CONSEIL DE COOPERATION ECONOMIQUE

UNDER THE PERMANENT PATRONAGE OF THE FRENCH ITALIAN PORTUGUESE AND SPANISH GOVERNMENTS

DISCUSSION PAPER[1]
ENERGY SYSTEM INTEGRATION

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1. A truly integrated energy system to enable a climate neutral future

The decarbonization scenarios, and the evolution in technologies and costs, bring opportunities and challenges that the EU will need to address in the context of the European Green Deal and in order to implement the Paris Agreement. Most importantly, **a stable, transparent, market-based and neutral long-term framework for different technologies is needed to drive investments into clean energy solutions that support and accelerate the energy transition**. This will be especially important also in the context of the EU Recovery Plan and the post-COVID-19 recovery phase.

To **reach the EU's ambitious climate & energy targets in 2030 and carbon-neutrality in 2050 at the lowest overall costs while ensuring security of supply of clean energy at an affordable cost for all consumers** (households, industries, etc.), a new energy paradigm at the core of the EU's energy policy is needed: Energy System Integration, bringing together, among other, electricity and gases across sectors, as well as Demand-Side Response, innovative and conventional storage solutions, etc. both within and beyond the energy sector:

- to boost energy efficiency
- to integrate renewable energies efficiently and effectively
- to support the development of the circular economy
- to pave the way for environmentally more sustainable agriculture, mobility and heating
- to sustain the development of a European industrial leadership in green technologies
- to develop a new energy paradigm able to be adopted world-wide

[1] This discussion paper has been drafted by the CCE based on the contributions of a panel of experts from large European companies in the energy system, including the electricity and gas sector, as well as selected end-consumers. The document is structured around the key questions Klaus-Dieter Borchardt, DDG ENER, requested the CCE High-Level Group (meeting on 11 February in Paris) to focus on: 1. A new "narrative" for the gas sector in the context of the energy transition; 2. Technologies and solutions; 3. Regulatory barriers and recommendation on how to overcome them. This paper aims to present a balanced and holistic perspective, focusing (particularly in chapter 2), in line with the request, on the efforts needed to accelerate the transformation of the gas sector. The content of this paper remains of the sole responsibility of the CCE.

- to optimize the use of existing energy infrastructures for the sake of cost-efficiency while avoiding stranded costs and assets.

The final objective goes beyond the energy sector and implies the smart sector integration to drive cost-efficiency and carbon neutrality across the economy, where renewable and decarbonized energy, be it electrons or molecules (in gaseous or liquid form) will flow freely between sectors (industry, transport, agriculture, buildings, etc.) reducing GHG emissions, allowing for greater flexibility and contributing to a sustainable, circular economy.

According to all scenarios, **climate neutrality will be achieved to a large extend through renewable energy production, with a growing share of renewable electricity and electric consumption, where applicable, and with renewable and decarbonized gases[2] (including hydrogen) and their uses at its core.** Nevertheless, while **the EU should pursue to progressively reducing Europe's fossil fuel dependency**, natural gas will continue having a relevant role for at least a decade until it is progressively replaced by renewable and decarbonised gases. During this period, natural gas will continue replacing more polluting fuels and providing flexibility and security of supply to the EU at affordable and competitive prices. In the longer-term, natural gas may have a role in the energy mix provided its emissions are abated through CCUS or compensated through other means.

