

Position Paper

Combining Heat and Power for an ambitious path to net-zero emissions

Setting the Scene

With 197 countries signed up to the Paris Agreement in 2015, a collaborative and ambitious approach to climate action has become critical to keep the global temperature increase to well below 2°C and pursue efforts to limit the rise of temperatures to 1.5°C.

According to the most recent projections by the Intergovernmental Panel on Climate Change (IPCC), the threshold for a rise of temperatures by 1.5°C will already be reached by 2040. Even in the intermediary scenario, the IPCC expects global temperatures to rise by 2°C by mid-century and to get as far as 2.7°C by 2100. To limit future climate change, reaching net-zero emissions by 2050 and keeping below our carbon budget are of utmost importance.

Ahead of the 26th United Nations Framework Convention on Climate Change (UNFCCC) in November 2021, the UK Conference of the Parties (COP) Presidency has made it a priority to secure global net zero by mid-century and keep 1.5 degrees within reach, through ambitious national 2030 emission reduction targets. To deliver this, the UK COP Presidency has called on world nations to prioritise accelerating the phase out of coal, curtailing deforestation, speeding up uptake of electric vehicles and support investments in renewable energy.

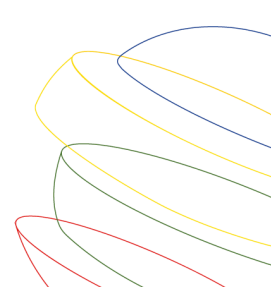
In its Net Zero by 2050 Roadmap, the International Energy Agency (IEA) affirms that the energy sector holds the key to responding to the world's climate challenge as it constitutes the major source of global emissions. With energy underpinning 70% of global emissions, decarbonisation of electricity and heat towards net-zero is of utmost importance. Additionally, the IEA Net Zero Roadmap stresses the importance of energy efficiency solutions as they will provide significant emissions savings during next decades.

Given that carbon dioxide (CO₂) emissions have a cumulative effect, rapidly eliminating most polluting generation must be prioritised while increasing energy efficiency. In this respect the quick switch to efficient generation based on low carbon and increasingly renewable energy sources will be win-win.

The cogeneration sector is committed to delivering on this ambition, with state-of-the-art solutions that address all dimensions of sustainability: people, planet/sustainability/environment and the economy.

Our vision

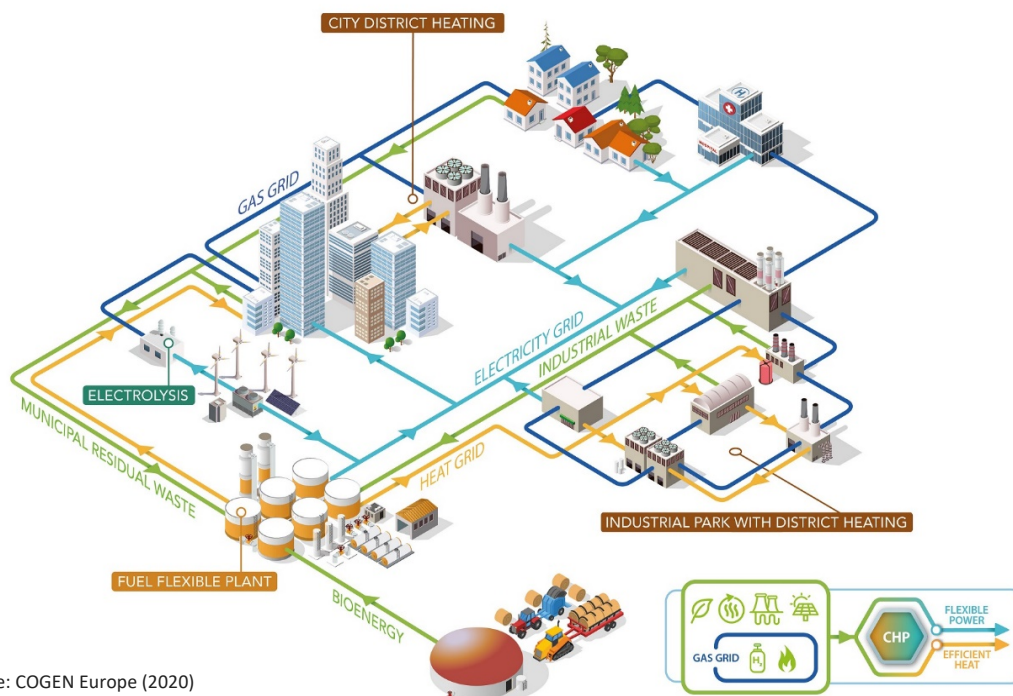
Cogeneration has a major role to play in the decarbonization and expanded electrification of the power system by increasing the efficiency of electricity generation through the capture of waste heat. Especially when coupled with electricity generation from low carbon fuels such as biomass and renewable natural gas, cogeneration becomes building block of a resilient, efficient and low-carbon economy.



