ZEP's response to the revision of the Trans-European Energy Infrastructure (TEN-E) regulation

The Zero Emissions Platform (ZEP) is a European Technology and Innovation Platform (ETIP) under the Commission's Strategic Energy Technology 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) under Horizon2020 R&I programme (grant agreement 826051).

Input on the upcoming TEN-E regulation

ZEP supports the European Union's commitment to reach climate neutrality by 2050, defined as net-zero greenhouse gas (GHG) emissions by 2050. To this end, carbon capture and storage (CCS) and carbon capture and utilisation (CCU) technologies play a crucial role. These technologies represent a readily available, cost-efficient pathway for the decarbonisation of industrial and energy sectors in the European Union. As shown by several modelling scenarios[1, 2], large volumes of captured carbon will be needed for the EU to achieve climate neutrality by 2050.

As geological storage sites are not evenly distributed among member states, the large-scale deployment of cross-border, European CO_2 transport and storage infrastructure is crucial to reach the European Union's objective of net-zero GHG emissions by 2050. This infrastructure will enable clean, competitive energy and industrial sectors, early large-scale clean hydrogen and, not least, the delivery of significant volumes of carbon emission reductions and removals[3].

It is critical to update article 4 (e), annex I (12) and Annex II (4) of the TEN-E regulation. The revised TEN-E guidelines should include:

- **All CO_2 transport modalities** – pipeline, ship, barge, truck, and train – allowing all European regions and industries to connect to the European infrastructure, thus becoming eligible for funding under CEF. As is the case in the European Taxonomy for Sustainable Finance, this should be harmonised in relevant pieces of legislation connected to the TEN-E regulation, such as the EU ETS and other funding programmes.

CO_2 transport and storage infrastructure is crucial to connect CO_2 emitters in industrial clusters to storage sites, opening up access to permanent geological storage of captured CO_2. Europe is well positioned to develop cross-border, shared CO_2 transport and storage infrastructure, both via pipeline and by other modalities such as ship, barge,

[1] European Commission, 2018. A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy.
[2] IPCC, 2019, Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development, page 134
[3] Zero Emissions Platform, Identifying and Developing European CCS Hubs, 2016

truck, and rail. This would send a strong signal to private investors and industry. With secure access to storage sites, more CO_2 industrial emitters are likely to invest in capture projects, bringing down costs of capture technologies.

Additionally, upcoming CCS projects – including those in the fourth PCI list – rely on CO_2 shipping to connect capture and storage sites. Without the possibility to transport CO_2 by ship and other modalities, these projects would be put at risk of not becoming operational. This scenario must be avoided at all costs, as CCS and CO_2 infrastructure are prime options for the decarbonisation of energy-intensive industries, where electrification is too costly or not feasible.

- In the revised TEN-E regulation, **CO_2 storage** should also be included as an essential part of the CO_2 infrastructure and component of a CCS project. CO_2 storage is a key element to delivering real climate change mitigation and it should receive funding as part of the CO_2 infrastructure.

For a climate-neutral Europe, around 600 million tonnes of CO_2 per year of unavoidable emissions will need to be stored[4], involving the capture of just under 15% of annual emissions (based on 1990 levels). The steel industry[5] alone estimates that 150-200 million tonnes of CO_2 transport and storage would be needed annually to become climate neutral in 2050. In Europe, a total storage capacity of 300 $GtCO_2$ has been estimated[6], with ongoing appraisal activities to identify investable storage sites. This shows that CO_2 storage can likely continue well beyond 2050.

- As the revised TEN-E regulation will drive the selection of the next Projects of Common Interest (PCI), it is vital to ensure that the next **PCI lists put the EU on the right track to achieve climate neutrality by 2050**, creating opportunities for cross-border CO_2 and hydrogen infrastructure projects to be further developed and scaled up.
- In order to create a level playing field and the conditions for long-term investments for CO_2 emitters across Europe, at the least **non-discriminatory third-party access** to cross-border CO_2 transport and storage infrastructure should be regulated.
- **Repurposing and retrofitting of natural gas pipeline networks** for the transport of CO_2 and low-carbon gases (such as clean hydrogen) should be included in revised TEN-E guidelines.

In some instances, investments to retrofit existing natural gas pipeline networks into CO_2 pipeline networks can be advantageous and cut initial costs of infrastructure. In this respect, the European Taxonomy for Sustainable Finance has included the retrofit of gas pipelines for low-carbon gas transportation as a sustainable investment in a net-zero economy.

[4] Shell, A climate-neutral EU by 2050, 2020
[5] ArcelorMittal, Climate Action in Europe, 2020
[6] European Commission, The Potential for CCS and CCU, 2019

According to the current formulation of Annex II (4.a), only new, dedicated pipelines would be seen as energy infrastructure to be developed in order to implement the priorities of the regulation. ZEP highlights that upcoming CCS projects are likely to re-use existing infrastructure and re-purpose it for CO_2 transport to reduce initial infrastructure costs. This paragraph needs reformulation to enable the possibility of repurposing and reusing existing gas pipeline infrastructure, and to include all CO_2 transport modalities, as well as CO_2 storage, as part of CO_2 infrastructure, thus making it eligible for funding.

- Once cross-border CO_2 infrastructure is in place, the production of early volumes of **clean hydrogen** from natural gas with CCS can be initiated, paving the way for a clean hydrogen economy. Hydrogen infrastructure is essential to deliver the climate neutrality objective under the European Green Deal. Therefore, the revised TEN-E regulation should include provisions for the development of dedicated hydrogen infrastructure. This will support the production and transportation of hydrogen, supporting the EU's decarbonisation pathway.

The revised TEN-E regulation should drive the transition towards a climate neutral economy, capitalising on the potential and opportunities of large-scale decarbonisation of European industrial and energy sectors.