Energy system integration should be based on a holistic, technology-neutral approach, that ensures that EU climate goals are achieved, for commercially mature technologies in which several tools, including energy efficiency, increased renewable electricity production, direct electrification where applicable, development and deployment of renewable and decarbonised gases, carbon capture and storage solutions, fuel to gas switch and hybridization of final demand, where appropriate, will be associated and the different solutions can compete among each other in order to optimise the overall system, as soon as they reach commercial maturity. **The aim of the Energy System Integration is not to "promote" specific commercially mature technology options, but to "enable" all of them in order to let the market and the consumers choose,** fostering the scale-up process of less mature technologies that are essential to achieve EU climate goals, like renewable hydrogen and energy storage solutions**.** Additionally, this approach should ensure a level playing field and should secure that all sectors have the opportunity to contribute to the transition to a low carbon economy. **Relying on energy efficiency and multiple energy carriers and innovative solutions, including renewable electricity as well as renewable and decarbonized gases, is therefore the most resilient and cost-effective pathway to carbon-neutrality.**

Further, system integration, and the energy transition more widely, must be structured from the bottom-up through optimised energy systems of different sizes. From prosumers through to energy communities and commercial optimisations to integrated electricity/gas/heat distribution systems and decentralized renewable gas and fertilizers production, such energy systems enable easier

[2] The term "renewable and decarbonized gases" used in this text is not exhaustive and it does not refer only to renewable and 100% decarbonized gases. In the transition, a blend of natural gas and gases with different level of decarbonization may be also necessary, at least in the initial phase, to help to develop new markets and build up volumes. We do not propose here any concrete definitions or classification for the new gases, this will of course be essential. CCE takes note of the terminology proposal presented by the New Gases Network at the Madrid Forum in 2019 which could be a good starting point for discussion (link)

management of the increasing complexity and encourage acceptance through direct customer participation.

System Integration should equally contribute to sustain the EU's three energy policy pillars – affordability, sustainability and security of supply – benefitting energy consumers and ensuring that system costs remain adequate. All these dimensions, including jobs and growth in the energy sector and the wider ecosystems of energy-using products and industries, are of particular importance since the EU is about to design a Recovery Plan, for Europe to emerge even more resilient and sustainable from the COVID-19 crisis.

Energy System Integration therefore should

- **Use both gas and electricity systems in the most efficient way**, reducing the cost of the energy transition for the consumers by optimising and using the advantages of each system, while being in line with climate objectives
- **Enable the large-scale deployment and integration of the growing amount of variable renewable electricity** (mainly solar and wind)
- **Enable the large-scale deployment and integration of other forms of renewable energy**, in particular renewable gases and carbon negative solutions, as well as decarbonized gases
- **Allow end-users to select the appropriate system-cost-efficient solutions** that best suits their specific needs (electricity, gas, heat, or hybrid)
- **Exploit intermediate energy carriers** when available and/or when renewable production cannot directly answer demand characteristics (e.g. high-temperature industrial processes using hydrogen of synthetic methane produced from renewable electricity)
- **Enable the creation of new links between energy carriers and the respective transport/transmission and distribution infrastructure**, as (renewable) electricity can be used in electrolysers (e.g. Power-to-Gas) to produce hydrogen (electrolysis) and synthetic methane (methanation), which will contribute to decarbonise end-uses and can also be stored on a large scale and over longer periods, allowing seasonal energy flexibility/storage. Similarly, biogas production (which cannot be consumed locally) can be converted into electricity (G2P) and injected into the electricity network for immediate consumption elsewhere or stored in e.g. batteries or hydro pumped storage.
- **Ensure an appropriate regulatory framework for the use and the value-exploitation of existing gas assets as well as any other assets that can support system integration**.
  - This includes the use of T&D gas assets and infrastructures to blend hydrogen and synthetic methane with natural gas, converting it where appropriate to the transport of pure hydrogen and facilitating the production of biomethane and its injection into the gas grids. Blending allows for building up hydrogen volumes in a cost-effective manner until reaching certain concentration levels in the gas grid, moving towards hydrogen-dedicated pipelines.
  - The **framework for electricity** should allow electricity assets and infrastructures to be valued and used in this context, namely the role of dedicated RES to renewable hydrogen production.
- Ensure that gas systems, including natural gas and gas blends with renewable, decarbonised and low-carbon gases, remain interoperable, avoiding market fragmentation and **ensuring a fully integrated European gas market.**

- **Make sure that the allocation of the costs not related to the energy production and supply** (e.g. costs due to social policies) **does not distort the level playing field between the different energy carriers** and avoiding any cross-subsidization.
- Similarly, **all energy carriers or end-uses should bear the corresponding cost of their GHG emissions**, based on a life-cycle approach in order not to distort the level-playing field between different energy carriers. For carbon leakage sectors, alternative solutions should of course be considered, such as the Carbon Border Tax / Adjustment announced in the European Green Deal.