To support an ambitious and speedy path to decarbonisation, the cogeneration sector is committed to the creation of a resilient, decentralised and carbon neutral energy system by 2050 with cogeneration as its backbone, empowering citizens and industry to generate their own efficient, reliable and affordable clean heat and power locally all over the world.

Achieving this vision will require:

- bringing together heat, electricity and gas networks, allowing the efficient integration of substantial amounts of renewable energy, and providing energy when and where needed.
- enabling an integrated energy system and a cost-effective energy transition towards a sustainable future.
- increased support measures from the governments, regional and local authorities.



Source: COGEN Europe (2020)

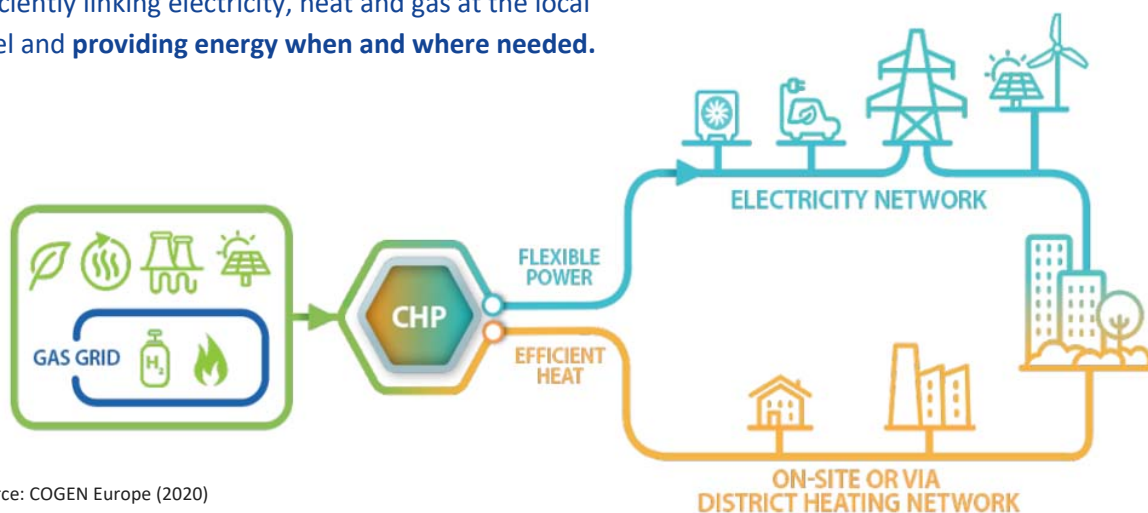
What is CHP?

Combined Heat and Power (CHP) is an energy efficiency solution that generates electricity and captures the heat that would otherwise be wasted. Cogeneration reaches total efficiencies of over 80%, compared to 50% of typical technologies (i.e. conventional electricity generation and on-site boilers).

This heat can be used for space heating, cooling, domestic hot water and industrial processes. The electricity is produced on-site or near the point of consumption, reducing distribution losses and supporting power grids.

Cogeneration: backbone of local and integrated energy

CHP enables the **integration of the energy system** by efficiently linking electricity, heat and gas at the local level and **providing energy when and where needed**.



Source: COGEN Europe (2020)

CHP around the world

As energy efficiency and decarbonisation ambitions pick up pace, consumers around the world show growing interest in CHP for their homes, businesses and cities. Beyond Europe and Asia, pockets of growth are emerging in the Americas and the rest of the world.

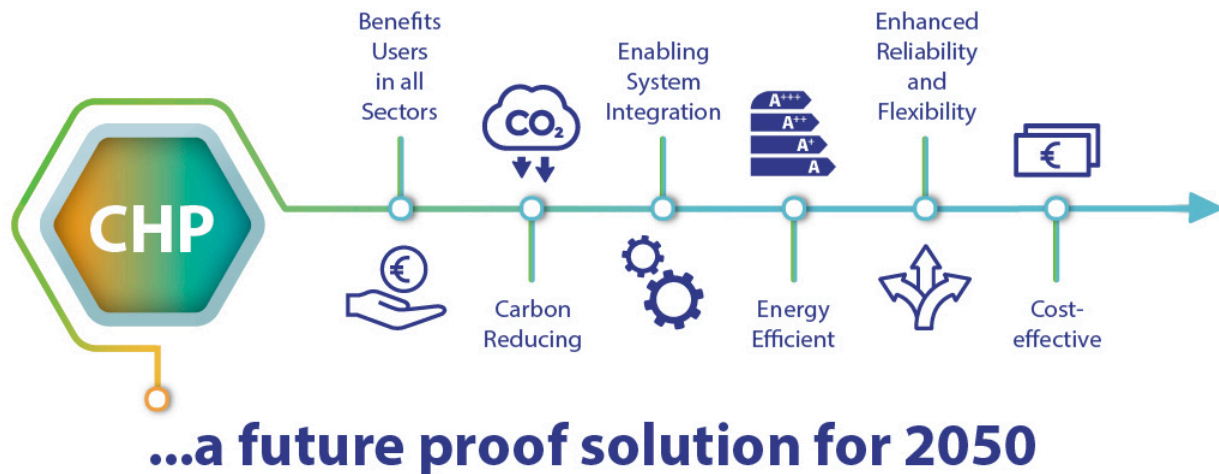
In 2016, the global installed capacity CHP reached 755 GW, 85% which are installed in the Asia-Pacific and Europe. By 2025, the global CHP capacity is expected to increase to 972 GW (an average annual growth of 2.8%).

