

Dr. Graeme Sweeney, Chairman of ZEP, responding to questions from NORDICCS:

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1. What are your thoughts concerning the future of CCS?

The Zero Emissions Platform (ZEP) believes that Carbon Capture and Storage (CCS) can and must be successfully deployed in Europe. CCS is an essential technology for the mitigation of CO₂ emissions from large-scale fossil fuel use—not only for power generation but also in the energy intensive industry. For some energy intensive industries CCS is the only decarbonisation option.

In its 2°C Scenario (2DS), the International Energy Agency (IEA) stresses that CCS will need to contribute up to 1/6th of the CO₂ emissions reductions required in 2050. In previous scenarios the IEA has calculated that the costs of climate change mitigation will be 40% higher without CCS. It is clear that CO₂ reduction targets cannot be met cost effectively without CCS and that the technology is critical to achieving the EU's long-term goal of reducing GHG emissions by 80-95% by 2050.

Even if Europe is currently falling behind on the commitments needed to deliver CCS., all is certainly not lost.

In the past year a number of key steps have been taken by EU institutions. We have the CCS Communication, the Communication on the 2030 energy and climate framework which recognises the key role of CCS, the review of the CCS Directive will start this year and a CCS project, the White Rose project in the UK, is still under consideration for NER300 Phase II funding. In the UK again, two projects—White Rose and Peterhead—have signed a Front End Engineering and Design (FEED) contract, and the Don Valley project is very advanced. In the Netherlands, the Rotterdam Capture and Storage Demonstration Project (ROAD) plans to realize an integrated chain of CO₂ capture, transport and storage on a large scale that could start operating in 2018.

The EU now needs to embed CCS in their policies to ensure a long-term vision and put in place concrete measures that will enable the deployment of this essential technology.

ZEP has developed a timeline in three stages for successful CCS deployment in Europe by 2050 ("The case for urgent action on CCS").

1. **Demonstration phase (2015-2020):** A small set of demonstration projects to show that CCS is technically and operationally feasible and to test the regulatory framework and gain public acceptance. This set of projects must be carefully chosen preferably such that different CO₂ emissions source types (coal, gas power, industry sources, pre- and post-combustion and oxy-fuel capture etc.) and different types of storage (deep saline aquifers, depleted oil and gas fields, enhanced oil recovery through CO₂) are tested.
2. **Pre-commercial deployment (2020-2030):** A period of wider deployment in the power and energy-intensive industries (e.g. refining, steel, cement). This involves a larger set of early commercial projects to build the CCS industry, with

several years of operations to include the learning from 2026 onwards in the design of commercial projects to be operational by 2030.

3. **Commercial deployment (2030-2050):** In this phase, CCS is deployed at full scale and deployment is rapidly increasing within the power and energy-intensive industries, when CCS technology has become fully proven at commercial scale and the supply chain has matured.

2. What are the major hurdles and barriers for the CCS industry, and what are its major opportunities?

While CCS projects around the world have continued to advance, Europe has fallen behind. EU funding instruments aimed at delivering the technology have so far yielded disappointing results.

CCS, however, is a commercially viable technology that, with the right political framework and transitional support measures, can be commercially available in Europe post 2030. Essential to meeting Europe's emissions reductions targets cost-effectively, CCS is also crucial for maintaining security of supply and will support competitiveness in Europe through the preservation and creation of jobs. Economically speaking, the case for the use of CCS in the power and industrial sector is clear.

In a situation where industry is expected to account for half of the global emission cuts required by 2050, CCS can help to preserve thousands of jobs. A 2014 study from the Trade Union Congress and Carbon Capture and Storage Association (CCSA), shows that in the UK alone, CCS could create between 15,000-30,000 jobs by 2030.

ZEP's own modelling demonstrates that the deployment of CCS in Europe will create and secure an estimated total of 330,000 jobs in fuel supply, equipment manufacture, plant operation and CO₂ storage facility operation. CCS clusters will also deliver further benefits that drive the development of local economies.

