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# CEEP INPUT TO THE SMART SECTOR INTEGRATION STRATEGY QUESTIONNAIRE

In the context of the current corona crisis and the discussions of EU Ministers for a recovery plan, CEEP continues to support the agreed EU climate neutrality targets in 2050 and sees it as an important message to keep the European Green Deal and its climate policies in the center of the recovery plan. We believe that when achieving our climate goals and rebuild our economy from this shock we must stick to our climate and energy objectives across the value chains.

While the industry has proven to be resilient and ensured secure supply of energy during this virus pandemic. Climate change has not stopped, and it continues to be a threat to our environment and our economy. CEEP underlines the importance to continue having climate policies as a top priority on the EU Agenda and they must be developed as part of a sustainable approach based on three dimensions: economy, environment and the social policy. These dimensions are at the core of the CEEP members activities as actors of public services and of services of general interest in Europe.

In this context, CEEP sees the coming Smart Sector Integration Strategy as at the center of the Green Deal and welcomes this consultation. In the next pages, CEEP develops its detailed answers but would call attention on the following high-level messages:

- As a general principle, for CEEP, it is needed to develop holistic concepts in which electrification as well as decarbonised and renewable gases and innovative heating/cooling, industry and transport solutions with their respective infrastructures will have a role to play. There is not one technology or application that is going to solve all our problems, but we will need to increase the cross-sectoral cooperation to unleash the true potential in all sectors/applications.

- Cost-effective and energy-efficient principles give a key role to decarbonized and renewable gases to achieve a carbon neutral transition. As there are many ways to produce decarbonized and renewable gases, it is key for an efficient market to have simple and clear definitions, for instance between renewable character and GHG footprint.

- Existing gas network operators have a clear expertise that must be used to for the introduction of hydrogen in present networks and for the construction and operation of hydrogen networks. This is a key element for the introduction of an EU-wide framework for decarbonized and renewable gases in the gas directive that can accelerate the establishment of a European market for these gases.

- Flexibility of energy systems is key to accommodate the growing intermittency of renewables and what is really lacking is the possibility for all sources of flexibility of all energies to compete on a level playing field.

- To enable decarbonized and renewable gases to make their contribution to achieving climate neutrality by 2050, the course must now be set at EU level. First and foremost, it is essential to have a clear commitment and strategic view from the EU on gas and the integration and use

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of renewable and decarbonized gases in the internal market and the grids taking into account their potential and constraints.

- Finally, CEEP would like to underline that the Smart Sector Integration Strategy must also give large room to district heating and cooling which is a sector integration technology; it allows thermal storage and recycling waste, a good example of circular economy.

*Detailed contribution*

1. What would be the main features of a truly integrated energy system to enable a climate neutral future? Where do you see benefits or synergies? Where do you see the biggest energy efficiency and cost-efficiency potential through system integration?

A truly integrated energy system has to be based largely on sector integration. Sector integration refers to a holistic energy system optimization concept that includes different energy carriers, sectors and the respective infrastructures. It characterizes an efficient interplay between the energy, heating/cooling and transport sector and related industries by the use of synergies. Thereby, it goes beyond sector coupling which is described by a study of the European Commission1 as the linking of the electricity and gas sectors, both in terms of their markets and infrastructure. We believe that a better linking of the electricity and gas sector is important but the connection has to be extended to the heating/cooling, mobility and industrial sectors in order to use all synergies optimally.

Within that sector integration, each decarbonized final energy carrier (electricity, gases, heat, cooling) must be used in the most cost-effective and energy-efficient way. In a truly integrated energy system towards a climate neutral future, each energy sector is used where it provides its maximum $CO_2$ emission reduction. This success will rely on joint decarbonization, for instance:

- Using batteries of electric cars to store electricity from renewables in highly windy or sunny periods to release it which is an example of a better integration of renewables,
- Power to gas facilities will benefit from revenues as sources of flexibility for the electricity system and as suppliers of hydrogen to the industry
- District-heating and cooling systems are beneficial for the system as a whole by acting as storage facility (P2H) and/or by integrating industrial excess heat/heat from waste incineration plants into the system. They can also integrate industrial spare heat or the heat from waste incineration plants for heating/cooling purposes. Similar synergies can be unleashed between biogas producers and the gas grid "waste" products in one sector as "fuel" in another).

Sector integration can take different forms and variations in Member States. It is, therefore, important that the European level focus on the establishment of an enabling framework than encourages successful national or regional approaches.