Under a new European framework for energy system integration, gas and electricity will continue to compete in a way that benefits the economy, consumers in line with the EU's climate objectives. However, they will also need to better cooperate and complement each other. For this to happen, several building blocks are needed to ensure a secure, resilient and cost-efficient decarbonisation process of the energy system: R&D&I, including demonstration projects and support to commercial deployment, a coordinated operation and infrastructure planning, and a clear commitment sustaining the development of renewable and decarbonised gases to create a level playing field for all technologies and solutions, as well as a sound and coherent regulatory framework in line with the EU's climate objectives will be needed.

2. Technologies and solutions

Available and mature technologies today to enable immediately energy system integration, are, for example, **CCGTs** and both **natural gas** and **LNG storage,** as well as **hydro pumped storage** or **DSR from industrial consumers**.

Gas-fired combined cycle power plants have been the first link between the gas and the electricity sectors, providing substantial amounts of energy to the system. By replacing coal fire power plants, CCGT will allow for short-term CO2 reductions while ensuring the system adequacy. In addition, CCGT also provides the necessary flexibility to cope with the increased intermittency that further renewables penetration is causing. CCGTs can remain an important part of the energy system in the long-term, thanks to their capability of being fuelled with renewable and decarbonized gas, or being abated with carbon-negative solutions including CCUS, next to energy storage solutions and flexible production of P2G products such as renewable hydrogen or synthetic methane.

Gas storage and LNG storage are also an important example of already existing infrastructures that can bring immediate flexibility to the electricity sector and, at the same time, avoiding unnecessary investments in electricity networks, specially to cope with peak energy demand on one hand and renewables intermittency on the other.

These existing mature technologies face major challenges to ensure their economic viability notwithstanding their contribution to the energy transition. For instance, CCGTs will contribute to the integration of intermittent renewables and should be used among others as backup for renewables in the mid- to long-term. However, the recently revised electricity market design does not provide the long-term visibility needed to trigger investments in flexibility and back-up nor the level of operational margins to allow the recovery of fixed and investment costs for assets providing these services. Thus, and in order to guarantee their important role in the context of the energy transition, **an adapted market design should be put in place encompassing CRM (open to flexible generation, storage and DSR) in order to ensure the right economics. This will ensure that such solutions remain operational**

or are added to the system according to its needs, can use renewable and decarbonized gases and contribute to the success of the energy transition. The same applies to existing gas storage infrastructures.

The adequate **remuneration of flexibility and of key assets/solutions for a fully integrated system** will need to be ensured, including adequate tariff design and future-proof regulatory framework for different energy sectors. This is one of the main "lessons learned" so far that needs to be considered if the EU wants to succeed in the energy system integration.

Biomethane production through anaerobic digestion is a relatively mature technology in some Member States, including Denmark, France or Italy (in France, for example, there are currently 139 biomethane plants injecting on the grid including 15 on the transmission grid, to be compared to 76 plants end of 2018; biomethane projects awaiting to be connected represent more than 20 TWh). Biomethane is actively contributing to sector integration, by creating virtuous synergies between the energy and agriculture sector. In France, for example, biomethane is produced respecting sustainability rules, and is essentially produced from wastes. Additionally, biomethane production can bring numerous positive externalities and also contribute to the circular economy: it supports the deployment of bio agriculture, produces a substitute to chemical fertilizers, creates local jobs and enhance Europe's energy independence. Biomethane can be used as substitute of natural gas in all its uses and can be easily injected into the gas grid.

