Carbon Capture and Storage (CCS):
an essential technology to reconcile EU energy security with climate objectives

Together with renewables and energy efficiency, CCS is a key technology to improve EU energy independence, diversity and security of supply while achieving climate objectives in an affordable manner and contributing to EU economic growth and competitiveness. Deployed in power generation (coal and gas) and energy intensive industries, CCS will ensure that the EU uses an energy which is clean, affordable and reliable, exploiting local and diversified fossil fuel resources effectively, both in terms of cost and environmental impact. The development and deployment of CCS technologies in Europe is therefore imperative.

In view of the upcoming June Energy and European Council, where EU energy Security will be discussed together with the Commission's proposal on 2030 Climate and Energy Framework, we urge EU Member States to embed CCS in their discussions.

1. Coal and lignite constitute more than 80% of EU fossil reserves[1]. CCS is the only proven technology allowing the EU to continue exploiting local fuel resources while greatly reducing negative impact on the climate and environment. CCS consists of three stages. First, capture of carbon dioxide (CO2) from power plants or CO2 intensive industries. Second, transportation of CO2 via pipeline or ship to a selected storage site. Third, CO2 injection into a suitable underground geological formation for the purpose of permanent storage. Existing CCS projects have already safely captured and stored millions of tonnes of CO2; it is a proven and effective process. Applied on coal and gas power plants as well on industry, CCS is the only proven solution capable of capturing ~90% of CO2 emissions. Provided there is a timely introduction of transitional support measures and a level playing field with other low-carbon technologies, CCS could therefore contribute at least 222 Mt[2] of CO2 reductions by 2030 – equivalent to at least 4% of the EU's greenhouse gas reduction commitment effort. About ¾ could be contributed by the power sector (around 40 GW) and ¼ by energy intensive industries.

2. Coal- and gas-fired plants will continue to play a major role in the EU energy mix as they are sources of affordable and reliable primary fuel. Equipped with CCS, both new and existing fossil fuel fired power plants will provide decarbonised and reliable energy output. By using locally abundant fossil fuel resources such as coal and lignite, power plants equipped with CCS will limit the EU's dependence on imports ensure the diversity of supply. Retrofitting existing coal and gas plants with CCS will allow assets to continue operating in a clean and cost effective manner[3]. Once demonstrated at large scale, CCS will be cost-effective *and* competitive, complementing other low-carbon technologies, with huge potential to drive costs down. UK Government and ZEP research has shown that CCS could be cost-competitive with other low-carbon technologies in the mid-2020s[4][5]. CCS Projects are therefore urgently needed to validate and optimise CCS technology, which

[1] Euracoal (2013) Coal Industry Across Europe 5th Edition
[2] On the basis of 1000 MW Hard coal, 90% capture, 80% capacity factor = 4.4 Mt CO2/year and 1000 MW gas, 90% capture, 75% capacity factor = 1.76 Mt CO2 /year
[3] The IEA has estimated that 100GW of coal plants worldwide may need retrofitting with CCS by 2050 to stay within a 2°C scenario
[4] https://www.gov.uk/government/publications/ccs-cost-reduction-task-force-final-report.
[5] http://www.zeroemissionsplatform.eu/downloads/1413.html

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will lead to overall cost reductions – both in terms of capital and cost of electricity[6]. Without CCS a huge technical burden would fall on other CO2 reduction solutions and the cost of meeting CO2 reduction targets would increase substantially; the IEA has indeed calculated that the costs of climate change mitigation will be 40% higher without CCS. [7]

3. CCS technologies are designed to operate so that CCS does not undermine the power production flexibility from advanced fossil-fuel power plants and contribute to grid stability of future "low-carbon" electricity grids. Providing decarbonised flexible back up capacity, CCS will contribute to the energy system stability and to the diversification of local energy supply. With intermittent renewable deployed on a large scale, new challenges have emerged. Variable energy output from wind and solar with preferential access to the grid affects grid stability, hence also the security of supply. Stepping in to provide flexible, reliable and efficient electricity supply, decarbonised conventional power will ensure the required grid stability for the security of the whole systems when renewables are not able to deliver. CCS will support the increasing penetration of renewables in Europe, ensuring these resources are optimised.