2. What are the main barriers to energy system integration that would require to be addressed in your view?

As decarbonized final energy carriers (electricity, gases, heat, cooling) must be jointly mobilized to get to a successful truly integrated energy system, rules must be harmonized between them with for instance;

- A similar approach for taxation geared towards CO2 emissions
- Regulatory disadvantages for sector integration technologies and a lack of incentives, e.g. double taxation in energy storage (P2H, P2G)
- Too high taxes and levies on storage

- Same type of information given to consumers, especially local consumers
- Further enhancement of cooperation between network operators for planning
- The neglect of district heating and cooling systems as effective decarbonization strategy/sector integration technology and the lack of funding for this technology
- The lack of a European regulatory framework for renewable / decarbonised gases
- The non-technology neutral favouring of energy production at building-level in the calculation of energy performance of buildings in the Energy Efficiency Directive (EED) and Energy Performance in Building Directive (EPBD) legislative files, as compared to renewable energy supplied by grids for electricity, gas or district heating/cooling

3. More specifically:

- How could electricity drive increased decarbonization in other sectors? In which other sectors do you see a key role for electricity use? What role should electrification play in the integrated energy system?

Thanks to the increased share of renewables, coupled with other sources of decarbonized generation, 60 % of the EU Electricity is already carbon free. According to Eurelectric, the European power sector should have a fully decarbonized electricity supply before 2050. This decarbonization pathway explains why electricity is retained by the European Commission in its Long-Term Strategy as a major energy carrier for decarbonization, the electrification rate should be 53-60 % by 2050 compared to 22 % today:

- **Industry:** a large part of the CO2 emissions of the industry is coming from heating and cooling processes, for which electrified processes are today available, but more investments are needed. The full decarbonization of energy processes in the industry is possible with decarbonized hydrogen.[1]
- **Transport:** again, electricity and hydrogen are coupled solution, electricity for light transport (cars) and hydrogen for electrification for heavy duty & long-haul transport.
- **Buildings**: here the coupling is between the 3 energy carriers once efficiency has largely reduced demand, electricity being key with heat pumps.

- What role should renewable gases play in the integrated energy system?

More than 40 % of the final energy in the Long-Term Strategy is not electricity, that is why it is of utmost importance that renewable gases and innovative heating solutions (see question below) with their respective infrastructures play a role:

- Cost-effective and energy-efficient principles give a key role to decarbonized and renewable gases to achieve a carbon neutral transition. As there are many ways to produce decarbonized and renewable gases, it is key for an efficient market to have simple and clear definitions, for instance between renewable character and GHG footprint.

[1] The word « full » refers to decarbonization of the energy, the making of a product can produce carbon that remains to be treated.

- In countries with an extensive gas infrastructure, it is logical to use the existing infrastructure and contribute to decarbonizing by increasing the share of renewable gases (biomethane or H2, for the latter network elements might have to be adapted to this very new molecule).
- The ratio between electricity and other fuels given by the Long Term Strategy is at the European level, it is important to keep in mind that the energy systems of the Member States vary and that this ratio will depend on national and local choices and especially on a cost benefit analysis where exiting gas infrastructures, district heating and cooling networks will be very important.

- <u>What measures should be taken to promote decarbonized gases?</u>

The promotion of the decarbonized gases should rely on the following:

- ✓ A well-functioning EU internal market on which all forms of decarbonized and renewables gases can compete together to get the best of them in the fight against the climate change,
- ✓ A European Framework for decarbonised and renewable gases which includes support mechanisms
- ✓ DSO must remain the guardian of the technical standards, e.g. feed-in of hydrogen and biogas,
- ✓ The establishment of a DSO-Entity for gas analogue to the electricity sector.

- <u>What role should hydrogen play and how its development and deployment could be supported by the EU?</u>

Hydrogen is a key gas for the deep decarbonization of the EU economy, for instance in heavy transport and the hard-to-abate industrial sectors. The climate efficiency of the use of hydrogen relies on the fact its carbon content is as low as possible as soon as possible. Today, it is already necessary to decarbonize the present industrial hydrogen obtained by SMR, technology exists based on electrolysis of water thanks to renewable and decarbonized electricity. Deploying electrolysis on industrial sites and coupling hydrogen generation by certificates of guarantees of origin or by PPAs has to be encouraged, it is key to minimize the hydrogen cost. Using local distribution grids has also to be encouraged to get benefit of high-size electrolysis, again costs are reduced. The existing technical knowledge of gas grid operators for the construction and operation of hydrogen grids should be used for the expansion of a potential hydrogen infrastructure since they are also capable of finding an efficient cross-sectoral system optimum.

This local approach, that can be developed in cooperation with local communities guarantees that Europe generates its own hydrogen and takes benefits of the existing gas networks.

Nevertheless, even with that cost-efficient approach, hydrogen from water electrolysis will remain more expensive than hydrogen obtained by SMR: it means that a public support is necessary.

- How could circular economy and the use of waste heat and other waste resources play a greater role in the integrated energy system? What concrete actions would you suggest to achieve this?.

Sector integration transforms what is considered as waste in one sector, such as spare heat in an industry, biomass waste from the forest industry, into a useful resource in another sector. So, waste is put to use in other functions such as fuel.

