establish a robust and comprehensive cradle-to-grave accounting methodology for Carbon Dioxide Removal, in line with the 4 principles;
4. The European Union should support the establishment of an international standard definition of Carbon Dioxide Removal.

As Carbon Dioxide Removal increasingly becomes a topic of discussion, we need to ensure the conversations going forward are shaped by common language and understanding. By acting now, we can prevent confusion and inconsistency, and ensure we actually reach the target of European climate neutrality by 2050.

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