



IP: CCUS AND ENERGY INTENSIVE INDUSTRIES (EIIs)

Energy Intensive Industries (EIIs) have been recognized as key elements in the global economy, for both developed countries and emerging regions. However, EIIs are also recognized as significant emitters of CO₂, contributing as the 25% of the total CO₂ emissions. Cutting down emissions in the EIIs is essential to achieve the decarbonization goals. The IEA Energy Technology Perspective (2017) indicates that the industrial emissions must be reduced by 50% or more than 70% in the 2 and beyond 2 Degree scenarios respectively (2DS and B2DS). While major industries have implemented decarbonising strategies, including developing more efficient combined heat and power generation, fuel switching, and applying advanced production processes, CCUS will still be essential to fully achieve close to zero net CO₂ emissions in the EIIs.

The Carbon Capture, Utilisation and Storage (CCUS) Task Force from the Carbon Sequestration Leadership Forum (CSLF) Technical group CSLF delivered a report recently [1]. The EIIs analysed in this report are the steel, cement, chemicals, refining, hydrogen, natural gas, heavy oil, fertilizers, and waste to energy sectors. In summary, this report covers the role of EIIs in current and future global and regional economies; suggests a prediction of the role of CCUS in EIIs to reduce CO₂ emissions; discusses the interactions between different EIIs and how those can contribute to the development of CCUS; and examines the role of stakeholders on the near-future deployment of CCUS in EIIs.

The key messages from this report are:

- CCUS in EIIs can be combined with the use of biomass, offering the opportunity to achieve negative emissions
- Emissions from EIIs generally have higher CO₂ concentrations than those from the power sector. That can lead to lower costs of CO₂ capture
- EIIs often have waste heat available to use on CO₂ capture processes, which can decrease the CO₂ capture costs through an optimum heat/energy integration
- The result of implementing CCUS in the industrial sectors should not be limited to added costs, but the whole picture should be analysed. Including CCUS in industries decrease the CO₂ emissions at a degree that cannot be achieved otherwise. Process emissions cannot be tackled down at such extent without CCUS
- Final product might have a slight increase on its cost, while intermediate actors in the product chain might incur in high cost increases which are likely to be recovered
- Research, development, and demonstration (RD&D) is still key, not only for specific aspects on each industry, but for common issues along the different sectors. For example, common infrastructures for transport and storage, understanding CO₂ purification, and energy/heat integration with the original industrial facility.
- Post-combustion systems offer the opportunity of implementing carbon capture systems with a low disruption of the industrial production facility. However, other emerging carbon capture technologies could become beneficial and its energy/heat integration with the original facility could optimize the costs
- CO₂ utilisation can provide an additional revenue stream to enhance the business model of the EIIs with CCUS. In addition, that can offer the opportunity to increase industrial scale demonstrations of carbon capture in EIIs



Compared to other technical or economic studies on EIs, this report focuses on the role of each industry in today's economies, their expected growth, the emissions of each sector, decarbonisation strategies and the potential of CCUS to cut down CO₂ emissions on EIs.

Monica Garcia Ortega, from IEAGHG, was one of the contributors in the CSLF report, which can be found here: <https://www.cslforum.org/cslf/sites/default/files/documents/Task-Force-on-CCUS-for-Energy-Intensive-Industries-Final-Report.pdf>

Linked to this report, a workshop was held in Chatou on the 7th November 2019, hosted by EDF and Club CO₂, and organised by a steering committee including representatives from Total (Dominique Copin), IEAGHG (Monica Garcia Ortega) and CSLF (Lars Ingolf Eide). A summary of the workshop can be found in the IEAGHG 2019-IP13 ([which can be downloaded here](#)) and the presentations are available here: <https://www.cslforum.org/cslf/Events/2019-CCUS-with-EIs-Workshop>.

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[1] Carbon Sequestration Leadership Forum. Technical Group. Task Force on Industry CCUS. Carbon Capture, Utilisation and Storage (CCUS) and Energy Intensive Industries (EIs). From Energy/Emission Intensive Industries to Low Carbon Industries, September 2019