ZEP recommendations for CCS, CCU, and low-carbon hydrogen in Member State National Energy and Climate Plans

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ZEP is a European Technology and Innovation Platform (ETIP) under the Commission's Strategic Energy technologies Plan (SET-Plan), and acts as the EU's technical adviser on the deployment of Carbon Capture and Storage (CCS), and Carbon Capture and Utilisation (CCU).

As part of the National Energy and Climate Plans process, the European Commission are expected to provide an overarching feedback to all Member States, as well as individual Member State feedback on their draft National Climate and Energy Plans submitted in December 2018.

ZEP encourages the Commission to consider six key areas outlined in this document when assessing whether Member States can achieve the five dimensions of the Energy Union objectives, and collectively realise the EU's 2030 climate targets.

Europe needs all available tools to deeply reduce emissions in line with the Paris Agreement and choosing the measures to reach net-zero emissions remains the prerogative of each Member State. Yet, we urge the Commission to ensure Member States provide credible, effective and implementable strategies to ensure that efforts to reduce emissions can collectively achieve the EU's climate targets.

In particular, ZEP cautions against putting too much faith in the electrification of heavy industry and the potential for green hydrogen. Whilst these strategies are, no doubt, incredibly important, the energy intensity and consequent demand for renewable electricity prevents the availability of options such as the production of green hydrogen at scale for many Member States.

As a result, climate scenarios from the ETC[1], Material Economics[2], IEA, IPCC[3], the BDI (BCG)[4], and others, have shown that CCS remains an essential technology to achieve net-zero emissions, particularly for industry.

[1] Energy Transition Committee, 2017. Better Energy, Greater Transition.
Available at: http://energy-transitions.org/sites/default/files/BetterEnergy_fullReport_DIGITAL.PDF
[2] Material Economics, 2019. Industrial Transformation 2050: Pathways to Net-Zero Emissions from EU Heavy Industry
Available at: https://materialeconomics.com/material-economics-industrial-transformation-2050.pdf?cms_fileid=b9785e8b652ba47f227181543fc5d1e8
[3] IPCC, 2018. Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report*
Available at: https://www.ipcc.ch/sr15/
[4] BDI (BCG), 2019. Klimapfade für Deutschland

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CCS is needed at scale to reach climate targets

Carbon Capture and Storage (CCS) is available today, constitutes an essential part of the lowest cost solution, and is particularly necessary for reducing emissions from 'hard to mitigate' sectors such as industrial processes and distributed heating. Once in place, a CCS infrastructure enables deep emission cuts for a variety of source points, and opens new paths for decarbonisation as well as carbon removal technologies

The Paris Agreement targets need to be taken seriously, ensuring all available and cost-effective measures are implemented to allow net-zero emissions to be achieved by 2050. The European Commission have set out their vision for a climate-neutral 2050, including CCS in several of their modelled scenarios[5]. In fact there are very few climate modelling scenarios in Europe and globally which achieve a 2^{o} target, let alone a 1.5^{o} target, without the use of CCS at scale[6].

The European Commission need to consider if, in aggregate, the ambition on CCS proposed in the National Energy and Climate Plans is sufficient to achieve the EU 2030 climate targets.

Low-carbon hydrogen production with CCS can decarbonise multiple sectors

Hydrogen has the ability to decarbonise power, heating, certain industries and transport. Hydrogen is key to decarbonise a number of different sectors and play a key role in the energy transition.

Decarbonised hydrogen can be produced through the application of CCS on established natural gas to hydrogen production units ("low-carbon" hydrogen), or electrolysis using renewable energy sources ("green" hydrogen). However, electrolysis is an energy-intensive method, whose climate footprint depends on the carbon intensity of the electricity supply.

In many Member States access to cheap and abundant renewable electricity for electrolysis and green hydrogen production is limited and will likely remain so for the foreseeable future [7].

Where green hydrogen has been cited as part of a NECP, the European Commission has to consider whether this is a credible strategy to provide hydrogen at the volumes required, and review the potential implications for other sectors, especially the electricity supply.

Sufficient progress on CCS is required pre-2030 to realise 2050 climate targets

Given the ambition of the European Commission to achieve a net-zero 2050 climate targets the Commission must ensure that collectively the foundations for decarbonisation at scale with CCS are realised by 2030.

[5] European Commission, 2018. A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy.
Available at: https://ec.europa.eu/clima/sites/clima/files/docs/pages/com_2018_733_en.pdf
[6] IPCC, 2018. Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report*
Available at: https://www.ipcc.ch/sr15/
[7] Zero Emissions Platform (ZEP), 2017. Commercial Scale Feasibility of Clean Hydrogen
Available at: http://www.zeroemissionsplatform.eu/component/downloads/downloads/1638.html

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Net-zero emissions will require significant investment and urgent actions on all emissions, including the hard to mitigate sectors such as heating of buildings and industries, heavy-duty and maritime transport. Europe therefore needs to deploy all available and most affordable solutions to cut its emissions dramatically. The timeframe, to 2050, means that we cannot rely on technological breakthroughs or radical changes in consumption patterns. It is essential to address the emissions we generate with available solutions as fast as possible.