4. CCS combined with sustainable bioenergy (Bio-CCS) has a potential to significantly contribute to attaining EU climate targets.[89] More than 50 % of renewable energy consumption in Europe is currently derived from biomass. Bio-CCS can deliver net negative CO_2 emissions; in fact it is the only large-scale technology that can actually remove CO_2 from the atmosphere, which according to the International Panel on Climate Change (IPCC) will be crucial to avoiding irreversible climate change.[10]

5. Captured CO2 from thermal power plants or industrial facilities can be used to increase the recovery of hydrocarbons from reservoirs. This process is called Enhanced Oil Recovery (EOR) and Enhanced Gas Recovery (EGR). Use of CO2 to increase the recovery of oil and gas from a reservoir may also liberate fossil gas that would otherwise be injected to maintain reservoir pressure. In this way CO2 EOR can further improve EU security of energy supply by increasing the effective indigenous production of European oil and natural gas.

6. CCS deployment will support economic stability with maintaining and creating jobs over the whole supply chain from fuel supply, equipment manufacturing and plant/storage site operation and will sustain the economic development of regions currently reliant on mining. The abovementioned ZEP report on transitional measures shows how the deployment of CCS in Europe will create and secure an estimated total of 330,000 jobs in fuel supply, CCS equipment manufacture, plant operation and CO2 storage facility operation[11]. The development of CCS core infrastructure (CCS Clusters) will ensure a stream of high quality work for a skilled workforce for many years to come – along with the potential to export our know-how derived from these projects.

[6] "Cost assessment of fossil power plants equipped with CCS under typical scenarios", Alstom, June 2012, p. 21/ Alstom Power study
[7] Redrawing the energy-climate map. World Energy Outlook Special Report", IEA, June 2013, p. 11, 43, 80
[8] http://ec.europa.eu/energy/energy2020/roadmap/index_en.htm
[9] http://www.zeroemissionsplatform.eu/library/publication/206-biomass-with-co2-capture-and-storage-bio-ccs-the-way-forward-for-europe.html
[10] https://www.ipcc.ch/report/ar5/wg3/
[11] ZEP Report on Recommendations for transitional measures to drive deployment in Europe

Recommendations:

1) An ambitious CCS milestone must be embedded into the Communication on Energy Security and in the EU 2030 energy and climate framework to give a long-term signal.
2) EU institutions and MS will need to put in place transitional support measures for CCS as soon as possible, which need to remain in place until the carbon price reaches sufficient levels. These could include a CCS fund to provide the appropriate financial support, Feed-in Premia and CCS Certificates, if carefully designed.
3) The ETS should remain the long-term driver for low-carbon technologies including CCS through structural measures that will strengthen it and lead to a predictable, meaningful and robust carbon price. We therefore welcome the Market Stability Reserve but we would strongly support timely action on additional measures to deal with the surplus in the system to further strengthen the scheme.
4) Legal barriers and other blockers need to be resolved – i.e. we need a robust review of the EU CCS Directive to remove unnecessary uncertainties for storage providers and uncertainty over CCS-readiness, the ratification of the London Protocol.
5) Development of transport and storage infrastructure needs to start now- we need to identify a small number of key hubs across Europe that could form the start of CCS clusters.
6) EU Horizon2020 funding will be crucial, along with the Connecting Europe Facility. Strengthened support to key underpinning R&I activities through H2020 must be ensured.

This document has been prepared on behalf the European Technology Platform for Zero Emission Fossil Fuel Power Plants. ZEP was founded in 2005, the European Technology Platform for Zero Emission Fossil Fuel Power Plants (ZEP) is a unique coalition of European utilities, petroleum companies, equipment suppliers, scientists, academics and environmental NGOs united in their support for CO2 Capture and Storage (CCS) as a key technology for combating climate change. ZEP serves as advisor to the European Commission on the research, demonstration and deployment of CCS.