Position Paper

COGEN Europe key recommendations on "EU climate target for 2040"

Brussels, 15 April 2024

COGEN Europe, the European Association for the Promotion of Cogeneration, supports the European Commission's initiative to develop a robust impact assessment on 2040 energy and climate targets, as part of a comprehensive and predictable legislative framework.

Setting an ambitious emissions, but realistic and evidence-based, reduction target for 2040 is necessary to secure investments in climate solutions in the coming years. To trigger industry commitment and citizen engagement towards carbon neutrality, EU's climate and energy framework for 2040 must create a level playing field to foster a stable and positive investment environment for solutions that ensure a smooth and cost-efficient transition between now and 2050.

We must prioritise the use of renewable energy sources in the most efficient solutions like cogeneration across all sectors, for high energy savings and resource efficiency purposes.

To achieve this, COGEN Europe recommends putting in place a robust and inclusive process to set an ambitious EU GHG target for 2040, taking into account the following principles:

1. Consider both net-zero and the carbon budget

✓ Identify the zero-emissions pathways that minimise the total emissions volume between now and 2050, to address cumulative effects of CO2 emissions. This entails considering the time value of carbon and allocate higher value to early emission reductions compared to GHG reductions achieved later in the process[1].

[1] Time Value of Carbon is the concept that greenhouse gas emissions cut today are worth more than cuts promised in the future, due to the escalating risks associated with the pace and extent of climate action. Sources: G. Cornelis van Kooten, Patrick Withey, Craig M.T. Johnston, Climate urgency and the timing of carbon fluxes, Biomass and Bioenergy, Volume 151, 2021, 106162, ISSN 0961-9534, https://doi.org/10.1016/j.biombioe.2021.106162.& "Time Value of Carbon," Larry Strain. Carbon Leadership Forum. April 2020.

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2. Assess cost-efficient pathways to decarbonisation

- ✓ Assess the cost-effective pathways to decarbonisation, taking into account the realistic potentials and diverse consumer needs, geographies, industries and availability of resources and infrastructure across Europe.
- ✓ Flexibility services must be assessed and promoted across integrated energy systems, considering multiple energy carriers, including heat and gas sectors.

3. Take a whole-economy approach to decarbonisation

- ✓ Take a whole economy approach, realistically accounting for at least Scope 1 and 2 emissions and adapting policy to tackle both direct and indirect emissions, while ensuring a globally competitive environment for European industry.
- ✓ Pay particular attention to the marginal effects of fuel switching across different energy carriers (e.g., gas to electricity switching in heating & cooling), including their impacts on the cumulative emissions rather than just the net-zero ends point.

4. Consider all cost-effective decarbonisation solutions

- ✓ Create a level playing field between all renewable, efficient and carbon neutral or low carbon solutions that can contribute towards the target.
- ✓ Consider the potential of high efficiency cogeneration which can run on any renewable fuel and is the most cost-effective way of using renewable limited resources, while providing flexible generation.

5. Accelerate green finance

- ✓ Provide a comprehensive framework to finance the energy transition for industrial and domestic consumers.
- ✓ Assumptions around cost-effectiveness of different flexibility and storage options should be more closely investigated.

6. Better recognition of CHP in techno-economic assumptions in PRIMES

- ✓ The European Commission's models must better account the efficiency benefits of cogeneration compared to power-only and heat-only solutions.
- ✓ The PRIMES techno-economic assumptions do not consistently consider CHP as a more efficient alternative to power-only plants (i.e. gas turbines, engines, biomass power only plants and gas boilers). This is in fact misaligned with the EU law, which requires CHP to be prioritised over thermal power plants and gas boilers (see EED Art 26 and RED III Art 3 & Art 15(a)). The only mentions of CHP are WtE plants and micro-CHP, which are niche applications.

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Setting a 2040 climate target for an ambitious, resilient and cost-effective pathway to net-zero by 2050

In the context of the EU Green Deal, Fitfor55 and REPowerEU, the decarbonisation of our energy sector is crucial to tackle climate change and accelerate the transition towards energy efficiency and economic stability. For it to be effective, EU level strategies must address the challenges and maximise opportunities for measures needed to achieve sectoral transformations and policies to respond in a comprehensive and inclusive manner. In addition, there is also an urgent need for energy security and competitiveness of EU industry as a response to ongoing changes in a geopolitical landscape triggered by Russia's invasion of Ukraine. Therefore, Europe needs plans and policies that foster customer engagement, industrial leadership and global competitiveness, and the uptake of climate-friendly solutions on an unprecedented scale.