Despite the significant progress achieved in the last year, to reap these benefits the EU now needs to embed CCS in their policies to ensure a long-term vision and put in place concrete measures that will enable the deployment of this essential technology.

In January 2014, the European Commission proposed a 40% GHG reduction target for 2030, as part of their proposal for a 2030 Energy and Climate Framework. The proposal recognized the importance of CCS for decarbonizing the power sector and energy intensive industries. However, for the time being, how CCS will contribute is not explicit. ZEP has calculated that, provided transitional support measures are introduced and a level playing field with other low carbon technologies is created, CCS could cost-effectively deliver at least 4% of the agreed GHG reduction on 1990 levels. We therefore urge EU Ministers to embed CCS in their discussions on the Commission's proposal for the EU 2030 Climate and Energy framework, with an ambitious milestone for CCS.

Europe must embed CCS in their 2030 energy and climate framework to ensure that the necessary environment for CCS to flourish, otherwise Europe risks missing out on the enormous potential of CCS – and on achieving decarbonisation objectives.

3. In your opinion, what is the role of public acceptance in the future development of CCS in the Nordic countries? On a global scale?

Public awareness and acceptance of CCS is generally higher in the Nordic countries than in the rest of Europe, particularly so in Norway. In Norway, communicating CCS and in particular CO₂ storage has been aided by the presence of an extensive petroleum industry infrastructure – people are more used to its presence and familiar with its direct impact on life, the economy and technology.

The greater level of public acceptance that the technology experiences in the Nordic countries should be used more actively to develop a stronger case for CCS. Specifically, grassroots calls for both industry and government to deliver CCS could be capitalized on.

At a broader European level, we must ensure that we are building public acceptance for CCS technology by demonstrating its ability to cost-effectively decarbonize Europe, as well as the significant socio-economic benefits it brings.

We urgently need CCS projects to validate and optimize the technology. From 2015 to 2020 we must have a small set of demonstration projects which test both different CO₂ emissions source types and storage – and also builds public confidence in storage.

The EU must also ensure the powerful economic and societal case for deploying CCS as an integral part of its policy mechanisms. CCS is essential for competitiveness, job retention and job creation in Europe. Unfortunately, the European Commission's CCS Communication of March 2013 lacked an analysis of the economic and employment benefits of CCS deployment.

In this context, it is essential to undertake an EU study on the employment, growth and fiscal benefits of deploying CCS in Europe. This help would help to address public acceptance issues and provide valuable data on the economic and societal benefits of CCS to Europe as a whole.

4. How do we raise CCS as a political issue?

In a context of the economic crisis and high unemployment, there are a few basic facts that are important to highlight to policy makers.

Firstly, without a successful CCS demonstration programme by 2020-2025, the long-term roll-out of CCS will be put at risk and in turn we jeopardise achieving our long-term decarbonisation goals. Secondly, CCS is great value for money and delaying deployment by just 10 years would increase the cost of decarbonising the global power sector by ±750 billion euros. And finally, an ambitious EU-wide CCS programme for power and industry has potentially enormous economic growth, job-creating, skills and fiscal benefits.

CCS is especially relevant in the current political climate, as we face a challenging time in EU energy policy discussions on ensuring security of supply for Europe, while staying in line with our emission reduction objectives. Following recent political developments in its eastern neighbourhood, the EU faces an uncertain energy future. It is clear that we must increasingly look towards our indigenous energy sources – CCS plays an essential role in enabling this.

There are challenges, but CCS can be put back on track in alignment with the EU's energy, climate and industrialisation objectives.

The bottom line is that failure to act now will mean Europe will miss its objective to decarbonise by 80-95% by 2050, while damaging its competitiveness and missing out on hundreds of thousands of jobs. This is a high risk strategy and one Europe cannot afford.

