How much CCS and CCU will be needed in 2030? – Objective: for Europe to be on track to reach climate-neutrality by 2050

A new political reality in EU and beyond with climate change at the heart

With the European Green Deal and European Climate Law, the European Union has increased its climate ambitions and formalised its support for the target of climate neutrality by 2050. Related to the European Climate Law, the European Commission has recently proposed to increase the current 2030 greenhouse gas (GHG) emissions target to reflect the increased climate ambitions of the EU. The Commission's proposal – currently in negotiation with the European Parliament and Member States – outlines a plan to increase EU GHG emissions reduction target to at least 55% compared to 1990 levels by 2030 within the European Union.

Similar to the EU's commitment to climate neutrality, other countries have set their own climate targets. Recent announcements highlighted China's plan to become carbon-neutral by 2060, while Japan and South Korea have communicated their intention to reach carbon neutrality by 2050.

Increased ambitions will enhance the implementation of CCS

The increased EU ambition for GHG emissions reduction by 2030 will make the role of CCS even more critical and the large-scale deployment of CCS within the 2020s becomes crucial to support the climate ambitions of the European Union. The urgency to develop CCS in order to achieve European and global climate ambitions is confirmed by the European Commission and reports from credible sources (e.g. IPCC, IEA), all included in the study highlighted below.

In its recent Impact Assessment on "Stepping up Europe's 2030 climate ambition", the European Commission indicated that, to allow industry to truly decarbonise after 2030, zero or very low carbon technologies, including hydrogen and **carbon capture, utilisation and storage**, will need to be developed and tested at scale in this decade.[1]

There is a long list of European CCUS projects that can become operational before 2030. In order to plan and drive the development and deployment over the coming decade, it is crucial to have a good estimate for how much CCS and CCU will be needed in 2030.

Updating the SET-Plan CCUS targets

The much-increased EU climate ambitions and shorter time for implementation strengthens the need for an update of the SET-Plan CCUS Implementation Plan. The

[1] EU commission impact assessment for 2030: https://ec.europa.eu/clima/sites/clima/files/eu-climate-action/docs/com_2030_ctp_en.pdf

current Implementation Plan from 2016 indicated a volume of 15 $MtCO_2$/yr for CO_2 captured by 2030[2]. This volume needs to be updated to reflect the increased climate ambitions of the EU. At the same time, the targets of the CCUS Implementation Plan, that are the drivers for research and innovation activities, call for revision.

The political landscape has changed, and not all the necessary information is yet available to clearly define the amounts of CO_2 to be captured by CCS and CCU in 2030. The EU climate target for 2030 and the EU long-term budget are not yet agreed, with consequences for the EU R&I funding programme Horizon Europe, and the Commission has not yet presented their updated reference scenarios, to include net-zero GHG emissions by 2050.

Still, with the clear urgent need for CCS, it is crucial to update the targets to give guidance on what is needed and how to make it happen.

What do model scenarios tell us about the future need for CCS and CCU?

The study on "Review of CCS and CCU in future EU decarbonisation scenarios" (October 2020)[3], by UCL Energy Institute for the SET-Plan CCUS Implementation Plan, has studied available global and European Integrated Assessment Models and reviewed the role of CCS and CCU in Europe in decarbonisation scenarios consistent with the 1.5°C and 2°C global temperature targets.

The scenarios consistent with the 1.5°C global target, indicate that CCS is essential for Europe to reach net-zero GHG emissions by 2050. **The median CO_2 abated by CCS is 230-430 $MtCO_2$/yr in 2030, increasing to 930-1200 $MtCO_2$/yr by 2050**. As expected, the 2°C scenarios show smaller median volumes of CO_2 abated by CCS, 35-100 $MtCO_2$/yr in 2030 and 600-930 $MtCO_2$/yr by 2050. The ranges are wide but show substantial abatement volumes already for 2030. **It is clear that Europe needs a large-scale CCS industry**. The 1.5°C scenarios indicate that $14 billion (median) of annual investments are needed in CCS in Europe until 2050.

The study does not give a clear consensus if and how CCU can play a role in the decarbonisation of different sectors of the European economy: some studies foresee a significant role while others do not consider it.

What do the current company plans tell us? Market-ready CCUS projects

There is a long list of European CCUS projects that are planned to come into operation within the next five to ten years *(ref. above)*. Given the new strong climate ambitions laid out by the European Commission, many new projects will be added. The expectation is that more projects will be sanctioned, that this list will increase further with approved EU

[2] SET-Plan Declaration of Intent on strategic targets in the context of Action 9, 2016: https://setis.ec.europa.eu/system/files/integrated_set-plan/setplan_doi_ccus-final.pdf
[3] Study: Review of CCS and CCU in future EU decarbonisation scenarios", 2020

2030 targets, and that national energy and climate plans from the member states will be updated accordingly.

The company plans from the energy-intensive industries and energy sector for operational CCUS projects, provided in this paper, indicate that 50 $MtCO_2$/yr abated by CCS could be achieved in 2030.

Conclusions

European climate neutrality by 2050 and the strongly increased EU ambition for GHG emissions reduction by 2030 make the role of CCS even more critical.

To reach these climate targets in a cost-efficient way, there is a need to support early deployment and establish the foundation for CCS and CCU to become investible technologies during this decade. Maturing these technologies at scale is essential to support the EU transition to climate neutrality, thus preserving jobs, stimulating economic growth, and diversifying supply chains into new industries and businesses. For this reason, there is a need for clear, ambitious and, at the same time, realistic volume indications of how much CCS will be needed in 2030.

50 $MtCO_2$/yr abated by CCS in 2030 is a preliminary yet well-founded indication based on companies' current plans. Today, this could be seen as an ambitious volume from every point of view, but, given the strongly increased ambitions (and the global development we can now see), this will most certainly be an underestimation of what will really be needed from CCS. This is also clearly outlined by the scenario studies that indicate far higher amounts.

In order to make this possible, there is a need for

- Development of European CO_2 transport and storage infrastructure, allowing CO_2 emitters across Europe the possibility to connect to secure CO_2 storage.
- An enabling policy framework, making it economically feasible for companies to invest in all parts along the CCUS value chain.
- Incentives to support timely large-scale deployment of all parts along the CCUS value chain, including but not limited to revisions of the EU ETS Directive. It is imperative that EU and national funding programs are coherent and coordinated.
- Strong continued support for CCUS Research and Innovation through the Horizon Europe programme and partnerships.