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GE VERNOVA'S VISION FOR CARBON CAPTURE IN EUROPE

The deployment of carbon capture technologies in Europe is proving to be essential. As this phenomenon accelerates, GE Vernova wants to share its vision of the role carbon capture, utilisation and storage (CCUS) has to play in Europe's journey towards energy transition.

Backed by its active participation in the European debate, GE Vernova would like to reiterate what it considers to be the key factors in the successful and effective spread of CCUS. The elements presented in this document are mostly based on our response to the European Commission's public consultation on "Industrial carbon management – carbon capture, utilisation and storage deployment."

Europe is currently going through a CCUS momentum that must be supported to ensure large-scale implementation of the full value chain. To achieve this, we need to consider all possible options, both technological and regulatory. GE Vernova is strongly committed to helping provide CCUS with the comprehensive framework it needs in Europe.

A KEY ROLE FOR CCUS IN EUROPE

GE Vernova welcomes the ongoing initiatives underway in Europe to develop CCUS deployment strategies, and especially those taken by the European Commission (EC). The pressing urgency of climate change requires bold action and a comprehensive plan that includes all available technologies and CO2-emitting assets in the challenge of achieving the energy transition in a timely and efficient manner.

Given the efforts and actions undertaken at European level to understand, address and act on the deployment of carbon capture technologies, it is all the more crucial to act quickly. We therefore fully support all initiatives taking place across Europe, which are the culmination of a long-term effort to provide a framework for this essential technology in the energy transition. Our vision is grounded on our experience as a provider of integrated solutions in the energy sector for decarbonisation services, both in pre- and post-combustion.

GE WISHES TO MAKE THREE MAIN RECOMMENDATIONS:

1. **Recognise the strategic need for CCUS in the energy transition for industry & power**
2. **Facilitate the deployment of CCUS through funding and specific business models**
3. **Implement cross-border coordination for CCUS value chains**

1. STRATEGIC NEED FOR CCUS IN THE ENERGY TRANSITION FOR INDUSTRY AND POWER

CCUS, a key technology for the decarbonization of industry and power.

Through its call for evidence and its intention to release a CCUS strategy, the EC acknowledges that carbon capture technologies will play a major role in decarbonising and maintaining the competitiveness of European heavy industry. This is true for hard-to-abate sectors and for the production of "blue" hydrogen. But CCUS is also an available solution for power generation as it can be retrofitted to existing gas plants or applied to new builds. In fact, CCUS for gas power is contemplated by the IEA and the European Scientific Advisory Board on Climate Change scenarios.

Strategic role of power CCUS in the ramp-up of renewable energy.

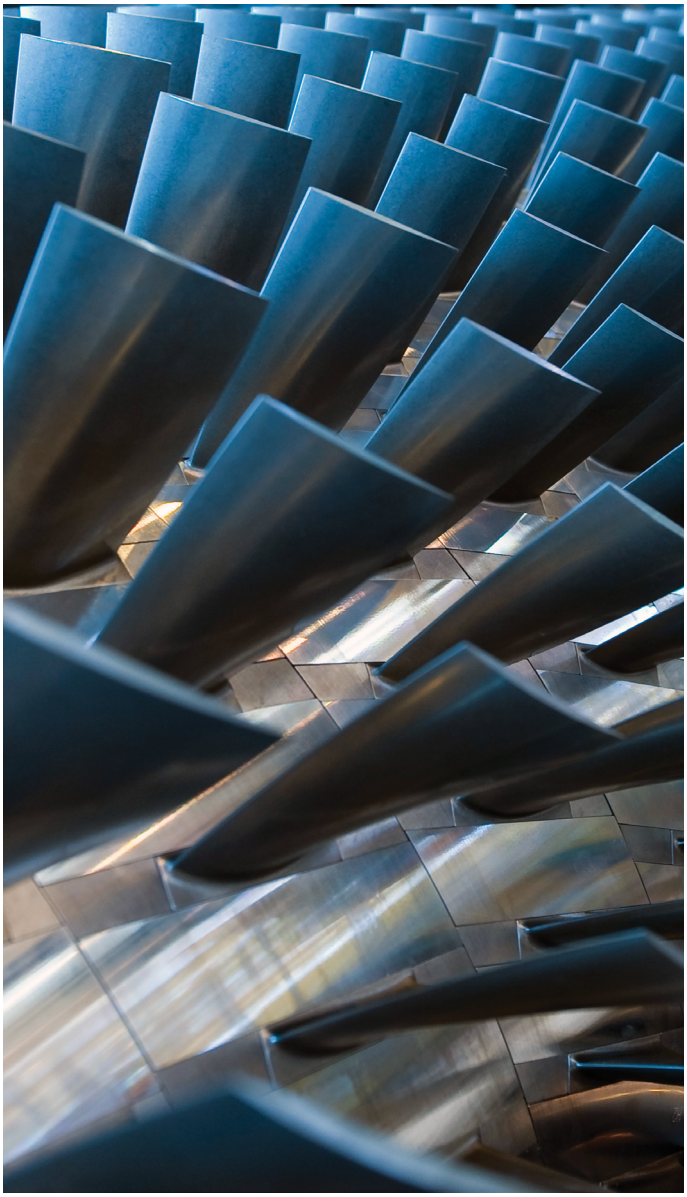
Decarbonised gas-fired power plants have a major role to play in net-zero energy systems, as they provide flexible, dependable, low-carbon energy. They ensure the stability and reliability of the electric grid by supporting the intermittent nature of renewables. As such, they are a complementary technology assisting the scale-up of renewable sources.

Decarbonised gas assets as a key source of energy in the EU.

