DECARBONISING EUROPEAN INDUSTRY

ENHANCING COMPETITIVENESS

ENSURING AFFORDABLE ENERGY PRICES

ENTSOG contribution to the
European Clean Industrial Deal:
the role of reliable, secure, abundant and cost-effective clean molecules and their infrastructures

The European Union (EU) is the global leader on climate change. It has set the objective to *achieve strategic energy sovereignty alongside climate neutrality by 2050*, by *phasing out unabated fossil fuels* while *boosting renewable energy production, energy efficiency and carbon capture, utilisation, and storage (CCUS)*.

Decarbonising industry and retaining competitiveness is a major challenge that the EU will need to address through a massive scale-up of renewable and low-carbon capacity to reduce energy prices and restore EU's industrial competitiveness. This will be a key priority for the new Commission that it will address through a set of initiatives to promote climate policy and competitiveness in a combined manner. These initiatives include a Clean Industrial Deal, an Industrial Decarbonisation Accelerator Act, and a review of State Aid rules. Within this framework, heightened coordinated and integrated planning of energy grids for electricity, natural gas including biomethane, and hydrogen, along with CO_2 networks, will be crucial as it will lead to significant cost savings.

The Budapest Declaration on the New European Competitiveness Deal highlights the importance of harnessing all available instruments to boost the EU's competitiveness. ENTSOG believes that security of supply, technology-neutrality and cost-efficiency are indispensable requirements to decarbonising the European economy without hindering its competitiveness.

This paper summarises ENTSOG's recommendations for EU policymakers in four key areas to develop an integrated, efficient and competitive energy system as a key part of the Clean industrial Deal.

ENTSOG'S RECOMMENDATIONS TO DEVELOP AN INTEGRATED, EFFICIENT AND COMPETITIVE ENERGY SYSTEM

1 MAKE RENEWABLE AND LOW-CARBON MOLECULES ABUNDANT AND AFFORDABLE THROUGH EFFICIENT AND COMPETITIVE INFRASTRUCTURE

The EU economy will need a diverse mix of clean energy sources, including both electricity and molecules like hydrogen and biomethane, to achieve its decarbonisation goals. The EU needs to rethink how to ensure that the infrastructure to carry these molecules to industry will be developed on-time, efficiently, and as cost effectively as possible. Many of these investments in new infrastructure need to be 'anticipatory' in nature, and state guarantees will be required to enable them to take place at the scale and timeline for industry to decarbonise competitively. Leadership by the EU in derisking these investments can make a decisive difference and ensure a fair and equitable transition for all European industry.

2 DELIVER COST-EFFECTIVE FLEXIBILITY AND ENERGY STORAGE SOLUTIONS TO MEET ENERGY SYSTEM'S NEEDS

Flexible, secure and smart infrastructure, with a focus on energy storage, will be essential to deliver competitive energy. The EU needs to ensure that flexibility and energy storage needs are converted into clear and effective business models for renewable and low-carbon molecule infrastructure.

3 REACH NET-ZERO WITH CCUS AND EFFECTIVE CO_2 MARKETS AND INFRASTRUCTURES

CCUS, both for energy intensive industry to decarbonise and later for negative emissions, will be essential for the EU to meet its energy, competitiveness and climate goals. The EU needs a new approach with a new EU-level financing mechanism and a coherent regulatory model to ensure that the necessary CO_2 infrastructure is built over the next 10–15 years to meet industries' needs and EU climate goals. Without this, the infrastructure will not be built in time, and the EU will fail to meet both the climate and industrial objectives of the Clean Industrial Deal.

4 PROVIDE A LEVEL PLAYING FIELD OF SUPPORT FOR ALL CLEAN INVESTMENTS,

with notably technology-neutral support and funding approach and a reform of State aid and other rules to ensure that the EU focuses on the most cost-effective decarbonisation solutions to support the Clean Industrial Deal.

THE FOUR CHALLENGES FOR THE NEW EUROPEAN COMMISSION

1 MAKING RENEWABLE AND LOW-CARBON MOLECULES ABUNDANT AND AFFORDABLE THROUGH EFFICIENT AND COMPETITIVE INFRASTRUCTURE

Renewable and low carbon molecules – notably renewable or low-carbon hydrogen and biomethane – will be needed at scale and on time to meet industry's needs to enhance Europe's competitiveness.

However, the following needs have to be addressed:

- The business case for renewable hydrogen is heavily influenced by the price of additional renewable electricity and its opportunity cost. Currently, renewable hydrogen is frequently more expensive for EU consumers compared to its low-carbon alternative, depending on a number of factors including the geographic location of renewable projects. As highlighted by the President of the EU Commission on 7 November 2024, various renewable hydrogen production projects in the EU totalling a capacity of 2 GW reached their Final Investment Decision (FID). However, the projected development of renewable hydrogen in the EU falls far behind the targets set out by the Commission's Hydrogen Strategy and RePowerEU.