What will be needed in the future energy system is its ability to reduce and manage energy effectively and smartly across different sectors and consumers. We expect to use less fuels, but still providing stable and efficient system to mitigate climate change, while keeping our economies and households functioning. Therefore, it is essential to use accurate assumptions in models which are designed to set a narrative of the upcoming EU energy and environmental targets. However, we are concerned that **cogeneration technologies are significantly mis-represented in the list of assumptions shared with stakeholders in the context of the EU 2040 Target Plan.** CHP technologies should be added for all relevant applications (DHC, industrial and SMEs), not only under the domestic solutions.

The cogeneration sector is committed to building the foundations to that: a resilient, decentralised and carbon-neutral European energy system by 2050, with cogeneration as its backbone. CHP empowers European citizens and industry to generate efficiently reliable and affordable clean heat and power locally, thus representing a "no regrets" solution for delivering EU's energy and climate objectives both in the medium and long term. There is an important cost-effective potential for highly efficient cogeneration as part of a renewables-driven, resilient and cost-effective net-zero energy system by 2050.

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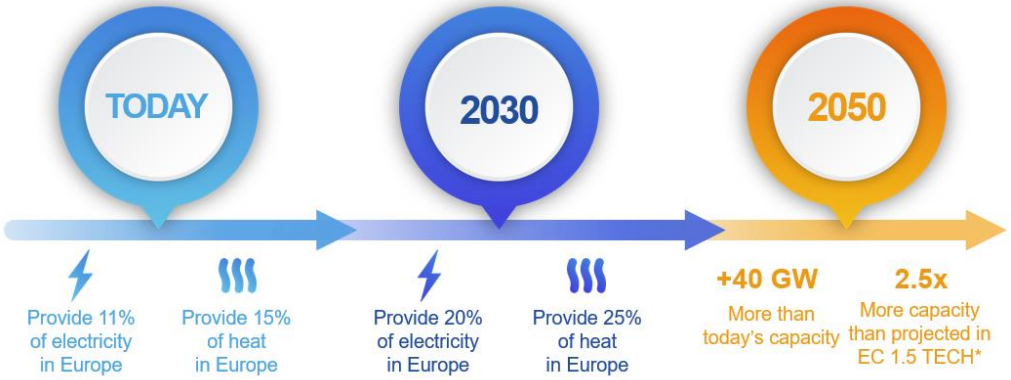
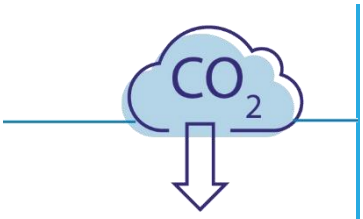


Benefits of future-proof cogeneration for an ambitious 2040 target plan

Energy and resource efficiency: Cogeneration makes better use of energy resources available locally to consumers across a range of increasingly low carbon and renewable energy sources.

Cogeneration plants will ensure the immediate switch to lower carbon and renewable fuels when they become available. Savings of lower carbon and renewable fuels due to cogeneration will accelerate the phase out of fossil fuels.

- Today, CHP saves 31Mtoe of primary energy. [1]
- By 2030, realising CHP potential could reduce 74Mtoe of energy. [2]
- By 2040, high efficiency CHP plants will be running predominantly on renewable, low carbon or decarbonised sources. [3]
- In 2050, optimising the efficient and flexible operation of CHP will save more than 20Mtoe. [4]



Emission reductions: Cogeneration is an enabler of a net-zero emissions economy by securing the efficient switch to lower carbon, decarbonised and increasingly renewable energy sources.

- Already today, CHP reduces at least 140Mt of CO2 by consuming less energy compared to less efficient power-only and heat only alternatives. [4]
- By 2030, realising the potential of CHP would ensure 350Mt of CO2 cuts, accounting for both the energy saved and the switch to cleaner fuels. [2]
- By 2050, CHP would primarily contribute towards system efficiency and flexibility, while reducing 5.5Mt of remaining CO2 at EU level. [3]

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Between today and 2035, CHP will continue reducing emissions significantly by displacing a more carbon intensive electricity and heat mix. This considers the many Member States' plans to phase out coal by 2030/2035 from their power mixes and eventually phase out natural gas from both heat and power generation.

