RENEWABLE CARBON INITIATIVE
INTERVIEW

CO_2 Value Europe

CO_2 Value Europe is an international and non-profit association representing the entire Carbon Capture and Utilisation (CCU) value chain in Europe. Its objective is to substitute fossil-based products and implement circular solutions to generate essential goods and services.

Interview

with **Dr Célia Sapart**
Scientific Director
CO_2 Value Europe

Dr Célia Sapart is an engaged scientist, who has decided, after 13 years of academic climate research, to join the front line of climate action in becoming Scientific Director at CO_2 Value Europe. Her role is to investigate the climate mitigation potential of Carbon Capture and Utilisation (CCU) technologies and to create a momentum for stakeholders to join the effort for the deployment of a circular carbon economy to “defossilise” the EU economy.

Carbon Capture and Utilisation (CCU) is an approach that includes different technologies to capture CO_2 directly from the air or from industrial point sources, and convert it into products such as synthetic fuels, chemicals and materials.

How does CCU support the transition of a linear to a circular economy?

CCU technologies have the potential to reduce or avoid CO_2 emissions, but also to remove CO_2 from the atmosphere when CO_2 is permanently stored in e.g. mineralisation products.

Moreover, CCU allows moving away from fossil carbon when captured carbon is used as feedstock to produce fuels and chemicals. In this context, the objective is to create a circular carbon economy, especially for sectors that will continue to rely on carbon and that do not have other solutions to meet climate targets on the short term.

How can CCU technologies help the EU to reach climate targets, decarbonise AND defossilise the industry and become independent of non-EU fossil feedstock providers?

The results of our recent quantitative assessment on the contribution of CCU towards climate neutrality in the EU show that at least 21% of emissions reduction achieved through technological solutions in the EU will come from CCU and that it will play a crucial role in the industry and transport sectors. Unlike other options, these technologies provide drop-in solutions which can be introduced in existing markets without significant modifications to powertrain production, distribution and infrastructures. CCU technologies have potential to provide solutions to "defossilise" hard-to-abate sectors and to generate revenues through the production of marketable products.

Moreover, CCU can help increasing energy sovereignty and reducing dependency on fossil fuels-based energy. Nevertheless, the slow deployment of CCU results from the low availability of renewable energy, the lack of clear market incentives and the absence of a consistently favourable regulatory framework.

In the EU policy discussions, the use of CO_2 to produce alternative fuels especially for aviation and shipping is at the frontline. However, many other usages are existing.

Do you also see possibilities to implement CCU for the chemical and construction sectors?

CO_2 Value Europe does not focus mainly on alternative fuel, it focusses on the 3 main CCU pathways: CCU fuels, CCU chemicals and CO_2 mineralisation.

In our activities, we show the importance of using CO_2 as feedstock to replace fossil fuels in the aviation, ship and long-distance road transports, but also in intensive industries e.g. to replace natural gas with e-methane in high heat processes. But we also advocate over the essential role captured carbon can play to substitute fossil carbon in the chemical industry and the fact that CO_2 can be captured permanently in building material via mineralisation processes. This has been presented in our recently published quantitative assessment on the contribution of CCU to reach climate neutrality in the EU.

CO_2 Value Europe is an association that focuses on the promotion of CCU. Given this focus one might expect that you would put CCU ahead of all other technologies and efforts to reduce CO_2. You clearly state that is not the case.

How do different approaches/options have to be combined?

CO_2 Value Europe ensures that its activities are based on credible scientific evidence, therefore, as stated in the IPCC reports, we are clear on the fact that CCU solutions should not substitute large-scale efforts to prevent greenhouse gas emissions especially when more energy-efficient solutions are available, but they should be seen as significant opportunities to reduce emissions and increase circularity in sectors

that will continue to be reliant on carbon-based feedstock and fuels and that cannot use renewable or low carbon energy directly.

Which approaches do you find most promising?

The production of renewable and recycled fuels, especially for applications where quotas already exist under EU regulations are particularly promising, e.g. e-kerosene for aviation or e-methanol for shipping. But the use of CO_2 to produce chemical building blocks such as olefins is also a key pathway to allow for the defossilisation of the chemical sector.

Moreover, it is important to note that CCU technologies have a high potential in the context of industrial symbiosis where renewable or low carbon energy, CO_2 emissions, CO_2 uptakers and the adequate infrastructures are already available or relatively easy to deploy.

To become a member of your association, a company has to agree to only promote CCU solutions that effectively contribute to a net reduction of global CO_2 emissions based on accepted LCA standards.