- Low-carbon hydrogen can be produced on demand, addressing the issue of intermittent renewable production, serving as a crucial complement to renewable hydrogen for a cost-efficient transition. However, high production costs compared to fossil-fuel 'grey' hydrogen and low demand add to the complexity of the picture. Further regulatory barriers may reduce the ability to produce cost-effective low-carbon hydrogen.

- Biomethane production is growing rapidly in the EU and can make a major contribution. It is a carbon-neutral solution for all energy usages and enhances industrial decarbonisation. Its domestic production strengthens energy security and resilience by increasing source diversification and reducing reliance on Russian gas. Biomethane can also be scaled up easily since the customers, market setup, and infrastructure are already in place. In a future green gas system, driven in part by the integration of larger volumes of biomethane, production and consumption will need to extend beyond local connections. It will be necessary to transport biomethane via the transmission level and across some borders. This remains a cost-effective path to decarbonizing the gas system, requiring minimal investment in new infrastructure. However, its potential cannot be fully unlocked today as network tariff discounts for renewable and low-carbon gases add to the complexity of the system at the implementation stage; they trigger cost-reflectivity issues; and they require a difficult bargaining via an Inter-TSO Compensation mechanism between TSOs and NRAs when their impact on TSO revenues becomes significant.

ENTSOG RECOMMENDS THE FOLLOWING:

- Explicitly require technology-neutral carbon contracts for difference (TN CCfD) to support both renewable and low-carbon hydrogen production and consumption in the new State Aid framework, especially for energy intensive industries.

- Design technology-neutral GHG abatement solutions based on TN CCfDs for projects with the best GHG performance levels for any granted support. Provide for necessary regulatory (EU Emissions Trading System [ETS] Review) and financial (Innovation Fund) tools to guarantee investment scale up and volumes for biomethane and other renewable gases.

- Include hydrogen as a source of flexibility and storage in the strategic planning of the Clean Energy Investment Strategy and in the initiative to boost the roll-out of renewable energy and energy storage.
- Develop an updated framework to enable flexibility and long-term energy storage solutions to address current curtailment and intermittency issues on the electricity side, with inclusion of electrolysis in grids planning. Prioritise hydrogen storage as a source of flexibility for renewable energy projects.
- Consider when appropriate a simpler and more stable framework for renewable hydrogen production and reconsider RED III implementation, amending timelines for additionality, building trustworthy Union Data Base and certification schemes, and ensuring coherent RFNBOs and industrial targets implementation.
- Evaluate the need for hybrid infrastructure, both offshore and onshore, for the combined production of renewable electricity and hydrogen and to alleviate potential electricity grid capacity constraints. Follow-up on these needs by constructing suitable hydrogen infrastructure (terminals, import pipelines, etc.) while taking advantage of the option to repurpose existing infrastructure.
- In addition to promoting the domestic production of hydrogen, support the development and implementation of large-scale hydrogen production projects in third countries, by using the international pillar of the EU Hydrogen Bank and the hydrogen global initiative.
- In the forthcoming delegated act on low-carbon fuels, provide a balanced and pro-competitive environment for investments by providing legal stability for investors (grandfathering clause), default values for each stage of the project life cycle, and imposing the same requirements for the domestic and imported low-carbon fuels.
- Review gas quality standards to enable biomethane to flow freely across borders and allow TSOs in high biomethane systems to fully cover future costs.

2 DELIVERING COST-EFFECTIVE FLEXIBILITY AND ENERGY STORAGE SOLUTIONS TO MEET ENERGY SYSTEM'S NEEDS

The rapid growth of electricity generation from intermittent renewable energy sources like wind and solar, driven by EU policies and national subsidies, has introduced new challenges to the stability of the energy system, with rapidly growing curtailments, projects cannibalisation, and negative prices.

Therefore, the EU has three structural systemic needs in its future decarbonised energy system, that cannot be met by the electricity system alone: high-temperature industrial processes, long-term energy storage, and flexibility for balancing intermittent renewable generation, including flexibility in day-ahead spot markets to foster price convergence and reduce congestion. The EU will therefore need molecules grids, as a partner to increased electrification.

Within this framework, repurposing natural gas grids is a cost-effective, time saving, safe step towards a sustainable energy future, as hydrogen and related infrastructure can compensate for parts of the volatility in the electricity system by providing storage and flexibility options.