Today CHP is being a low carbon resource, not a zero-carbon resources like PV and wind. Yet because of its higher capacity factor, it helps displace more marginal grid generation and reduce more CO2 than the same capacity of PV and wind (as estimated by the US Department of Energy below). This demonstrates the need to accelerate the deployment of high efficiency cogeneration, along PV and wind. [8]

Category	Natural Gas CHP	Utility Solar PV	Utility Wind	Biogas CHP
Capacity, MW	20.0	20.0	20.0	20.0
Annual Capacity Factor	90%	24.3%	34.3%	90%
Annual Electricity, MWh	157,680	42,574	60,094	157,680
Annual Thermal Provided, MWh_{th}	169,466	None	None	169,466
Annual Energy Savings, MMBtu	689,110	399,382	563,737	689,110
Annual CO_2 Savings, Tons	71,375	32,995	46,573	164,448
Annual NOx Savings, Tons	59.8	18.1	25.5	59.8

*Savings based on EPA AVERT Uniform EE Emissions Factors as a first level estimate of displaced marginal generation (**https://www.epa.gov/avert**)*[2]

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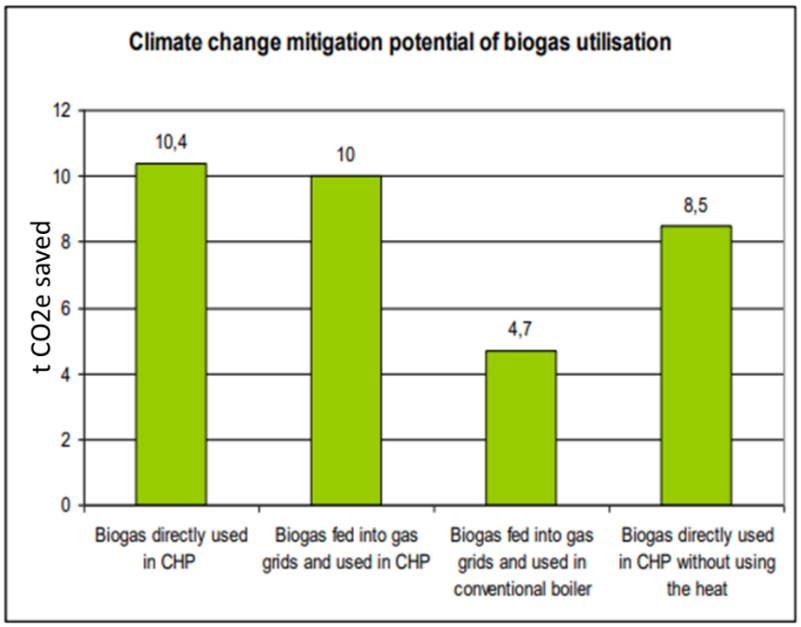
As energy grids become cleaner, CHP can and will evolve to low and non-emitting fuel sources. As shown, below the use of renewable sources with CHP maximises the emission reductions potential of those valuable fuels because of its energy efficiency benefits.



Source: CODE2 Project/Berlin Energy Agency, 2015

Moreover, when coupled with CCSU technologies, the use of CHP can lead to important negative emissions. Therefore, it is essential to properly include CHP in the techno-economic assumptions used in the COM's modelling to better reflect overall energy system's costs and efficiency. CHP has a significant potential in reducing costs for industry and district heating and cooling systems, while providing resiliency and back-up needs in a highly electrified future energy system.

Reliable and flexible energy: Cogeneration solutions are ready to respond to future energy system challenges, complementing electrification and intermittent renewables in an ideal way.

- Cogeneration is a key local systems integration solution, smartly and efficiently linking electricity, heat and gas systems.
- CHP can generate on-demand electricity at times of peak demand and insufficient intermittent renewable energy production.
- Embedded CHP in industry and buildings are key to provide demand-side capacity and are a key contributor to reliable supply.