Biomethane is also a key technology to decarbonise the transport sector. For instance, in the case of long-haul trucks, railway and maritime transport, these sectors are indeed facing specific challenges: they need a high-volume density fuel, they currently rely on gasoil or on heavy fuel oil, and for the time being, the only available alternative fuel is LNG. The shift from heavy fuel oil to LNG is a first step in terms of substantial CO_2 reductions (and air quality improvement) that should be kickstarted and supported now in order to avoid continued investments in unabated fuel oil for years to come. This is all the more important as an LNG fuelled fleet is future-proof: with dual fuel engine and vast cryogenic tanks, shifting now to LNG will also help to accommodate the vast majority of renewable and decarbonized fuels. In particular, Liquefied Biomethane (LBM) and Liquefied Synthetic Methane (LSM) can be immediately deployed without modification thanks to the existing LNG infrastructure. In a medium- and long-term horizon, blue and green hydrogen, respectively, or other hydrogen-based energy carriers could complement biomethane.

The biomethane competitiveness is gradually increasing, but the missing valorisation of positive externalities related to its production, such as the positive impact in particular also on rural areas, is hampering its large-scale development potential in the short term.[3]

A flagship solution is the production of renewable or green hydrogen using either renewable electricity from the power grid or from dedicated renewable assets, which is considered the most advanced and available **Power-to-Gas** technology. Green hydrogen is also considered the most viable solution to ensure the decarbonisation of different sectors like heavy-duty transport, maritime transport as well as for greening the hydrogen produced in the industrial sector, for example. Hydrogen-based solutions, including fuel cells, should be further explored to decarbonize mobility. Alongside, the electrification of light-duty vehicles (but not only) should also continue to be pursued through electric batteries.

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[3] For LSM, progresses are expected on the methanation part, and availability of new sources could also greatly improve the competitiveness of the solution. For instance, reusing the CO2 generated during the processing of the biogas into biomethane could be an extremely virtuous option.

The existing gas infrastructure has an important role to play with regards to hydrogen, as it offers several options that may co-exist, depending on time and location: the blending of hydrogen in the gas network up to a given share, the actual repurposing of parts of the gas network to pure hydrogen, and the methanation of hydrogen prior to its injection in the gas grid.[4] **Blending responds to different interests**: it allows to kick-start the decarbonation of users connected to the gas grid; it supports the integration of renewable electricity in cases where it faces a congestion on the electricity grid (power-to-gas); it also contributes to the development of the hydrogen market by offering to hydrogen producers an option to produce hydrogen in a way that is de-correlated from any specific and local use, as the producers will be able to inject into the gas grid whatever production is beyond this specific and local use. **Converting parts of the gas grid to pure hydrogen** is also an economically viable option to connect hydrogen producers and users.

Other renewable and decarbonized gases exist and are in early phases of development, requiring industrial scale demonstrators such as: thermal gasification of wastes (which produces both hydrogen and synthetic methane), methanation of hydrogen to synthetic methane, etc. Support schemes may be necessary to help them develop and reach utility scale and maturity.

In addition to gaseous fuels and infrastructures that provide cost efficiently large volumes of flexibility, it is important to consider that there are other flexibility options, such stationary batteries, hydro pumped storage, demand side response (including from EVs), interconnections or other innovative technologies, such as CAES, LAES or PHES. Similar to the case of renewable and decarbonized gases, **some of these technologies are still in early phases of development or are subject to well-known market failures**, so apart from the creation of the correct market signals for both short and long-term flexibility, support schemes may also be necessary to help these technologies to develop.