It is also clear that significant progress has been made in developing CCS technology elsewhere, especially Canada and the USA. Several large-scale CCS projects are under construction or recently completed, such as Boundary Dam and Quest in Canada and the Gorgon project in Australia. China also has many pilot projects in operation and in construction. These international developments underline the importance for renewed and strengthened European participation in the broader development of CCS technology.

5. What is the importance of inter-Nordic cooperation in order to further the development of the CCS industry?

International collaboration and knowledge-sharing are crucial to demonstrating the huge potential of CCS and successfully deploying this essential technology. Cooperation not only within regions but across regions will yield real benefits for everyone; for industry, for governments and society alike.

The specific circumstances of Nordic countries make the region particularly conducive to cross-border cooperation on the development of CCS. In the first instance, their proximity and interest in the Arctic is a strong factor. The threats to this wealthy, yet vulnerable region can be linked better to the case for CCS. The Nordic countries can do this both in the Arctic Council, which is also a forum to connect with Canada and U.S., and on the EU stage.

Nordic countries should also look at possibilities for economies of scale when it comes to CCS projects. While full-scale projects are the first step, developing this while conscious of possible future linkages and clusters, particularly in energy intensive industries, could ensure the continued advancement of CCS.

Finally, Norway plays a central role in developing CO₂ storage in the North Sea. The Norwegian continental shelf has the greatest potential storage capacity in Europe.

6. Which are the five main questions for the CCS industry over the coming 5 years?

Business-as-usual is not an option and urgent political action to reset the EU CCS programme is needed. Five key actions are required:

Firstly, CCS must be integrated into the upcoming proposals for the EU 2030 energy and climate framework to signal the long-term potential of this technology. The EU should also support the inclusion of CCS in any international agreement i.e. at the global climate negotiations in Paris in 2015. For CCS, an ambitious milestone will be needed to provide a clear signal to investors. As the discussions on the 2030 framework become more concrete, it is essential that these points are taken into account.

Secondly, in the EU, the Emissions Trading System (ETS) should remain the central tool of EU climate policy, providing a predictable and robust carbon price and a long term driver for CCS. However, the carbon price is currently too low and will likely remain so through the

2020s. A key priority should therefore be to strengthen the ETS through structural reform, including a tighter cap on the number of emission allowances flowing through the market out to 2030 and beyond, which would help the ETS reduce emissions costs effectively while triggering investments in low carbon technologies such as CCS.

Thirdly, transitional support measures for CCS are vital to cover the incremental costs of demonstration and early deployment projects. We are therefore calling for EU institutions and Member States to consider mechanisms such as a CCS fund, Feed in Premia and, if carefully designed, CCS Certificates. We would recommend that Member States set out clear plans on how CCS will be funded.

Fourthly, legal barriers and other blockers need to be resolved. For example, through a robust review of the EU CCS Directive that removes the unnecessary burdens, risks and uncertainties on storage providers, which are currently hampering investment. The State Aid guidelines must also enable CCS.

And last but not least, transport and storage infrastructure: Development of infrastructure needs to start now. Effective business models need to be developed and the process of setting up infrastructure put into motion. We need to make sure that up to six storage pilots are in place by 2020, to test the storage sites and build public acceptance. One exciting opportunity, for example, is to develop a hub in the North Sea, which could store 100 million tonnes of CO₂ a year by 2030. In this area, EU Horizon2020 funding will be absolutely key. We also strongly encourage the Connecting Europe Facility to issue a call on infrastructure and development in early 2014.

As regards funding for CCS, public grants need to cover both capital and operational costs since capital grants alone are not sufficient to incentivise CCS 'first movers'. This is because they do not ensure that the power plant will dispatch and operate over the lifetime of the project so that the return on the investment is realised. In addition incremental operating costs for CCS will not be covered at low CO₂ price levels. We are therefore calling for a CCS fund large enough to support EU demonstration projects in the power and industrial sectors, and also take into account the lessons learnt from recent EU funding schemes.