



To decarbonise buildings, the EU needs efficient solutions using decarbonised and renewable gas and electricity.

# Gaseous solutions for residential heating

Renewable and low-carbon gases provide cost-efficient and reliable heating solutions in many building areas where electric heat pumps are not fit-for-purpose and technically inefficient.

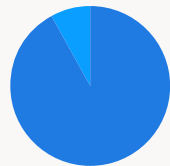
 The residential heating sector is a **European industry:**



Directly employing over 125,000 people

1.8 MILLION

jobs in value chain



Imports from non-EU countries are less than 10%



Biomethane, renewable LPG, and hydrogen markets create local jobs

Today's residential heating sector offers technologies that can swiftly reduce GHG emissions. The installed stock of boilers can often run with 10-20% of hydrogen blends and many of the latest generation of boilers are certified to work with 20% hydrogen blended in the natural gas, biomethane, and synthetic methane grids. From 2025, new generations of boilers will be 100% hydrogen-ready to ensure customers can easily convert from methane or blends to 100% hydrogen at marginal costs via a dedicated conversion kit. All gas appliances can run on low-carbon and renewable gases, including biomethane, bio and renewable LPG, and hydrogen.



The gas industry's solutions achieve tangible results that improve the energy performance of buildings

**Gas condensing boilers:** provide heating as well as hot water efficiently, by condensing water vapours produced in the combustion process into liquid form. They achieve up to 35% CO<sub>2</sub> emissions reduction when replacing non-condensing technology.

**Water heaters:** provide water at the required temperature, running on gas (or electricity).

**Hybrid heat pumps:** combine an electric heat pump with a gas or a boiler for more system efficiency and sector integration directly at home. They enable the use of renewable fuels, minimise CO<sub>2</sub> emissions, and provide flexible delivery of heating depending on seasonal fluctuations, building requirements, or exogenous limitations.

**Thermally driven heat pumps:** use gases as the source of energy to transfer heat from the environment to buildings and are ready for low carbon and renewable gases.

**MicroCHP and fuel cells:** generate heat and electricity simultaneously, from the same energy source, in individual homes or buildings. They reduce CO<sub>2</sub> emissions thanks to low fuel requirements.

Benefits of gaseous solutions:

- Flexible and immediately available
- Decarbonisation wins by replacing coal and oil heating systems
- Renewable and low-carbon gases provide clean solutions to fully decarbonise the energy system
- Complement intermittent renewables production and increase electricity demand
- Developed, reliable networks with high storage capacity and efficient technologies

## System efficiency of existing gas infrastructure

End-users in the heating sector can benefit from well-developed gas infrastructure. It represents an efficient solution to integrate renewable and low-carbon gases and will allow large cost- and time savings for heating customers and the society in general.

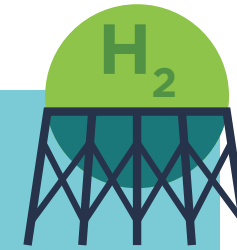
Gas infrastructures' key advantages for gaseous solutions in heating:

- A hydrogen pipeline can transport 10-20 times more energy than an electricity cable
- Repurposed pipelines represent 10-35% of costs required for a newly built hydrogen pipeline
- Gas storages are at least 100 times cheaper than electricity storage in batteries

A better energy system integration between gas and electricity grids is crucial: it can reduce price volatility and overall end-user energy prices. Thereby, it protects customers and alleviates energy poverty.

Moreover, the existing infrastructure can be used to accommodate renewable gases also in off-grid areas.

## Hydrogen: the technology of the present and the future



In most parts of Europe, the gas grid can be adapted quickly to accommodate up to 20% hydrogen with very limited costs and many parts of the grid are ready for 100%. Heating technologies are ready for or can be easily replaced with hydrogen in buildings and will provide a stable demand.

Different and complementary scenarios are currently being investigated:

- Via a dedicated H2 infrastructure and storage;
- By blending H2 with natural gas, biomethane, or emethane from the existing gas grid;
- The local production of H2 by energy independent buildings to store electricity excess;
- The use of H2 for district heating networks.

### To transition towards climate-neutral residential heating in Europe by 2050, we recommend a robust policy framework that:

- Accelerates and supports the **replacement of inefficient heating equipment**, installed in existing EU buildings.
- Enables and favours the **rollout of low-carbon and renewable gases** such as biomethane, synthetic methane, hydrogen and bioLPG in the heating sector.
- Makes good use of the **synergies between energy vectors** to optimise systems and cost efficiency.
- Enables and promotes the **digitalisation of heating systems**.
- Incentivises building insulation and takes a comprehensive approach and focus on the **cost-effective modernisation of heating and cooling systems**.

