COGEN EUROPE

Towards an efficient, integrated and cost-effective net-zero energy system in 2050

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European Energy Forum – Dinner Debate
14 February 2023, Strasbourg

Our Mission

Cross-sectoral voice of the cogeneration industry

Work with EU Institutions and stakeholders to shape better policies by:

Building a robust evidence-base demonstrating the benefits of cogeneration.

Using the expertise of our membership.

Establishing strong coalitions and partnerships.

MEMBERS

National Associations

Corporate Members

Our Vision

Resilient, decentralised and carbon neutral European energy system with cogeneration as its backbone

2050

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COGENERATION

Single Input

Two Outputs

Cogeneration transforms 90% of the energy into useful heat and electricity for factories, offices, public buildings and homes.

Cogeneration at the very heart of Europe…

European Commission

European Parliament

Council of the European Union

All rely on CHP for sustainable heat and power

Cogeneration ready for the future

Hassfurt, Germany

- Hassfurt generates 100% of electricity from RES + **H2 from excess PV/wind**
- **2 CHPs** run **flexibly** on **up to 100% H2 & on biogas,** at times of insufficient PV/wind

Szlachęcin, Poland

- **Waste heat, CHP, heat pumps & district heating**
- **CHP uses waste heat** recovered from sewage treatment plant
- **Heat pump powered by CHP electricity**

Bresia, Italy

- Steelmaker ORI Martin **recovers exhaust gases** to reduce pollution
- **On-site CHP uses waste heat** to generate heat & electricity for the city
- CHP **heat** supplied via DHC to **2000 homes**
- CHP **power** supplied to **700 homes**

PACE Project, EU

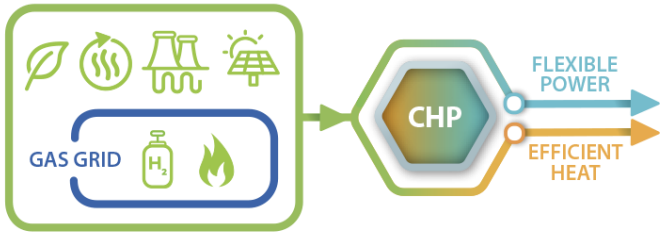
- **Flagship EU project** unlocking the large scale European deployment of **fuel cell micro-CHP**
- Over 2500 micro-CHP to be installed in 10 EU countries

Sources: Hassfurt, Szlachęcin, Brescia, PACE Project

Key role for CHP for EU Green Deal Ambition

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.**

Buildings are “Hard to Decarbonise”

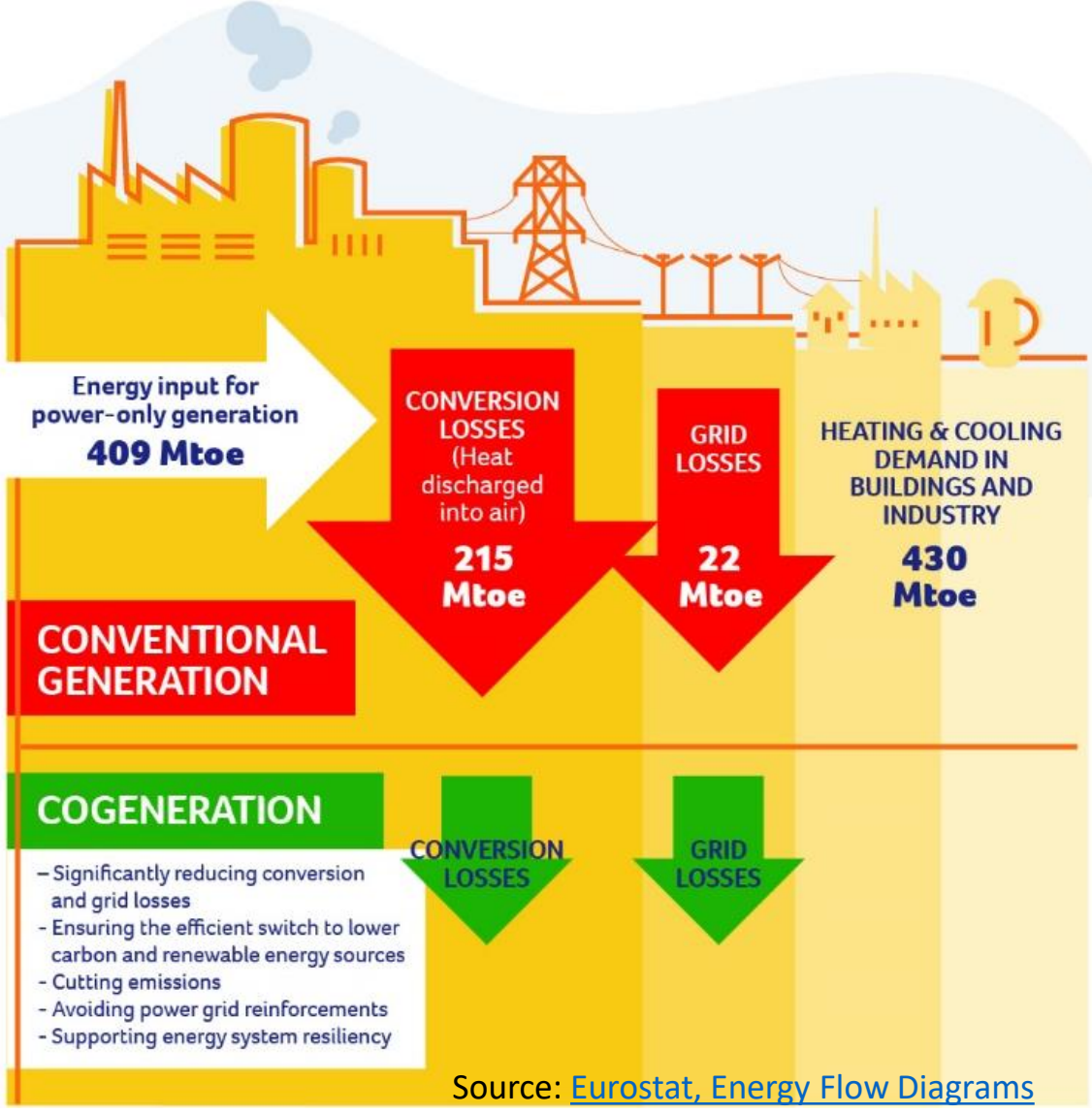
CHALLENGES:

- **40%** of energy consumption & **36%** of GHG emissions;
- **80%** of buildings demand comes from heating and hot water
- **75%** of heat demand is based on inefficient natural gas and oil boilers;
- Electrified heat could **increase peak demand by 200-300%**; and
- **PV and wind are intermittent,** sometimes producing in excess and at times in deficit.

OPPORTUNITIES:

- Improve **building efficiency**;
- **Smartly electrify** through demand-responsive heat pumps;
- **Seasonal storage** of PV & wind excess as **RES H2;**
- Enable **smart CHP** to produce flexible power & clean heat; and
- Foster **heat storage to flexibilise heat pumps & CHP** at district level.

“Energy Efficiency First” Key to Reinforce Virtuous Cycles



Source: Eurostat, Energy Flow Diagrams

Technology neutrality

- PV & wind scaled up to meet most of demand
- CCGTs scaled up to secure back-up capacity for peak demand
- **Vicious cycle:**
  - ➢ *Heat demand becomes peak power demand*
  - ➢ *CCGTs required to produce back-up power, while heat is wasted*

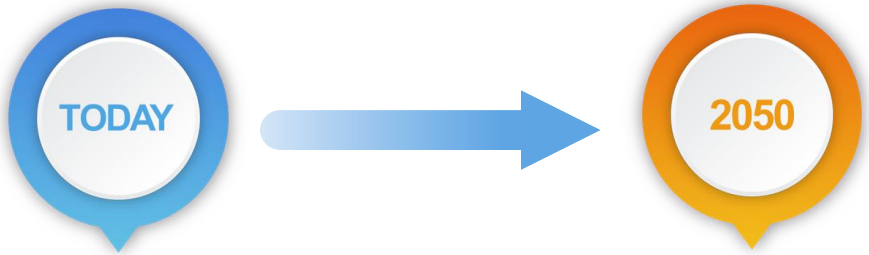
Energy efficiency first

- PV, wind & thermal RES optimised for highest system efficiency
- Direct PV/wind use maximised via demand response & excess stored as H2
- **Virtuous cycle:**
  - ➢ *Heat demand is met with electricity + CHP heat*
  - ➢ *Residual power demand is met with CHP electricity*

ESSENTIAL ROLE OF CHP IN DHC FUTURE

- CHP heat is key for DHC to ensure the **efficient** & **affordable** **switch to lower carbon and increasingly renewable** energy sources

- CHP power increasingly used to provide **flexibility** **and energy system resiliency**, complementing **electrification** and **renewables intermittency**