While EU Energy Ministers emphasize the importance of integrated planning across all energy carriers to ensure cost-efficiency and a fair transition, the EU Strategy for Energy System Integration (ESI) prioritizes electrification. This one-sided Strategy limits the use of molecular energy sources for hard-to-abate industries and long-haul transport, presenting financial viability challenges for the overall energy system. The assumption that electricity is always less expensive in production and end-use overlooks significant investment requirements and the broader system perspective.

Forthcoming EU policy initiatives should therefore focus on enhancing system flexibility while promoting cost-efficiency, technology-neutrality, and security of energy supply using an objective and evidence-based approach. These principles should guide the Clean Industrial Deal and the Clean Energy Investment Strategy. All measures at both the EU and Member State levels should be assessed against these four key criteria – enhancing system flexibility while promoting cost-efficiency, technology-neutrality, and security of energy supply.

CONSEQUENTLY, ENTSOG RECOMMENDS THE FOLLOWING:

- Review the existing pillars of the EU Strategy on Energy System Integration and the related hierarchy for cost-effective decarbonisation to fully align the Energy System Integration with the competitiveness objectives of the Clean Industrial Deal.
- Enshrine in the legislative framework the remuneration schemes for flexibility and energy storage in the electricity sector.
- Ensure a level playing field for all renewable and low-carbon energy carriers in the forthcoming review of the State Aid framework, considering the needs for flexibility and cost-efficiency. In the context of the Clean Industrial Deal, the EU should ensure that State aid goes to the most cost-effective decarbonisation solution.
- Make sure that the announced Electrification Action Plan takes full advantage of energy molecules to enhance flexibility and security of supply. It should recognise the flexibility offered by electrolysers and by hydrogen infrastructure, including hydrogen storage.
- Make sure that the Clean Energy Investment Strategy includes not only new hydrogen and CO_2 networks, but also a clear path and all necessary tools to enhance the repurposing of existing energy infrastructure to lower costs.
- Make sure that the Strategy for a modernised Single Energy Market, to be adopted at EU level by June 2025, is consistent with the Clean Energy Investment Strategy, with technology-neutrality and with the need to enhance the repurposing of existing energy infrastructure.
- Make sure that the Clean Industrial Deal prioritises the hydrogen infrastructure needed to connect large-scale hydrogen projects with demand and build on the cross-sectoral cooperation and flexibility that hydrogen can provide to the electricity sector.

3 REACHING NET-ZERO WITH CCUS AND EFFECTIVE CO_2 MARKETS AND INFRASTRUCTURES

Without a cost-effective, timely and fit-for purpose CO_2 grid, and a competitive and technology-neutral energy framework that includes the use of capture, transport, storage and utilisation of carbon dioxide, the EU has no chance of meeting its decarbonisation and Clean Industrial Deal objectives.

CCUS will be vital for high-heat energy intensive industry, low-carbon hydrogen, balancing the electricity market, and, in due course, delivering negative GHG emissions. Recognising this, the European Commission estimates that around 450 million tonnes of CO_2 will need to be mitigated annually by 2050, and the Net-Zero Industry Act Regulation (NZIA) sets an annual storage injection capacity target of 50 million tonnes of CO_2 by 2030.

Between 2030 and 2035, much of the EU's energy intensive industry that will need CCS to decarbonise, such as the steel, iron, and cement sectors, will be fully exposed to the effects of the ETS as the Carbon Border Adjustment Mechanism (CBAM) enters into full force. If by that date no 'fit for purpose' CO_2 grid is in place, this industry will have to pay the full cost of ETS allowances – that is expected to be significantly higher in the mid-2030s than today – but they will have no technical or economic way in which to actually decarbonise. They will therefore continue to emit and pay the carbon cost rather than decarbonising, contrary to both the EU's climate and industrial objectives.

However, there is today no viable business case for CCUS without public support. EU ETS prices are too low to enable EU energy intensive industry to invest in capture facilities, and therefore infrastructure providers to invest in CO_2 networks.

Without support in the short term to de-risk investments in CCS for industry, the CO_2 grids and capture facilities, these essential infrastructures needed to decarbonise will not be in place by when industry needs them – building even a very limited CO_2 capture facility, grid and storage takes ten years or more. Decisive action by the next Commission to derisk and catalyse CCUS investment at scale is therefore necessary if the EU is to meet its medium term GHG objectives and the aims of a Clean Industrial Deal.

In addition, there is no clear EU regulatory framework for CO_2 transport, hindering the development of cross-border CO_2 infrastructure. Existing legislative mechanisms provide frameworks that mainly address CO_2 storage but not CO_2 transport infrastructure. The level of regulation required at the EU level to ensure the efficient and competitive operation of the future CO_2 grid and storage value chain will depend on market size and development, evolving as the network develops.