District heating and cooling: in many European Countries / Cities combined heat and power plants (CHP) and district-heating and cooling systems (DHC) are important cornerstone of local sector integration models. In Sweden for example, district heating supplies as much as half the total heating market, using a wide mix of energy sources such as biofuels, waste, heat pumps and 8% industrial waste heat. Besides the use of waste heat from the gas-power plants (CHP) fuelled by gas, biofuels, solid waste etc., it also spares heat from industrial sites and data centres can be fed into the grid and heat urban areas and industrial sites.

Ties between the gas infrastructure and other sectors such as waste management and the agriculture industry will increase in the future. Biomethane plays an important role in decarbonising the gas grid. The availability of renewable gases at affordable prices will be important for a successful decarbonisation.

In Austria, thanks to the European project MAGNITUDE, coordinated by EDF and with the local partner Cybergrid, the excess heat of an integrated pulp and paper mill is injected in the district heating network of the city nearby in coordination with the heat network operator. The mill is studying the installation of a new steam accumulator that could reduce the steam blow-off (that would reduce consumption) but also provide frequency regulation services to the electricity system.
When it comes to regulation, DHC-systems cannot be compared to the cross-border electricity and gas networks. They are self-contained local systems with a demand-optimised heating production. Third-party access, thus, has to be negotiated with the operators of DHC-systems under consideration of the economic and technical requirements. This is stipulated in the Renewable Directive (2018/2001) in Article 24. DHC-systems need to get greater credit for their positive role and should be included in the TEN-E-regulation or rather as project common interests even if there is no immediate cross-border connection (but a regional cross-sectoral dimension)

- How can energy markets contribute to a more integrated energy system?

The different energy systems (gas, electricity, heat and cooling) rely on different industrial organizations and on markets rules. Of course, ideally more coupling would mean more similar rules, nevertheless before deploying any of them, it will be necessary to evaluate their costs and their benefits.
A fair-level playing field between energy carriers such as gas and electricity and beneficial conditions for sector integration technologies are necessary. Currently, the development of sector integration applications / technologies is hampered by (double) taxation and levies at the member states level. This is the case for many storage technologies.

- How can cost-efficient use and development of energy infrastructure and digitalisation enable an integration of the energy system?

The energy European networks (gas and electricity) are among the best in the world, it is an opportunity to accommodate the very high volume of renewable electricity that will be installed in the

coming years, and this share will increase daily, weekly, monthly and seasonal volatility. Digitalization of the whole value chain and especially for consumers and for distribution networks is key to get benefits of their full flexible capacities, which will have to be mobilized daily, weekly monthly and seasonally.

In a system with a very high share of renewables;

- ✓ Batteries of electric cars can be used to store daily electricity generated for instance by solar panels during the day to be re-injected in the night; the volume of cars also allow to envisage easily weekly storage
- ✓ Heat Pumps (industrial, domestic or tertiary) can modulate their input
- ✓ The specific dynamic of heat networks can be used as a thermal battery
- ✓ Domestic uses (dishwashers, water boilers…) can also be digitally used to be better used when there is a high output of renewable energy
- ✓ Power to Gas is key for seasonal storage

As DSOs often operate electricity, gas and district heating grids, they are in best position to coordinate and work toward an optimization of infrastructures taking into account the advantages, local conditions, etc. of the different sectors.

4. Are there any best practices or concrete projects for an integrated energy system you would like to highlight?

**List of R&D projects leaded by EDF and supported by European funding where lessons can be learned**:

- EU Sys Flex stands for "Pan-European system with an efficient coordinated use of flexibilities for the integration of a large share of RES." The project develops new types of services that will meet the needs of the system with more than 50% of renewable energy sources. The main project objective is to find the right blend of flexibility and system services to support secure and resilient transmission system operation.
- Magnitude project aims at developing business and market mechanisms as well as supporting coordination tools to provide flexibility to the European electricity system, by increasing and optimizing synergies between electricity, gas and heat systems.
- TDX-Assist: Coordination of Transmission and Distribution data eXchanges for renewables integration in the European marketplace through Advanced, Scalable and Secure ICT Systems and Tools (TDX-ASSIST) project aims to design and develop novel Information and Communication Technology (ICT) tools and techniques that facilitate scalable and secure information systems and data exchange between Transmission System Operator (TSO) and Distribution System Operator (DSO).
- Open Entrance: open Energy Transition Analysis for a low-Carbon Economy aims at developing, using and disseminating an open, transparent and integrated modelling platform for assessing low-carbon transition pathways in Europe.
- Plan4RES: the project is intended to support the main stakeholders of the European energy system (TSOs, DSOs, Utilities, Energy providers…) by helping them taking better decisions regarding the development and operation of their energy portfolio, also considering the

emerging technologies and innovative flexibility sources while maintaining a high level of reliability.