Cogeneration supplied 16% of the electricity worldwide in 2018, as well as a significant share of heat. As governments, businesses and citizens commit to phasing out coal and move towards lower carbon and renewable sources, CHP is key in ensuring the efficient uptake of a range of energy sources. The use of renewable fuels in cogeneration has risen significantly – in 2018, around 37% of all biofuels and waste globally were used with cogeneration. Moreover, according to the International Energy Agency about 5.4% of global CHP electricity was produced from renewable sources in 2018 with the share of renewables-based cogeneration constantly rising. With Europe being the frontrunner in renewable cogeneration, its share increased significantly from only 2.9% in 1990 to 17.2% in 2018.¹

¹ According to Eurostat, renewables accounted for more than 30% of the fuel mix used with cogeneration in Europe in 2018. This variation can be explained by methodological differences: while the IEA statistics expresses the share of renewables in electricity output, the Eurostat statistics expresses the share of renewables in fuel input for both electricity and heat.

CHP Benefits

Cogeneration is a future-proof efficiency solution with multiple benefits for end consumers and society as a whole:



- Fosters energy efficiency. Cogeneration is up to 40% more efficient than the separate generation of heat and power, across a range of increasingly renewable energy sources. Cogeneration achieves more value for consumers by using less energy. This helps reduce the consumption of fossil fuels and ensures the maximum use of renewable energy.
- Cuts emissions. As the fuel mix decarbonises, cogeneration reduces emissions cost-effectively by displacing more energy and carbon intensive technologies.
- Supports renewable energy integration. As the energy mix decarbonises, CHP will ensure the efficient switch to renewable energy. Cogeneration solutions can run on any renewable fuel, including all gaseous fuels, biomass, geothermal, waste heat, residual waste, solar thermal. State-of-the-art CHP technologies are hydrogen ready, having the flexibility to run up to 100% hydrogen. Integrated concepts that combine PV, Wind, heat/power storage, heat pumps, district heating and CHP show that higher shares of renewables can be used cost-effectively when CHP is added to the mix.
- Enhanced energy system resilience. Cogeneration can generate electricity and heat when and where needed, especially in the face of increasing disruptions to the grid due to the effects of climate change. This brings flexibility and resilience to an energy system which has to cope with a growing shares of intermittent renewables such as solar and wind power. CHP can keep the lights on, ensure electricity heating is delivered and EVs can be charged at times of insufficient supply of wind and solar. By efficiently using renewable hydrogen or synthetic gases, CHP closes the loop in delivering system efficiency. CHP also plays a crucial role in hospitals and industry, where the continuous supply of heat and electricity must be ensured at all times.

- Reduces cost. By making the most out of available primary energy and reducing grid losses, CHP can ensure lowest cost for both the consumer and the society. In the future, as intermittent renewables take centre stage and electrification accelerates, CHP can be optimised to deliver lowest cost flexibility while maintaining the highest level of reliability.
- Empowers consumers. With cogeneration, consumers can cost-effectively meet their energy, resiliency, competitiveness and environmental objectives. CHP design and operation can be adapted to the needs of a multitude of consumers across all sectors of the economy. It is compatible with net-zero emissions scenarios, as it is fuel flexible, cost-effective and complementary to other clean energy solutions.

Call to action

To tackle climate change, our decarbonisation efforts must be consistent with a net-zero emissions pathway by 2050. Moreover, emissions reductions should accelerate, minimising the total volume of emissions and keeping the world below the allocated carbon budget. This must be achieved cost-effectively, making sure no one nation is left behind.

Solving climate change is within our reach and industry is committed to deliver on highly ambitious objectives. For that to be delivered world leaders must commit to:

- Accelerate and step-up ambition to cost-effectively reach net-zero emissions in the coming decades across the world.
- Facilitate massive financing for highest efficiency and lowest carbon solutions.
- Design future-proof integrated energy systems, maximising the use of all clean technologies.
- Ensure access to reliable, efficient and affordable clean energy, so that no one is left behind.
- Empower consumers to produce their own clean energy, from local communities to large scale industries, from small businesses to vulnerable consumers, from remote areas to densely populated cities.