Regarding the **heating sector** (a key energy usage case), gas and electricity provide both highly efficient solutions for heating with high performance condensing boilers and heat pumps, which are well known. The technologies used amongst EU Member States varies considerably due to historical reasons, climate and infrastructure availability, which means that the transition to a decarbonized heating sector will heavily depend on the starting point of each Member State. In areas that have a widespread gas network available (including district heating facilities), the repurpose of that infrastructure to accommodate renewable and decarbonized gases or the use of centralized heat pumps would allow a more predictable and cost-effective transition for the end-consumer. In other cases, in regions with higher average temperatures the combination of a scattered network and lower utilisation levels will likely mean that electrification or hybrid heating solutions are more cost competitive and that the role the existing gas infrastructure will change, focusing more on high heat demand consumers, peak heat needs, for which it will also be necessary to provide renewable and decarbonized gases.

In this context, **hybrid heat pumps** are a solution to combine maximal efficiency during all the year and especially during the winter while at peak they rely on flexible gas networks, thus bringing major flexibility to the power grid. Hybrid heat pumps can probably be a massive system integration tool for demand response in terms of capacity (GW). One of the reasons why hybrid heat pumps have not yet been largely deployed is instructive on the difficulties of System Integration: as hybrid heat pumps are using both electricity and gas, none of the two sectors have been too keen to promote them, each

[4] A number of TSOs are working on this topic (in France for example the network operators published a joint report on the technical and economic conditions for injection of hydrogen in the gas grid). Regarding blending, gas operators (in France in particular) have received several requests of hydrogen producers willing to inject.

sector focusing on its own technology (gas boiler vs. heat pump). In some cases, end-users lack appropriate signals that incentivize them to choose the less costly solution for the system.[5]

Energy labelling and building regulations have a decisive impact on the choice of the heating appliances. By choosing primary energy factor and CO2 content that may not reflect correctly whole system costs for a given usage of different energies, they can mask the interest of the most effective solution for the final customer, or for the real estate developer, that is often the real prescriber.

3. Recommendations for a policy framework for energy system integration

The **main barriers to the development of new solutions for system integration are their current cost-competitiveness (commercial maturity not yet reached)**, the **lack of a clear commitment in favour of the large-scale development of renewable and decarbonized gases, the lack of level playing field between energy carriers and the missing valorisation of positive externalities. These factors negatively impact** the availability of funds to finance R&D, pilot projects and evolution to large scale solutions as well as support schemes.

Moreover, **the development of new solutions is hindered by the absence of a clear regulatory framework and incentives to support and remunerate system integration**. This could include, for example, rules allowing grid operators to handle different gases (methane, hydrogen, CO2) and incentives to the gas and electricity grid operators in order to adapt their infrastructures for the smart integration of renewable energy and to cope with the coexistence of different gases and also incentives to developers/promoters of said initiatives and reform of State Aid guidelines.

Thus, **an EU framework to support energy sector integration, establishing a common set of rules for all Member States, is needed**. This is of particular importance since the EU has to urgently design and implement a Recovery Plan post COVID-19 crisis. The plan should be open to a plurality of technologies and solutions, making sure that the most efficient and affordable solutions are adopted, focusing on:

- European future-proof technologies that contributes to decarbonization and is quickly deployable on the market
- European research and stimulus for not yet mature technologies

In addition, those efforts would **allow the EU to become a global leader on industrial and technology strategic value chains**.

We recommend the Commission to consider the following elements as essential building blocks to **establish a clear and stable regulatory framework** that promotes the necessary investments, needed to ensure the energy system integration to accelerate the transition:

- As a prerequisite, **make sure that the allocation of the costs not related to the energy production and supply** (e.g. costs due to social policies) **does not distort the level playing field between the different energy carriers** and avoiding any cross-subsidization**, as well as an appropriate**

[5] Hybrid heat pump development allows to reduce electricity system costs, including transport and distribution costs, by decreasing the power demand during cold snaps in winters, which are the dimensioning events for the electricity networks. If end-users electricity grid tariffs are not adapted, consuming a lot of power during these relatively short periods may not represent a significant cost for the end-user, at least for network tariffs: keeping a low efficiency but low-cost auxiliary electric heater for these extreme periods could be the economic optimum for the end-user.

internalization of externalities (through robust and sustained CO_2 price signals across sectors, including non-ETS sectors, through properly allocating cost and benefits, etc.).

