Pure Offices
Cheltenham Office Park
Hatherley Lane
Cheltenham
Gloucestershire
GL51 6SH
United Kingdom
+44 (0)1242 802988

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Submission to the Consultation

Thank you for the opportunity to provide a submission to support our online questionnaire entry. Below is included a summary of the options to consider in the EU long-term strategy for reduction of CO_2 emissions, based upon work of the IEA Greenhouse Gas R&D Programme (IEAGHG) in the areas of carbon capture, utilization and storage in the power and industrial sectors (including CCUS and biomass-CCUS).

Summary

Nowadays, several scenarios consistent with the goals of the UNFCCC's Paris agreement are available, such as IPCC, new Shared Socioeconomic Pathways, IEA, Energy Technology Perspectives, Statoil, and Shell. Those "Well below 2°C" scenarios model how the emissions reduction goal can be achieved. Recognizing the challenge task of achieving the EU greenhouse gas emissions reductions in accordance with the Paris Agreement, there are available evidence-based studies where a mix of measures are key to fulfil the decarbonized scenarios. That means that energy efficiency, renewables, fuel switching, and CCUS must be taken into account instead of relying in one unique solution.

CCUS (or just recognized as CCS in many cases) is identified as one of the key technologies. Moreover, CCUS can be the only solution to cut down an important contribution of the CO_2 emissions from the industrial sector. There are industries with a high CO_2 emissions rate linked to the production process itself, which cannot be completely removed through renewables or fuel switching but with the implementation of CCUS.

In this response, our focus is on CCUS/biomass-CCUS, the importance to recognize this pathway in the long-term EU strategy, and the challenges or barriers preventing the large-scale deployment of those technologies.

CCUS
Firstly, as reported in the IEAGHG technical review 2014-TR4 (IEAGHG 2014), there is a wide range of alternative carbon capture technologies at technology readiness level (TRL) of 9, meaning that are at "Normal commercial service", available to be implemented in the power and industrial sector and with significant potential to reduce costs.

- Power Sector

There are currently 2 full scale power plants operated successfully with carbon capture technologies.

As currently under review by IEAGHG within the technical study "Further Assessment of CO_2 capture emerging technologies and their potential to reduce cost", there are nowadays many research initiatives around the world to cut down the CO_2 capture costs. Additionally, several companies ensure a reduced cost of CO_2 capture by the use of their commercial products.

- Industrial Sector

As extracted from IEAGHG (2018b): "Manufacturing industry and refineries are major contributors to global CO_2 emissions. In 2014, those sectors were responsible for 24% of direct CO_2 emissions. In the absence of strong climate policies, the CO_2 emissions from those sectors are expected to rise over the coming decades (IEA, 2017, a,b).

To limit the average global temperature increase to well below 2°C above pre-industrial levels, as agreed in the UNFCCC's Paris Agreement, deep CO_2 emissions reductions across the industry sector are required (IEA, 2017a,b). Several carbon-intensive subsectors, like cement and iron and steel, show few alternatives to CCS for making significant emissions reductions. The IEA's beyond 2 degree Celsius scenario which explores least-cost decarbonization pathways, shows that CCS accounts for around 40% (42 $GtCO_2$) and about 25% (26 $GtCO_2$) of the cumulative CO_2 emissions reductions projected in the cement and iron and steel sectors over the period 2014-2060 if future temperature increases are to be limited to 1.75 °C by 2100 (IEA, 2017a).". Updated information on CO_2 avoidance costs in the cement and iron and steel industries can be found in IEAGHG (2018b).

- Opportunities and challenges for the implementation of CCUS in EU as part of a strategy for long-term greenhouse gas emissions reductions

The main challenges associated to cutting down emissions through the implementation of CO_2 capture systems are:

- Technology-based challenges. Carbon capture technologies for the power sector are already at TRL 9 and the operation is trustful. Carbon capture technologies in the industrial sector are not at such readiness level (IEAGHG, 2018b).

  After capturing the CO_2, it is needed to storage or reuse that CO_2 stream. The access to storage sites are dependent on the region and the transport of CO_2 from the capture point to the storage site must be studied accordingly (ship, or individual/cluster pipelines). Storage is a well-established technology. Clustering several "small" CO_2 streams is more technologically challenging but with high potential for the industrial sector.

- The business case of low carbon technologies involves several challenges linked to the development status, energy/fuel prices, and policies. The price of energy/ industrial products of a decarbonized scenario are clearly higher than those on a carbon-intensive scenario. For further information on costs, please, see the recent IEAGHG technical review (IEAGHG 2018b). However, it is important to evaluate the value of CCUS not only through the price of the technology but also based on how the technology is integrated in the energy grid/production facility, how secure is the energy/product supply and which is the rate of CO_2 avoided. In this regard, CCUS is a convenient tool to decarbonize the industrial and power sector at lower cost.

For Biomass-CCS, from IEAGHG (2014b), it was concluded that it is needed to review the incentives mechanisms, "in order to clarify the status of biomass CCS and to discuss the potential options to recognise and reward negative emissions". Perhaps, "As IEAGHG is not policy-prescriptive, we encourage related policy-orientated organisations to make use of the

relevant information in this report and develop it into recommendations for policy makers. This should particularly include the formulation of suitable incentives mechanism for biomass CCS”

References

IEA (2017a) Energy Technologies Perspectives - Catalysing Energy Technology Transformations. International Energy Agency, Paris (France).

IEA (2017b). World Energy Outlook 2017. International Energy Agency, Paris (France).

IEAGHG (2014a) Assessment of emerging CO_2 capture technologies and their potential to reduce costs, 2014/TR4

IEAGHG (2014b) Biomass and CCS – guidance for accounting for negative emissions, 2014-05

IEAGHG (2018a). Effects of plant location on costs of CO_2 capture, 2018-04, April 2018

IEAGHG (2018b). Cost of CO_2 capture in the industrial sector: cement and iron and steel industries, 2018-TR 03, September 2018

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Prepared by:

Dr.- Ing. Monica Garcia
Technology Analyst (Carbon Capture systems). IEAGHG.
monica.garcia@ieaghg.org Tel +44 1242 802988

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Registered office: Park House, 14 Northfields, London, SW18DD