Why are these standards so important to CO_2 Value Europe – both for a sustainable industry and for promotion of CCU as a clean technology towards policy-makers?

The CCU concept is recognized by the IPCC as a climate-mitigating solution but under the condition that it decreases the net greenhouse gas emissions of the process based on full life-cycle assessment (LCA). This is a crucial step to ensure real emission reductions over their entire value chain.

Currently, the storage of CO_2 (CCS: Carbon Capture and Storage) is in the focus of policy while CCU receives less attention, or is even evaluated as an approach that is not removing but only delaying emissions (e.g. CCU for the production and burning of fuels).

Where does this misconception of CCU come from and how can you scientifically argue against it?

The misconception likely comes from the fact that the potential of CCU is often evaluated with the same approach as the potential of CCS. One challenge is that CCU is often assessed in a linear way only considering its decarbonisation potential, while the main objective of these large set of technologies is not only to reduce emissions, but mainly to move away from fossil carbon by substituting fossil feedstock with renewable carbon by creating a circular carbon economy.

It is important to note that CCS and CCU distinctly differ regarding their CO_2 reduction potential, the underlying technical processes and outcomes, their effects on climate mitigation, and their environmental policy targets. Therefore, presenting CCS and CCU as a mix or a comparison does not do justice to the specific characteristics of the two concepts and could be counterproductive for the further development particularly of CCU. Therefore, it is highly important to assess the mitigation potential of both concepts with independent tools.

Are there any disadvantages of CCU?

The advantages and disadvantages of CCU technologies highly depend on the context and on the type of CCU pathways. For the CCU chemical and fuel pathways, the main disadvantage is related to the significant amount of low carbon energy required to produce low carbon or renewable hydrogen and for the capture step, especially when it comes to Direct Air Capture. However, CCU is not a way to “steel” low carbon energy from other sectors, but it is a solution to bring renewable energy (in the

shape of e.g. CO_2-based fuels) to essential sectors that cannot use low carbon or renewable energy directly.

Another disadvantage is the high granularity of CCU technologies and the complexity of assessing the climate mitigating potential of these solutions. However, progresses have been made on that end and several global guidelines have now been released on how to perform Life-Cycle-Assessment on the different CCU pathways and we have as well developed a model to assess the contribution of the different CCU pathways to reach climate neutrality in the EU.

What is the advantage of CCU over CCS? Why have both approaches to be considered?

CCS is a linear solution to decarbonise the industry, but it does not help to work on the cause of climate change while CCU is a concept allowing to both reduce greenhouse gas emissions, but also to create alternative feedstock and move away from fossil carbon use.

Moreover, when the deployment of CCS can be compromised by its costs, CCU can offset some of the costs of CCS by providing additional revenue streams that create a more compelling business case. Also, CCU could be applied in closed-loop concepts (e.g. capturing CO_2, producing CH_4 through hydrogenation, using CH_4 for energy purposes, capturing the emitted CO_2 and repeating the cycle) or in permanent CO_2 sequestration in building materials (e.g. through mineralisation) thereby reducing the amounts of CO_2 that needs to be stored underground.

Therefore, and as stated in the last IPCC report, both CCS and CCU solutions are essential for decarbonising emissions and "defossilising" the economy to reach climate targets.

CO_2 Value Europe is mainly active in Europe. How do you see the policy framework for implementing CCU in Europe in comparison to North America and Asia, especially China?

CO_2 Value Europe is indeed focusing on the European context but is interested in the development of CCU value chains globally. We have members from both the US and Asia and we have close ties with stakeholders like the Global CO_2 Initiative in the US, the Carbon2Value Initiative also in the US and our sister Association CO_2 Value Australia. Through these collaborations we try to understand differences and similarities across the continents.

Clearly, the specific circumstances are different and the policy frameworks are difficult to compare, especially in this turbulent geopolitical context. But since the CCU value chains can be geographically broad with trade of CCU products playing an important role, it is important for the EU policy makers to consider this reality and allow international collaboration, while maintaining EU's industrial sovereignty.

How does the RCI profit from your collaboration and input and where do you see your own role as a partner of the RCI?

Since we concentrate our efforts on CCU, we hope that RCI will be able to benefit from detailed knowledge and intelligence on the CCU context, especially when it comes to the policy framework and the reach out to policy makers. On our side, we value the partnership with RCI as a trusted, like-minded actor that believes in the value of alternative carbon feedstock to defossilise our economy and increase carbon circularity in our production systems.