Position paper

27 November 2024

COGEN Europe Consultation Response

Energy Security Architecture – Fitness Check

COGEN Europe welcomes the European Commission's consultation on "Fitness check evaluating the EU's energy security architecture". COGEN Europe supports a comprehensive and ambitious approach to energy and climate actions, that fosters resilient and efficient integrated energy systems, with the aim to achieve the lowest cost decarbonisation for highest level of security of supply and consumer protection.

Energy security has different dimensions and has been dealt with in silo, which can lead to higher cost and increased risks for consumers:

- On the **electricity** side, increasing electrification and growing shares of renewable energy penetration will involve higher resiliency and security of supply needs, which can add significant costs to the power sector and overall energy system. From a consumer perspective, the affordable and continuous supply of clean energy is of utmost importance.
- As regards **gas systems**, the availability and affordability of low carbon and renewable gases (including hydrogen) requires additional certainty to ensure that current gas users can plan for the future. This will entail investments in cleaner fuels and/or a fuel switch.
- Security of **heat supply** must not be ignored or solely considered under electricity or gas. As 50% of energy consumption, heat-related infrastructure requires careful consideration. Electrified heat (either consumer domestically or in industry) has the potential to affect security of supply in the electricity sector. Heat that cannot be electrified requires alternative clean sources (i.e. bioenergy, hydrogen, solar thermal, geothermal, waste and heat waste) and efficient infrastructure such as district heating. Security of heat supply has important social and competitive impact across our economies.

To address these challenges, the EU's security of energy supply architecture must better integrate the benefits of energy efficiency and energy systems integration. CHP is particularly important in linking electricity & heat in an efficient way, as well as electricity and gas, complementing power-to-heat & power-to-gas links!

As national and regional decarbonisation efforts intensify and consumer level actions multiply, investments in integrated energy infrastructure become necessary to ensure energy security and resilience.

When talking about energy supply, priority should be given to the following principles:

- ✓ **energy efficiency** applied across the entire energy value chain, in energy conversion, transmission, distribution and end-use
- ✓ **maximise the use of renewables** in combination with efficient technologies
- ✓ a **diversified mix** of clean technologies
- ✓ **integrated energy systems across all energy vectors**, optimally linking electricity, gas and heat, allowing for synergies and easy switching between different energy sources, technologies and grids

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1. Put Energy Efficiency First

Key challenge: Energy efficiency is not sufficiently emphasized across different levels of the energy value chain – conversion, transmission, distribution and end use – as well as at system level.
A technology-neutral approach, without energy efficiency first, will create a vicious cycle where massive investments are needed for additional power-only back-up and girds, on top of PV/Wind.

Evidence:

- Today, most energy losses happen in electricity conversion and transportation. Of 409 Mtoe of primary energy inputs, over 200 are wasted as heat dispersed into the air. These are fossil fuelled power plants that waste more heat, while producing electricity, than the total heat demand of buildings!
- Between 5-10% of electricity is further wasted via grid losses
- Conversely, Eurostat confirms that only 30% of thermal power generation is produced with high efficiency cogeneration – the remaining 70% of electricity comes from power plants that waste more than 50% of the fuel used.

Recommendations:

- Ensure smarter production and consumption of energy, to deliver needed heat and power, when and where needed, must be considered as a booster of energy security.
- Prioritise cogeneration for the production of thermal (power and heat). This creates a virtuous cycle: Power is produced efficiently to cover residual demand, at times of insufficient PV/Wind. Heat is recovered (and possibly stored) to reduce demand for power-to-heat, further mitigating seasonal peak demand.

2. Promote integrated energy systems

Key challenges:

- Addressing security of electricity and gas supplies separately risks leading to higher costs for energy overall, while creating vulnerabilities for consumers if either is compromised, should those systems be built and operated in silos.
- Impact of electrification on energy security is not fully assessed, taking into account seasonal peak demand and different demand/supply/grids contexts and dynamics.

Evidence:

- Electrifying heating and cooling in buildings alone with heat pumps could double electricity demand and even increase seasonal peak demand by more than 150%. Such levels of magnitude cannot be addressed by demand response or grids, without increasing electricity system costs considerably. This energy security risk is not considered in any of the key EU legislation, including the EPBD, EED, Electricity Market Design.

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Recommendations:

- Reinforce synergies between electricity, heat and gas systems to help mitigate increasing system costs and protect consumers from price shocks in one market segment
- Support the use of efficient and renewable technologies that optimally and flexibly link energy systems, such as district heating or cogeneration

4. Diversified energy mix & technology hybrids/synergies

Key challenges:

- Promoting only certain technologies or energy sources (e.g. electrification of transport, heat and industry) can weaken energy security, because it limits investments in alternative infrastructure and solutions.
- This will prevent these technologies and approaches reaching maturity for higher choice of clean energy down the line.

Recommendations:

- The future of clean energy lies in combining net-zero technologies at local level or on-site to deliver higher energy efficiency, increased resiliency and lower cost for consumers.
- Decentralised, diversified and integrated systems for energy generation are more resilient and less vulnerable to accidents (e.g. extreme weather conditions). Renewable energy sources and cogeneration are ideal distributed energy systems, enabling households, industry and district heating to have secure access to clean heat and power at lowest cost and with least environmental impact.