- P**romote all efficient renewable energy carriers, basing future CO2 emission standards also on a life cycle assessment methodology**, for example in the transport sector not on "tail-pipe emissions." Similarly, **all energy carriers or end-uses should bear the corresponding cost of their GHG emissions**, based on a life-cycle approach in order not to distort the level-playing field between different energy carriers.

- **Revise the gas and electricity tariffs** to ensure that there is no duplication of costs, that existing and future flexibility costs are visible and properly reflected in the final prices to allow an economic case for flexibility solutions like hybrid heating and that energy system integration is not penalized and turned inefficient; a **level playing field for different facilities across the energy system**, regarding market access, network tariffs, etc. is needed; in particular tariffs and market rules should be reviewed to avoid undue obstacles to the development of Power-to-Gas, for example.

- The **renovation wave** promised in the European Green Deal should be used to **promote the replacement of old and inefficient boilers** with highly-efficient systems, such as (hybrid) heat pumps and condensing gas boilers that will increasingly be operated using renewable and decarbonized gases. It should **also promote connection to district heating and cooling networks** where available as well as their modernization.

- **Revise energy taxation** to ensure that there is no duplication of taxes on energy stored/converted and that energy system integration is not penalized and turned inefficient; a **level playing field for different facilities across the energy sector** is needed to avoid undue obstacles to the development of Power-to-Gas. Energy Taxation shall not originate any cross-subsidies between energy carriers, should increase the transparency in the benefit of final customers, and favour energy efficiency and economically-sustainable decarbonisation.

- **Commit to a strategic vision regarding gaseous energy carriers and sustainable use of gas infrastructure**. This vision should encompass both the role of natural gas as a cost-effective decarbonization option available in the short to medium term (replacing more carbon-intensive and polluting fuels such as coal and oil that are being phased-out), and the increasing use over time of renewable and decarbonized gases (including bio- and e-methane as well as hydrogen) and the role of the existing gas infrastructure in integrating, transporting and storing renewable and decarbonized gases, coexisting also in some regions, where feasible, with the use of abated natural gas via CCUS technologies. While energy independence should primarily be fostered and local production maximized, the Commission could also consider **a common approach to imports from partners and neighbouring countries of such gases**, in particular for green hydrogen.

- **Consider the most effective options for setting targets for the development of renewable energy, including renewable electricity and renewable and decarbonized gases and support schemes** to develop and deploy these gases, at the least costs for consumers and the system, considering "lessons learned" from targets and support schemes to develop and deploy renewable electricity in the past. This should lead to set up the right incentives for developers/promoters of renewable energy including gas infrastructure operators.

- **Ensuring remuneration of firm capacity, flexibility and other services to the system** – CCGTs for instance, will need an appropriate market design **encompassing CRM (open to generation,**

storage and DSR) able to ensure their economic viability and allowing them to contribute to the integration of intermittent renewables (flexibility and backup) in the short term and before other viable solutions to provide flexibility and other services to the system become fully available. Moreover, provisions in the Clean Energy Package to create (local) markets for congestion management should be swiftly implemented, ensuring that system operators properly indicate their flexibility needs and that market players are able to devise the right products to answer those needs.

- **Promote the development of a robust and coordinated investment process between the gas and electricity** network operators, possibly including a **coordinated or joint TYNDP, with fully transparent and open stakeholder participation,** in particular on peak power demand, geographical location of power generation and efficiency for different uses. This process should identify in the assessment the investments required to transport and store energy across the EU energy system in the most efficient way, including energy transition projects, optimising investments in both sectors, and aiming for the lowest societal cost. The **distribution level** shall also be better integrated into the assessment and modelling, and TEN-E categories should be extended in order to ensure that efficient projects supporting the integration of renewable and decarbonised gases, hydrogen infrastructure (in particular resulting from the conversion of the gas infrastructure) and CO_2 transportation projects are covered (PCIs). Moreover, the regulatory framework for operators that invest in retrofitting their networks for increased hydrogen content should recognize the respective costs.