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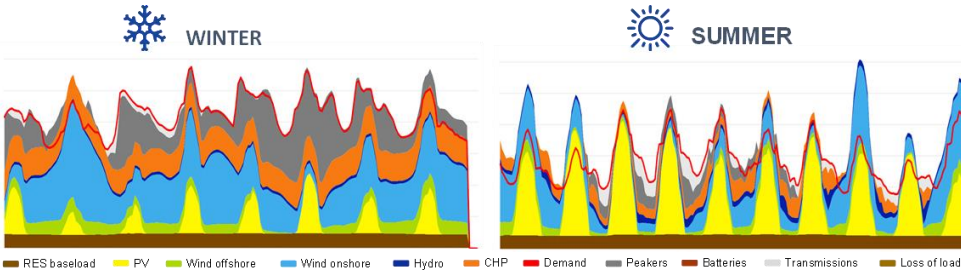
- CHP is future proof and fuel flexible, having the capability to easily switch to renewable sources including biomethane, bio-LPG, hydrogen.



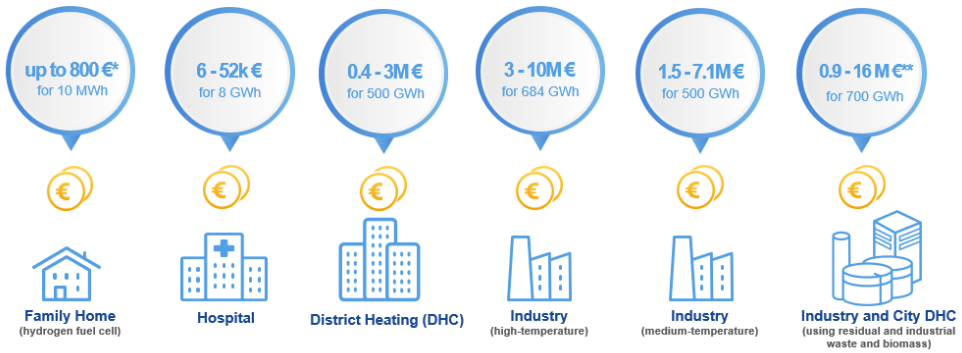
CHPs (orange) run as base load during low wind and sun periods, covering a high share of the peak demand.

CHP stops producing when variable renewable generation is sufficient to cover demand, and covers evening peaks.

Source: Artelys, 2020

Cost-effective: Cogeneration used on-site or nearby reduces consumer bills. Moreover, it significantly lowers overall energy system costs, by minimising operating costs of power grids and helping avoid grid losses and reinforcements.

- By 2050, optimising CHP across energy systems and sectors will deliver net savings of up to EUR 8.4M per year at EU level. [3]
- Energy bills can be reduced significantly by adding CHP to mix of solutions to heat and power buildings, districts and industries. [3]



*Based on retail power prices including taxes, levies and grid costs, self-consumed electricity and hydrogen retail price of 80-100 €/MWh. All other user cases assume cogenerated electricity is sold to market at wholesale electricity prices, excluding taxes.
**Based on biomass price of 40-60 €/MWh.

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Empowered consumers: Cogeneration accompanies the decarbonisation pathways of industry, buildings, and districts across Europe.

Today CHP provides:

- 11% of EU's power and 15% its heat.
- 65% of DHC heat. [6]
- ~ 60GW of CHP installed on-site, embedded across EU industries and strongly contributing to the security of supply.
- >100,000 active energy consumers like homes, hospitals and SMEs.

By 2030 on the path to 2050:

- By 2030, CHP could deliver 20% of electricity and 25% of heat. [2]
- By 2050, CHP could cover important shares of non-electrified heat, up to 52% in buildings, 81% in industry and 50-91% in DHC. [3] & [5]

References:

[1] Eurostat, 2021. Cogeneration statistics 2005-2019

[2] EU Project CODE2, 2015. European Roadmap for Cogeneration in 2030.

[3] Based on high efficiency cogeneration definition and efficient district heating requitements.

[4] Artelys, 2020. Towards an efficient, integrated and cost-effective net-zero energy system in 2050. The role of cogeneration.

[5] COGEN Europe own calculations based on Eurostat CHP data.

[6] EU project Heat Roadmap Europe, 2019. Towards a decarbonised heating and cooling sector in Europe

[7] Fit for 55, 2020. Renewable Energy Directive Recast Impact Assessment

[8] US Department of Energy, 2023. CHP Benefits Today and Tomorrow.

About COGEN Europe

COGEN Europe, the European Association for the Promotion of Cogeneration, is the cross-sectoral voice of the cogeneration industry. We have over 60 members: 13 national associations and 50 organisations 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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