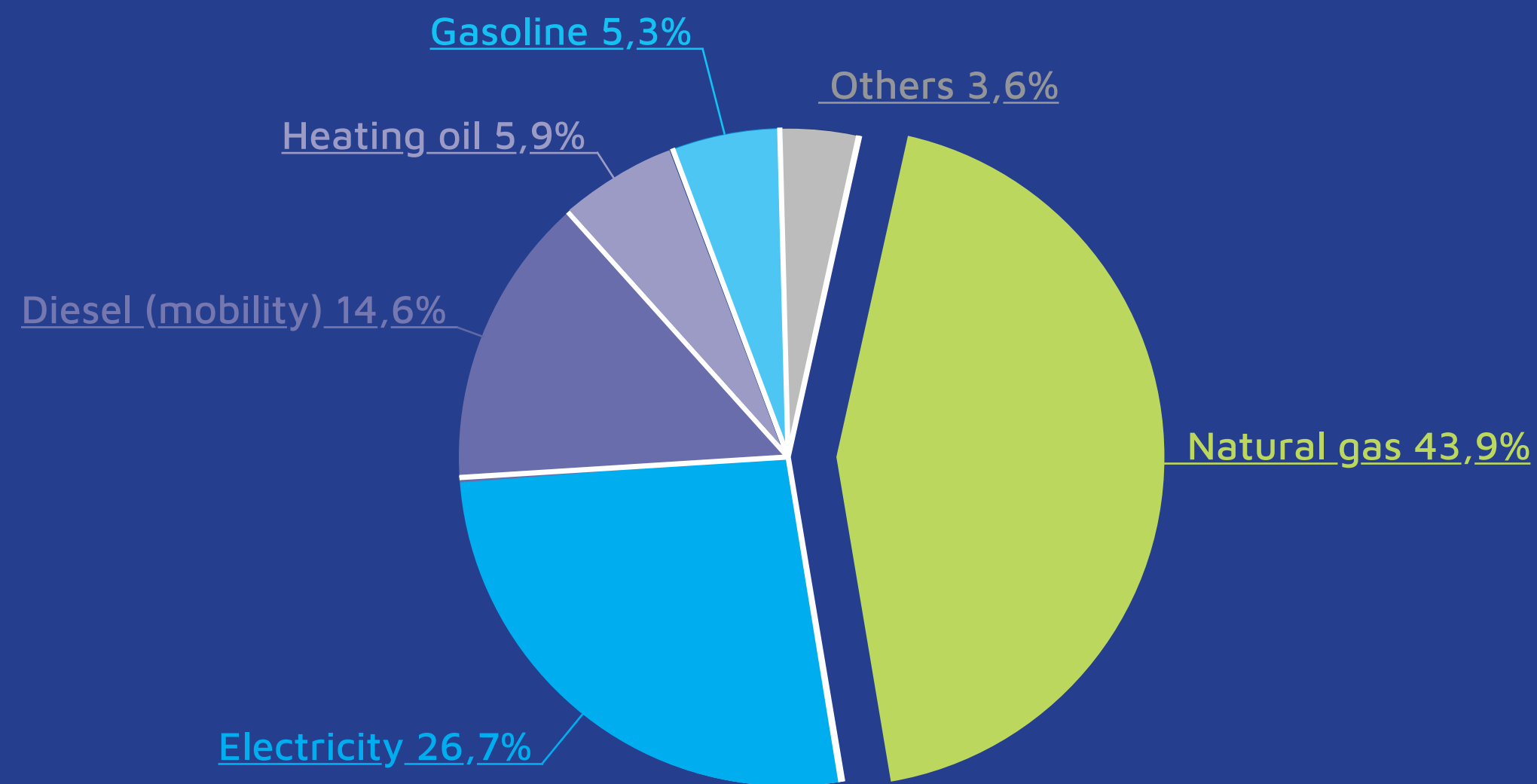


# The prominent role of natural gas in Brussels

Natural gas is central in Brussels' current energy system. It accounts for roughly half of all the energy consumed in the region and is mostly used for heating buildings. Decarbonising natural gas will therefore be a major challenge to achieve a zero-carbon economy in the Region by 2050