Achieving deep reductions in CO_2 emissions in the most affordable and economically sustainable way will require a mixed portfolio of technologies and solutions. It is estimated that a portfolio of solutions which includes CCS, biomethane and hydrogen as part of a balanced energy mix, delivers a saving of over €1,150 bn compared to a pathway without CCS[8]. This compares to €1,000 bn modelled in the ZEP 5th Market Economics report[9].

CCS is required for industry to decarbonise and remain globally competitive

For many industrial activities to remain competitive globally in a net-zero Europe, CCS is essential.

The European Commission must increase its focus on how decarbonisation of heavy industry can be achieved in the EU and how collectively Member States can contribute. The Governance Regulation[10] places a minor focus on industry; however, this sector alone emits around 500 million tonnes of CO_2 per year, equivalent to 14% of all EU CO_2 emissions.

The future of these energy intensive industries is highly dependent on CCS. For these sectors and many more, CCS is critical to retaining high-skilled jobs and boosting economic activity across EU Member States in an increasingly carbon-constrained world[11]. Recent modelling work by Material Economics has shown that CCS has a role to play in all net-zero heavy industry 2050 scenarios, concluding up to 235 Mt CO_2 storage per year is required for heavy industry alone by 2050[12].

Without CCS and certain CCU technologies, Europe's industrial regions risk rising investment uncertainty as climate pressures mount, resulting in stranded assets, an eventual exodus of process industries, and the loss of millions of jobs also further down the value chain[13]. In Germany alone, over 50 million tonnes of residual process CO_2 emissions would remain unabated without CCS,

[8] Pöyry, 2018. Fully decarbonising Europe's energy system by 2050.
Available at: http://www.poyry.com/sites/default/files/media/related_material/poyrypointofview_fullydecarbonisingeuropesenergysystemby2050.pdf.

[9] Zero Emission Platform (ZEP), 2017. CCS and Europe's Contribution to the Paris Agreement.
Available at: http://www.zeroemissionsplatform.eu/library/publication/271-me5.html

[10] Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC)
Available at: http://data.europa.eu/eli/reg/2018/1999/oj

[11] Zero Emission Platform (ZEP), 2017. CCS and Europe's Contribution to the Paris Agreement.
Available at: http://www.zeroemissionsplatform.eu/library/publication/271-me5.html

[12] Material Economics, 2019. Industrial Transformation 2050: Pathways to Net-Zero Emissions from EU Heavy Industry
Available at: https://materialeconomics.com/material-economics-industrial-transformation-2050.pdf?cms_fileid=b9785e8b652ba47f227181543fc5d1e8

[13] Zero Emissions Platform (ZEP), 2018. Role of CCUS in a below 2 degrees scenario
Available at : http://www.zeroemissionsplatform.eu/component/downloads/downloads/1688.html

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risking about 3.5 million steel-related jobs alone, and several hundred thousand more in the chemicals and cement sectors[14].

Cross-border CO_2 transport infrastructure networks are required across Europe

Widespread investment in CO_2 transport and storage infrastructure must start now in order to enable deployment of CCS at widely from 2025[15].

The Commission should concentrate on encouraging the collaboration between national and regional governments to implement cross-border CCS and low-carbon hydrogen infrastructure as a strategic option for greenhouse gas (GHG) mitigation. This will involve stimulating cooperation across countries, supporting development and provision of infrastructure, and reducing the level of risk for companies that need to act to reduce emissions where they actually occur.

A CO_2 and hydrogen network enables Europe's industry sector options to deeply decarbonise, drives climate innovation and improves the attractiveness of Europe as a base for industry.

Negative emissions technologies have a role to play in a carbon-neutral Europe

Almost all scenarios to meet Paris Agreement targets rely on negative emissions to some extent, to offset residual emissions in areas of the economy that are impossible or too expensive to currently abate. It is important to stress that negative emissions *do not remove the need to act as quickly as possible on climate change mitigation now*. However, even with a rapid acceleration of mitigation globally, negative emissions are likely to still be required[16].

There are limited options for enabling negative emissions: land use change and afforestation can, and must play a key role, as can bioenergy coupled with CCS (BECCS) when used in combination with industrial processes, such as steel and cement production. Direct air capture of CO_2 combined with CCS may also have an important role to play.

The European Commission must develop strategies in the 2030s to consider negative emissions technologies on a Europe wide scale, and encourage Member States to consider negative emissions technologies in climate and energy plans to 2030 and 2050.

[14] BDI (BDC), 2018. Klimpfade fur Deutschland.
Available at: https://bdi.eu/publikation/news/klimapfade-fuer-deutschland/

[15] Pöyry, 2018. Fully decarbonising Europe's energy system by 2050.
Available at: http://www.poyry.com/sites/default/files/media/related_material/poyrypointofview_fullydecarbonisingeuropesenergysystemby2050.pdf

[16] IPCC, 2018. Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report*
Available at: https://www.ipcc.ch/sr15/

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