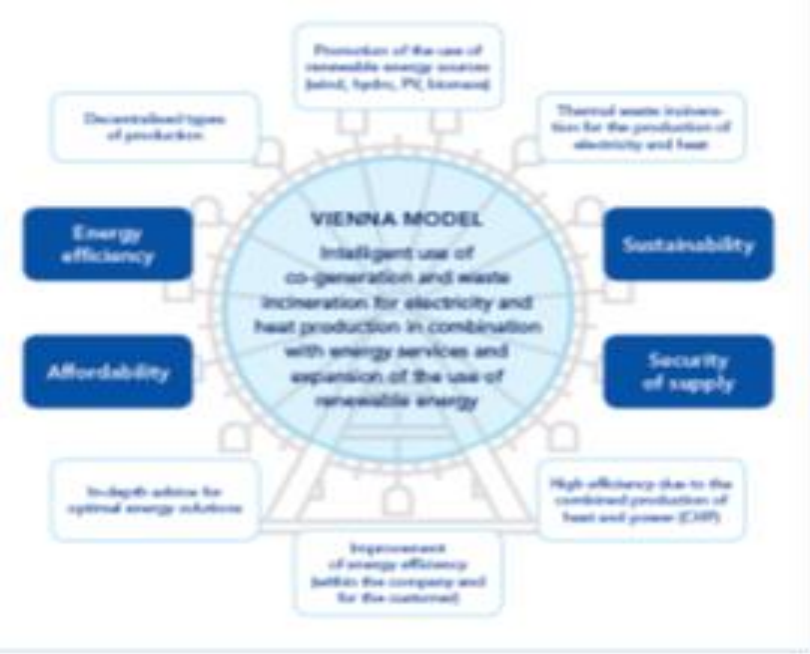
**The Vienna Model:**

See movie: https://www.youtube.com/watch?v=J0C8rZp_0uE

Short description:

The Vienna model combines the use of waste heat from power generation (known as cogeneration), the generation of energy from 800,000 tonnes of municipal waste, 200,000 tonnes of sewage sludge and 100,000 tonnes of industrial and commercial waste per year, the use of industrial waste heat and the use of renewable energy sources, thereby guaranteeing the supply of electricity, heating and natural gas to around 1.4 million customers and saving up to three million tonnes of CO2 annually by maximising efficiency.

The Vienna Model is built on six cornerstones developed by Wiener Stadtwerke back in the 1960s that can be seen in the graph below.




In recent years this «traditional Vienna Model» has been extended and complemented by different *Heat2Power* solutions which additionally increase the flexibility of the system. Large heat pumps (1 GWth installed capacity) use the waste heat of CHP-plants as source which would otherwise be disposed of in the Danube. Two giant electric kettles à 10 MW capacity each are powered with excess electricity. Rapid availability of system (within 10 minutes 20 MW are at disposal). Mainly used for the participation in the balancing market and as back up for the district heating system.

The Vienna Model is supported by three energy networks - gas, electricity and district heating. These networks guarantee an optimal interaction between the various forms of energy. All technologies are connected to the energy networks and also to each other, so that energy can be converted, stored or fed directly into the network in a flexible way and when required.

5. What policy actions and legislative measures could the Commission take to foster an integration of the energy system?

Regulations must evolve towards policies that helps the integration of the energy system.

- ✓ **Adjusting State Aid Guidelines** to the reality of the investments required to decarbonise the EU industry while maintaining its global competitiveness
- ✓ **Investing in policies to support markets for low carbon products**
- ✓ The **definition of cross-border projects should be revised** to refer to "projects with positive cross-border impacts". Domestic sector integration projects with positive indirect effects on the overall European system should also be eligible for financing. The energy infrastructure priority corridors and areas are defined in Annex I of the TEN-E Regulation. The section on "priority thematic areas" (*smart grids deployment*) should be expanded to include sector integration technologies and solutions, especially district heating networks
- ✓ The **funding mechanisms (TEN-E-regulation, PCI, CEF) have to be adapted towards a more cross-sectoral regional approach** rather than a silo-driven cross-country approach. Innovative sector integration technologies that indirectly support the European system as a whole should be eligible for funding via the CEF (including district heating and cooling networks)
- ✓ **Supporting the expansion of district heating and cooling (networks).** Recognition of the positive role and the promotion of district heating and cooling networks, *inter alia* inclusion of the eligibility of the district heating and cooling networks for funding in the TEN-E Regulation and/or as a project of common interest (PCI) even where there is no direct cross-border dimension

As described above, flexibility of energy systems is key to accommodate the growing intermittency of renewables and what is really lacking is the possibility for all sources of flexibility to compete on a level playing field. For reaching our targets set in the European Green Deal the Smart Sector Integration Strategy must be on top of the agenda.