Through the forthcoming electrification of large sectors of the economy, recalled by the IEA in July 2023 as one of the most important strategies to reduce CO_2 emissions from energy, will increase the need for flexible, dispatchable power. Building new thermal assets is therefore essential. In a recent study, Frontier Economics shows that prolonged periods of high residual load (when variable renewable energy cannot cover demand) will occur all over Europe in 2040 through 2050. Those high residual load supply gaps will require 350 GW coming from power plants which need to be abated, i.e. running on low-carbon fuels or equipped with carbon capture.

Decarbonising gas-fired power stations with CCUS as a complement to hydrogen combustion.

CCUS and hydrogen can both be used in existing and new gas plants. While mid-merit or baseload combined-cycle gas marries well with CCUS, simple-cycle peaking turbines often are also well suited to accommodate operating with hydrogen. This is due to the need to minimise the operating costs of the electricity system taking into account the higher cost of "green" hydrogen as a fuel. In addition, large quantities of hydrogen are needed for all economic sectors and require the construction of dedicated transport and storage (T&S) infrastructures which might not be available to meet all demand before 2050.



Address public opinion.

Citizens and policy-makers regularly express concern about the potential environmental impact of CCUS and the prospect of extending the life and demand for fossil fuels through power CCUS. To destigmatize the use of the technology for all sectors, a European education campaign should be conducted to reassure the public and to deconstruct unfounded myths. Power CCUS is not intended to hinder the deployment of renewable technologies, but to enable an efficient and cost-effective transition towards this objective. It can also preserve jobs in industrial sectors that need to be decarbonised through skills retraining in renewable energy.

2. FACILITATION OF CCUS DEPLOYMENT

Needs of financing for initial deployment of carbon capture.

The Emissions Trading System (ETS) carbon price is not sufficient on its own to make a business model profitable for investors wishing to retrofit existing gas plants or industries with CCUS. Similarly, investment in new plants with a carbon capture system would require subsidies such as carbon contracts for difference (CfDs), as well as specific capacity payment schemes in the case of power assets. This would give confidence to investors. Alternative financing mechanisms to conventional funds could be deployed, such as tax credits as foreseen under the American Inflation Reduction Act (IRA).

Dedicated business models for CCUS in the power sector.

To spread the initial deployment of CCUS in the power sector, some countries have implemented CfD-based models. The United Kingdom adopted the Dispatchable Power Agreement (DPA) which provides a private law contract between the electricity producer and a public-owned limited company (LCCC) setting out the conditions for capturing and storing CO_2. It determines an availability payment to ensure low carbon electricity generation capacity through a contribution to the investment cost, and a variable payment to ensure that the power CCUS plant dispatches ahead of an unabated equivalent plant. The Netherlands also included CCUS for industrial installations and blue hydrogen in its SDE++ programme. This scheme offsets the difference between the CO_2 emissions reduction cost and the generated revenue on the basis of the ETS price

Support for R&D of industrial carbon removals.

Industrial carbon removals, and in particular direct air capture (DAC), are essential to achieving zero emissions. DAC can benefit from the same T&S infrastructure as CCUS but is still at R&D stage and needs support and funding. While CCUS is a near-term solution that can capture up to 95% of the CO_2 emissions generated by the combustion of natural gas, DAC pursues the same CO_2 capture objectives and will achieve negative CO_2 emissions.

Integration of carbon markets.

Carbon dioxide removals (CDRs) are part of the wider issue of carbon markets in Europe. Where the EU ETS imposes rules on the total volume of greenhouse gases (GHG) that can be emitted yearly by high emitting sectors, certification systems for CDRs are as diverse as they are unregulated. They are mostly managed by private sector actors who apply heterogeneous regulatory frameworks. GE supports the EC's vision of integrating the CDR and ETS markets into the same regulatory system as they both cover similar trading products and demand, only differing in terms of suppliers and applicable rules. This would improve the overall carbon market and enable consistent controls on carbon reductions & removals, while preventing market abuse.

3. CROSS-BORDER COORDINATION FOR CCUS VALUE CHAINS

Acceleration of access to storage.

While there is vast potential for CO_2 offshore storage in the North Sea, further development is needed to achieve the conclusive results expected by stakeholders. Onshore sites should also be considered to facilitate CCUS deployment, particularly in Southern and Eastern Europe with no direct access to the North Sea. Ratification of the London Protocol and collaboration amongst the EU's neighbouring countries are also key in overcoming T&S barriers. Moreover, exception to surrendering emission allowances does not apply to EU ETS installations that export CO_2 for storage outside the EEA. Considering the importance of the strategic cooperation with the UK in energy policy and the size of its offshore storage potential, the EU and UK ETS systems should enjoy an equivalent status to allow for the export of CO_2 to British sites.

Deployment of CCUS infrastructure.

Developing infrastructure and short-term transportation options (trains, trucks, ships) should be supported by public funding until a steady carbon market is deployed. Emphasis should be placed on cross-boundary infrastructure to create a well-integrated European network that connects emitters to carbon sinks. Common set of standards and guidelines should be adopted to provide clarity on the responsibility over CO_2 along the supply chain (from capture to storage).

Improved MS coordination on CCUS Strategy.

Given the wide discretion that Member States (MS) hold in drawing up national energy and climate plans, the prioritisation of CCUS varies greatly within the EU - despite the importance that the technology is set to play in the EU's energy transition. While the construction of an efficient carbon infrastructure must take into account the decarbonisation needs of the whole EU, the EC is in a position to encourage MS to adopt a specific national CCUS roadmap with quantifiable targets and budgets for 2050.

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