> 50% of EU's DHC
runs on CHP

~30% of CHP is RES

CHP to provide **30%-40%**
of total DHC heat
~90% of non-electrified heat

0.4 - 3M €
of yearly cost savings
for a DHC using CHP for 500 GWh

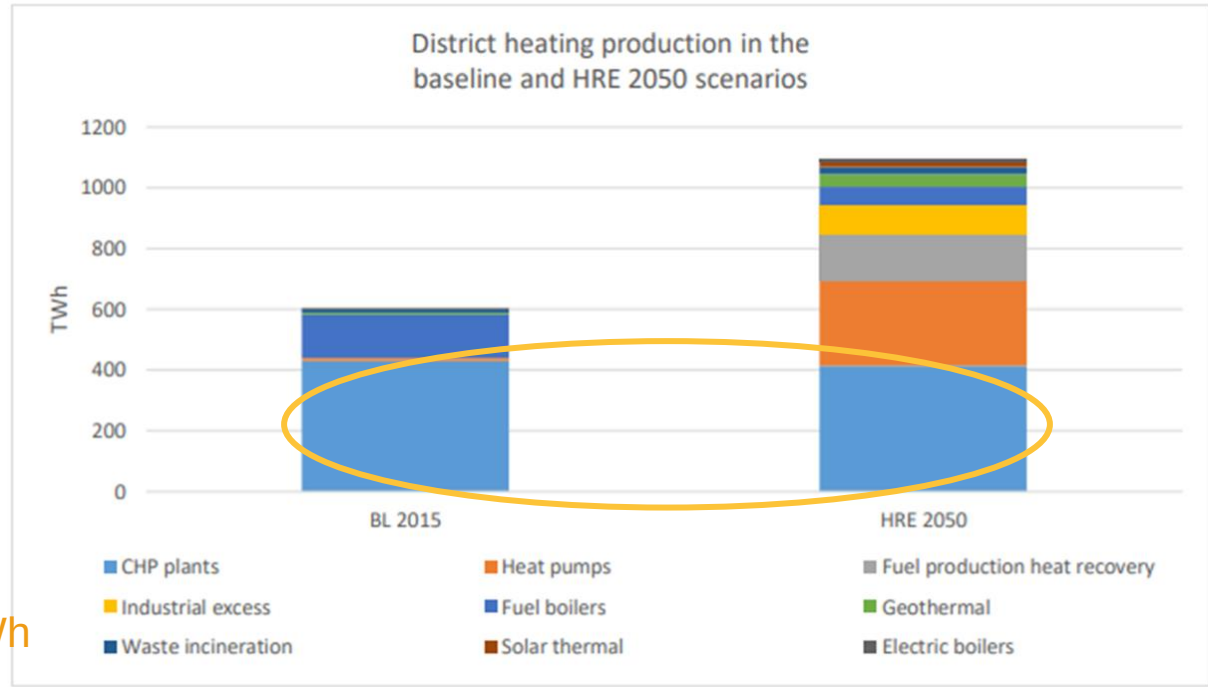


Figure 3-2 Annual district heating production in the baseline and HRE 2050 scenarios

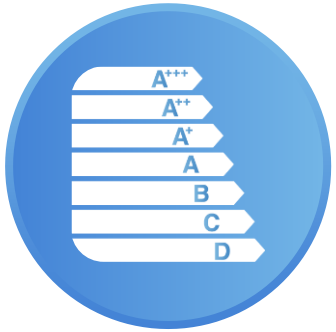
Sources: EU Project Heat Roadmap Europe (HRE), 2019; Artelys, 2020; Eurostat, 2021

CHP's Multiple Benefits in 2050

Artelys OPTIMIZATION SOLUTIONS | STUDY ON THE ROLE OF COGENERATION

€4-8 Bn

↓ cost for energy system



150–220 TWh

↑ energy savings across energy system

~20%

↓ remaining CO_2 emissions

13-16%*
of total electricity

and **~30-36% of flexible thermally generated power** at times of low wind & sun and to cover peak demand

19-27%**
of total heat

and **52-100%*** of thermal heat** in buildings, industry & district heating

* excluding off-grid RES for P2X generation.
** excluding furnaces.
*** excluding furnaces; DHC for industry is 100% CHP.

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Source: Artelys, 2020. Cogeneration in 2050

Policy recommendations:

1

Energy efficiency first

- *Prioritise high efficiency cogeneration for thermal energy production to maximise renewable energy use and reduce fossil fuel consumption and GHG emissions*
- *Recognise role of high efficiency CHP in the "efficient DHC" definition by 2050, beyond 2035 (EED)*

2

Zero-emission buildings (EPBD)

- *Create a level playing field for renewable energy produced on-site or delivered to buildings through all energy carriers*
- *Allow new buildings to connect to existing efficient DHC and high efficiency CHP*

3

Demand-side flexibility (EPBD)

- *Recognise sector coupling solutions like smart cogeneration to produce flexible power at times of high peak demand and insufficient PV/wind generation.*

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