Sources:

Eurostat, 2024. Energy Balance Flow Diagram

D. Connolly, 2017. Heat Roadmap Europe: Quantitative comparison between the electricity, heating, and cooling sectors for different European countries

Imperial College London, 2019. Unlocking the potential of Energy Systems Integration

https://www.mdpi.com/2071-1050/12/19/8199

https://www.researchgate.net/publication/342068654_On_the_value_of_combined_heat_and_power_CHP_systems_and_heat_pumps_in_centralised_and_distributed_heating_systems_Lessons_from_multi-fidelity_modelling_approaches

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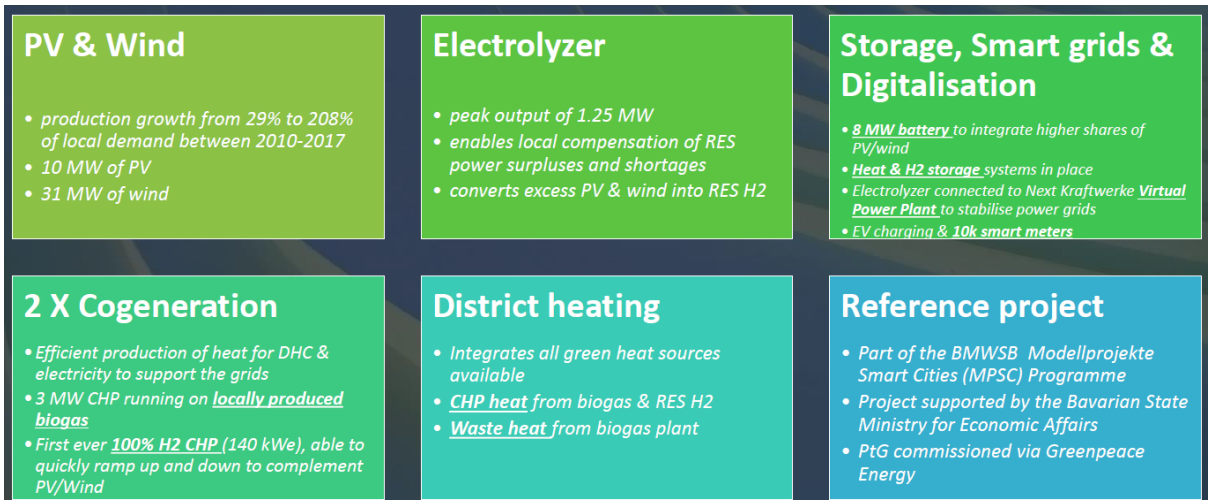
About cogeneration

- A diverse range of cogeneration technologies is produced in Europe, from the kW to the MW, for industrial, district heating and residential applications.
- Most cogeneration installed in Europe is produced by EU manufacturers and installed by highly specialized installers across well-established distribution channels.
- The cogeneration sector creates more than 100.000 jobs across Europe
- Cogeneration produces today 12% of the total electricity and 16% of the heat in the EU. Moreover, close to 30% of thermally produced electricity is based on cogeneration.
- More than 60% of the heat supplied through district heating comes from local cogeneration plants. This ensures significant energy savings (>30 bcm) and CO2 emission reductions (>150 million tons of CO2 reduced yearly).
- Renewable cogeneration is scaling up, as renewable shares in the CHP mix increasing 3 times between 2009-2019
- Manufacturing capacities for innovative cogeneration systems are increasing across Europe. Fuel cell micro-CHP production capacity increased by 500% between 2016 and 2023. The industry is significantly investing in hydrogen-readiness, as well as improving efficiency and flexibility capabilities of CHP systems.

Cogeneration Contributing to power system security and resilience

Hassfurt City decarbonisation project is a perfect example of energy efficiency, system integration and technology openness, which leads to higher security of supply, higher RES and lower cost. The city started with up to 200% overcapacity of PV/Wind compared to local power demand → CHP + DHC are used to close the heat decarbonisation cycle. Excess PV/wind are stored as H2. Two CHP plants using biogas and H2 are used to deliver green heat via DHC.



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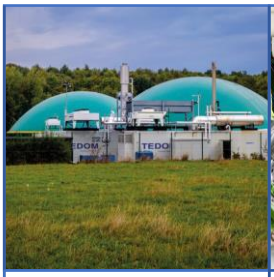				
Biogas CHP supplies heat & power to local community *Ochain Energie, Belgium*	***Renewable H2 & Biogas CHPs complement PV and Wind via DHC*** *Hassfurt, Germany*	***Waste heat, heat pumps & CHP working together via DHC*** *Szlachęcin, Poland*	***Renewable H2 CHP to decarbonise paper mill (HyflexPower Project)*** *Saillat-sur-Vienne, France*	***Largest European stationary fuel cells trial delivers >2600 micro-CHP systems in people's homes (PACE project)*** *10 European countries*

About COGEN Europe

COGEN Europe, the European Association for the Promotion of Cogeneration, is the cross-sectoral voice of the cogeneration industry. We have 56 members: 17 national associations and 39 corporate members spanning the entire value chain from technology manufacturers and users to consultancies. The cogeneration sector is committed to the creation of a resilient, decentralised and carbon neutral European energy system by 2050 with cogeneration as its backbone, empowering European citizens and industry to generate their own efficient, reliable and affordable clean heat and power locally.

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