

Major study finds multiple benefits of efficient and integrated energy towards net-zero in 2050

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The European Green Deal promises to deliver on a net-zero energy system by 2050, through higher ambition on energy efficiency, system integration and renewable energy. A new study by Artelys published today finds that cogeneration (CHP) is a primary enabler to achieve carbon neutrality in Europe by 2050. Realising the cost-effective potential for CHP in all sectors will maximise energy efficiency and integration of the European energy system at the lowest cost, while bringing key benefits to end consumers.

Today, Artelys published the study “Towards an efficient, integrated and cost-effective net-zero energy system in 2050: the role of cogeneration”. The study was commissioned by COGEN Europe and is supported by 26 industry partners spanning across the entire energy value chain. Building on the European Commission’s ambitious 1.5 TECH scenario in the Long Term Strategy, the study optimises the uptake of CHP in terms of both efficiency and flexibility across integrated heat and power systems.

The study finds that there is cost-effective potential for CHP as a key solution in a highly electrified, highly renewable and low demand net-zero emissions energy system. When considering higher shares of bioenergy sources, CHP uptake is even more relevant fostering the efficient use of these fuels. Optimising CHP as part of integrated energy systems leads to energy system cost reduction of €4.1-€8.2 billion and allows to reduce remaining CO₂ emissions by 4-5 MtCO₂ annually in 2050, as part of a net-zero emissions Europe. CHP will displace less efficient power-only and heat-only generation, contributing 13-16% of total power and 19-27% of total heat production in 2050. Optimised CHP will operate flexibly and efficiently when and where needed, especially at times of peak demand by heat pumps and electrical vehicles and insufficient wind and sun generation.

Christopher Andrey, Projects Director at Artelys, said: “This study highlights the benefits of cogeneration in Europe under different 2050 carbon neutral pathways, at both user and system levels, across different geographies and in all sectors. The study shows that a refined modelling of electricity-heat interlinkages is essential to assess the cost-effective potential for CHPs, in the context of the EU Green Deal in highly decarbonised contexts.”

Hans Korteweg, COGEN Europe Managing Director, commented: “The Artelys study shows that cogeneration enjoys widespread support in the EU and beyond, as a solution of choice across all sectors. Furthermore, it indicates that there is a cost-effective potential for 40 GW of additional cogeneration capacity to be built between now and 2050. This will bring efficient, flexible and affordable power and heat to hundreds of cities and industries, as well as millions of citizens. An ambitious and predictable regulatory framework for cogeneration is imperative to fully reap the benefits of efficiency and energy systems integration for citizens, businesses and the energy system between now and 2050.”

Marco Pezzaglia, COGEN Europe’s Chairman, reacted to the study publication: “The cogeneration industry welcomes the Artelys study, showcasing how cogeneration can be the backbone of a carbon neutral Europe in 2050. In a resource-finite world, we can no longer afford wasting energy. Cogeneration needs to be prioritised over the inefficient separate production of heat and power starting today. This will help maximise energy efficiency in key sectors of the economy and integrate the European energy system at the least cost.”

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About the study

This study pursues three objectives: 1. Explore the potential of further integrating Europe’s energy system in an efficient way to reach a carbon-neutral economy cost-efficiently; 2. Assess the role of cogeneration, building on the European Commission’s Long-Term Decarbonisation Strategy (LTS); 3. Provide recommendations to better reap the benefits of efficient and local system integration solutions in policy-making and modelling.

The study proceeds in two steps: 1. User focus, featuring a micro-economic assessment of heat generation solutions (with/without CHP) in different use-cases first considering the point of view of a user. 2) Whole energy system scenario-based assessment of 2050 European energy mix featuring: Benefits for the whole energy system; and; Cost-optimised high efficiency CHP deployment across 1.5 TECH* & Integrated Energy Systems (IES) decarbonisation pathways.

In this assignment, the Artelys Crystal Super Grid model has been used with European-wide integrated gas, heat and electricity scenarios, capturing key aspects of the energy transition, with a focus on sector integration.

<https://www.cogeneurope.eu/knowledge-centre/cogeneration-in-2050>

About COGEN Europe

COGEN Europe, the European Association for the Promotion of Cogeneration, is the cross-sectoral voice of the cogeneration industry. Its mission is to work with EU institutions and stakeholders to shape better policies and eliminate administrative, regulatory and market barriers to the wider use of cogeneration in Europe. 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.

www.cogeneurope.eu

About Artelys

Artelys is a consulting and software edition company specialised in energy systems modelling and decision-support.

Artelys Crystal Super Grid, used in this study, provides a comprehensive interface that, along with the most advanced quantitative tools, will help you evaluate the costs and benefits of infrastructure projects or policy proposals, as well as optimize investments in generation assets, networks and flexibility solutions.

The Crystal platform has been leveraged to develop the METIS model on behalf of the Directorate General for Energy of the European Commission. METIS includes a set of pan-European multi-energy scenario data.

<https://www.artelys.com/>