- **Ensuring the right to be connected for installations for new gases** (e.g. P2G) to the gas network on an easy and agile manner, ensuring that these installations' capacities are open to third parties (TPA) and operating under a well-designed Guarantees of Origin (GOs) scheme.

- **Ensure coordination in terms of operational rules between distribution and transmission system operators.** High level principles should be established at the DSO level with increasing development of renewable and decarbonized gases being injected and moving between the two network systems (from TSOs to DSOs and from DSOs to TSOs). This could indeed be a subject matter for an autonomous gas DSO entity (as requested by the Clean Energy Package for electricity DSOs, "E-DSO") that works in conjunction with ENTSO-G, ENTSO-E and E-DSO, on an equal footing and with high transparency.

- Ensure that the conditions for the provision of flexibility are sufficiently harmonized on a European level through a **dedicated Network Code on Demand Response, Storage and Aggregation**. This will enable considerable cost savings, while also allowing room for manoeuvre to adapt to the specificities of different Member States.

- **Support a clear definition and classification for the various types of renewable, decarbonized and low-carbon gases** to promote the development of sustainable solutions, support investment decision-making and ensure transparency for all consumers.

- **Ensure an appropriate financial "taxonomy" framework, based on their specific environmental footprint, for different energy carriers and infrastructures,** where no technology is chosen upfront and where the transitional dimension is considered. In absence of that, and the current orientations seem to open to that risk, the status quo may prevail in some sectors and the overall energy transition costs will increase.

- **Free market players shall develop the installations and capacity needed**, **in line with the applicable regulatory framework** (unbundling); free market players should be the ones pushing these projects forward with proper incentives already at the R&D phase. **If the market fails to deliver, regulated gas network operators should be allowed in a transitory period (until market interest comes back) to engage in decarbonisation activities** aimed at increasing the potential and actual quantities of renewable, decarbonised and low-carbon gases, developing, operating and owning innovative technology facilities and supporting their scaling-up, in a way that does not distort competition and secures third party access to maximise societal benefits.

- **Amend the relevant EU legislation to enable network operators to operate several categories of gases**, including CO2, providing incentives to the grid/network operators in order to adapt their infrastructures to cope with the coexistence of different gases and also incentives to developers/promoters of renewable and decarbonized gases. While injection of biomethane in the grid requires relatively minor - but necessary - adjustments and has no consequence for the users, three injection routes by 2050 have been identified for hydrogen: blending, methanation and 100% hydrogen clusters. The Commission should propose to set a specification of blended hydrogen as a sector-wide target by 2030 and after. The aim is to mobilise equipment manufacturers and downstream users, and to manage operators investments on a case-by case basis.

- **Promote the circular economy principle through the use of gases from the agricultural sector**; the reform of the Common Agricultural Policy (CAP) should recognise the role of sequential cropping as a sustainable agricultural practice which is subject to support, ensuring no double counting in the support schemes. Such a system would directly reward farmers for the tonnes of CO2 removed by growing inputs used for the production of biomethane, in addition to food crops.

- Furthermore, the EU's LNG strategy should be revised to **consider the role of** liquefied biomethane (**LBM) and** liquefied synthetic methane **(LSM) as well as, hydrogen-based energy carriers, to use existing LNG regasification terminals as entry door to energy imports**. LNG can help to further decarbonise the transport sector with the use of LBM and LSM that offer almost 100% GHG emissions reduction and contribute to achieving net-zero emissions.

- Last but not least, **foster demand participation into the balancing services and markets,** avoiding disproportionate technical requirements by TSOs which mean, in fact, a barrier to the demand and also **foster demand side participation** through the access to the consumer data by services providers.

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