ENTSOG THEREFORE RECOMMENDS THE FOLLOWING:

- Build a de-risking programme for Carbon Capture and Utilization (CCU) and Carbon Capture and Storage (CCS) markets based on the Industrial Carbon Management Forum (ICM) work on full storage/usage value chain rules, which would need to include:
  - granting CCU and CCS technologies a special status under the NZIA as a net-zero technology manufacturing, and
  - creating a level playing field for all solutions needed to deploy industrial decarbonisation, including carbon capture, transportation, storage, and usage in the forthcoming review of the State Aid framework.
- The Commission should take leadership by establishing a new fund/mechanism – a Carbon Bank – based on the existing Hydrogen Bank model, providing technology-neutral Carbon Contracts for Difference as a part of the EU ETS reform, especially for energy intensive industries, alongside a combination of Commission grants and State guarantees for anticipatory investments in CO_2 grids.
- The forthcoming Competitiveness Fund should be a major contributor to this priority. Given that state grants and guarantees rely on the financial strength of each Member State, not all the Member States will be able to offer those guarantees. The instrument should be based on a smart combination of EU funding and EIB tools, which do not depend on the State's willingness or ability to provide guarantees and help develop infrastructure projects. Such a Commission initiative would act as a catalyst and model for Member State funding, which can be supported through the rapid development of a CCUS Important Project of Common European Interest (IPCEI).

- Ensure a grid regulatory framework that will foster investment by designing a catalogue of services for planning, interoperability, standards and grids operations adapted to a nascent CO_2 market and grid, thus creating a minimum set of principles and flexibility in the regulatory approach, recognising that CCUS is not currently at a mature stage.
- Catalyse ratification of the amendment to Art. 6 of the London Protocol and the conclusion of bilateral agreements by the Member States, which will be needed to enable cross-border CO_2 transport, storage, and usage.
- Establish for the CCU value chain a CO_2 certification scheme.
- Ensure under the TEN-E Regulation that the methodology for the assessment of CO_2 projects is aligned with the CBA methodologies for both natural gas and hydrogen.
- Implement licensing and fast-tracking of investments for CCS and solve permitting challenges.

4 PROVIDING A LEVEL PLAYING FIELD OF SUPPORT FOR ALL CLEAN INVESTMENTS

The need for risk-sharing mechanisms to enable industrial investment in the early-stage of the clean hydrogen and CO_2 markets is widely acknowledged and goes beyond CCUS mentioned above.

Although the European Commission and various Member States have established certain 'pilot' mechanisms to grant subsidies and to de-risk projects and facilitate investment decisions, these schemes are not yet sufficient to attract the significant funding needed.

In addition, Biomethane Purchase Agreements can help de-risk investments in biomethane projects by guaranteeing a market for the produced biomethane, thus facilitating the financing and development of new production capacities. This support is crucial for scaling up biomethane production to meet the EU's ambitious targets for renewable energy and reducing greenhouse gas emissions.

ENTSOG RECOMMENDS THE FOLLOWING:

- Make sure that the energy dimension of the Clean Industrial Deal prioritises technology-neutrality, system flexibility, cost-efficiency and security of energy supply as overarching principles to put Europe's economy back on track and level the playing field with international competitors.
- Establish under the EU ETS System the Technology-neutral Carbon Contract for Difference mechanism – a type of 'Carbon Bank' combined with guarantees for anticipatory network investments.
- Ensure that the European Competitiveness Fund, which is supposed to target innovation and technologies, is applicable to clean energy infrastructure, including new and repurposed hydrogen pipelines.
- Fast-track a CCUS IPCEI, inter alia so that relevant EU and national funding programmes maximise their potential to fund CO_2 and hydrogen infrastructure projects

- Make explicit provision for the combination of grants and State guarantees for anticipatory investments in hydrogen and CO_2 grids in the new State Aid framework in a cost-efficient manner, without discriminating between existing, repurposed and new pipelines.
- Expand on the best experiences of the IPCEI framework and mobilise more funds towards networks at EU and national levels both for CO_2 and hydrogen networks.
- Scale up the use of Biomethane Purchase Agreements (BPAs).
- Promote and innovate public-private partnerships.

ABBREVIATIONS

BPAs	Biomethane Purchase Agreements
CBAM	Carbon Border Adjustment Mechanism
CCU	Carbon Capture and Utilization
CCS	Carbon Capture and Storage
CCUS	Carbon Capture, Utilization, and Storage
ESI	Energy System Integration
ETS	EU Emissions Trading System
EU	European Union
FID	Final Investment Decision
ICM	Industrial Carbon Management Forum
IPCEI	Important Project of Common European Interest
NRAs	National Regulatory Authorities
NZIA	Net-Zero Industry Act Regulation
TN CCfD	Technology-neutral Carbon Contracts for Difference
TSO	Transmission System Operator

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