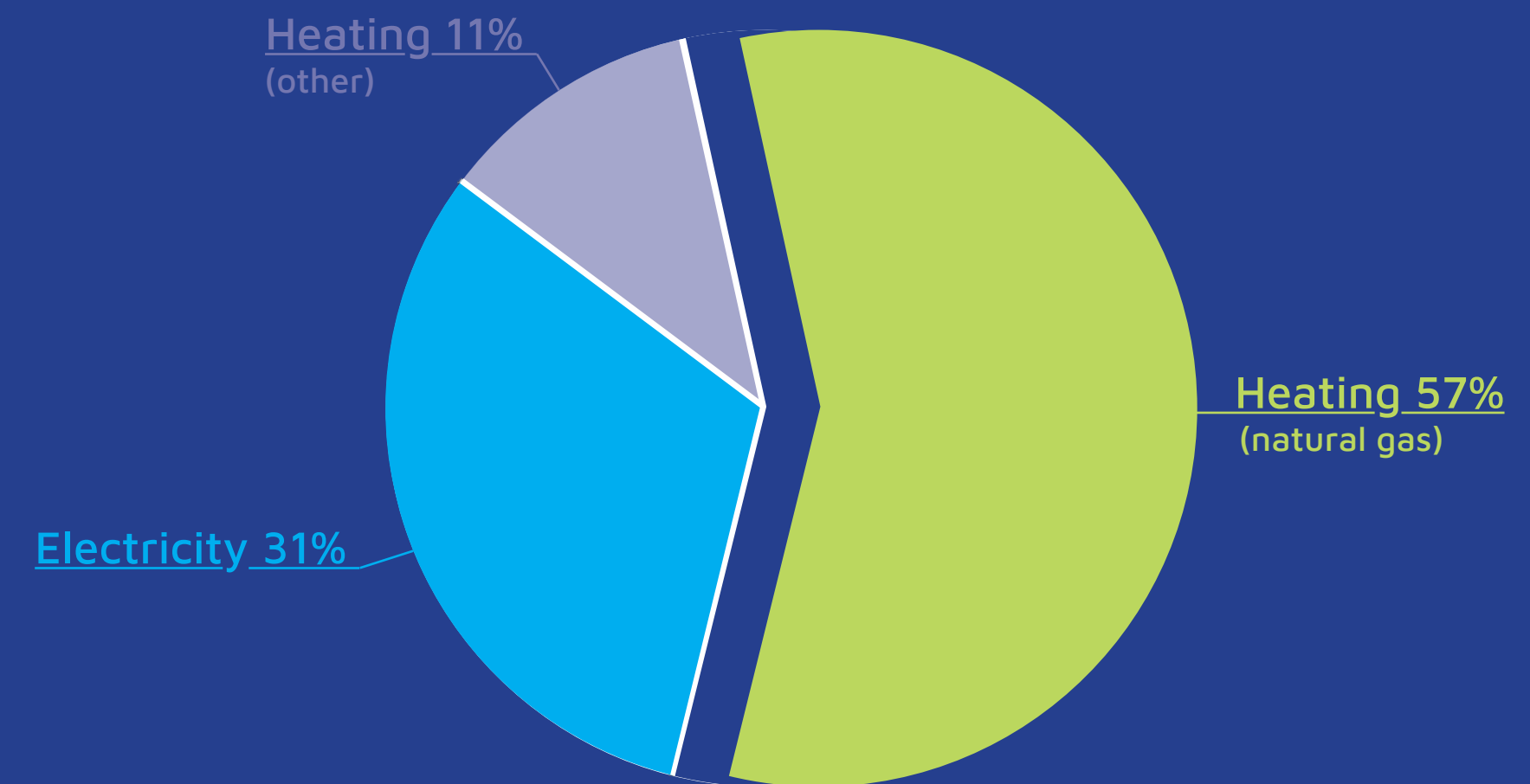
## Natural gas is the main energy source for the Brussels economy.

Final energy consumption in Brussels per energy vector (%), 2018



## Most buildings in Brussels depend on natural gas for heating.

Energy consumption in buildings in Brussels (%), 2018

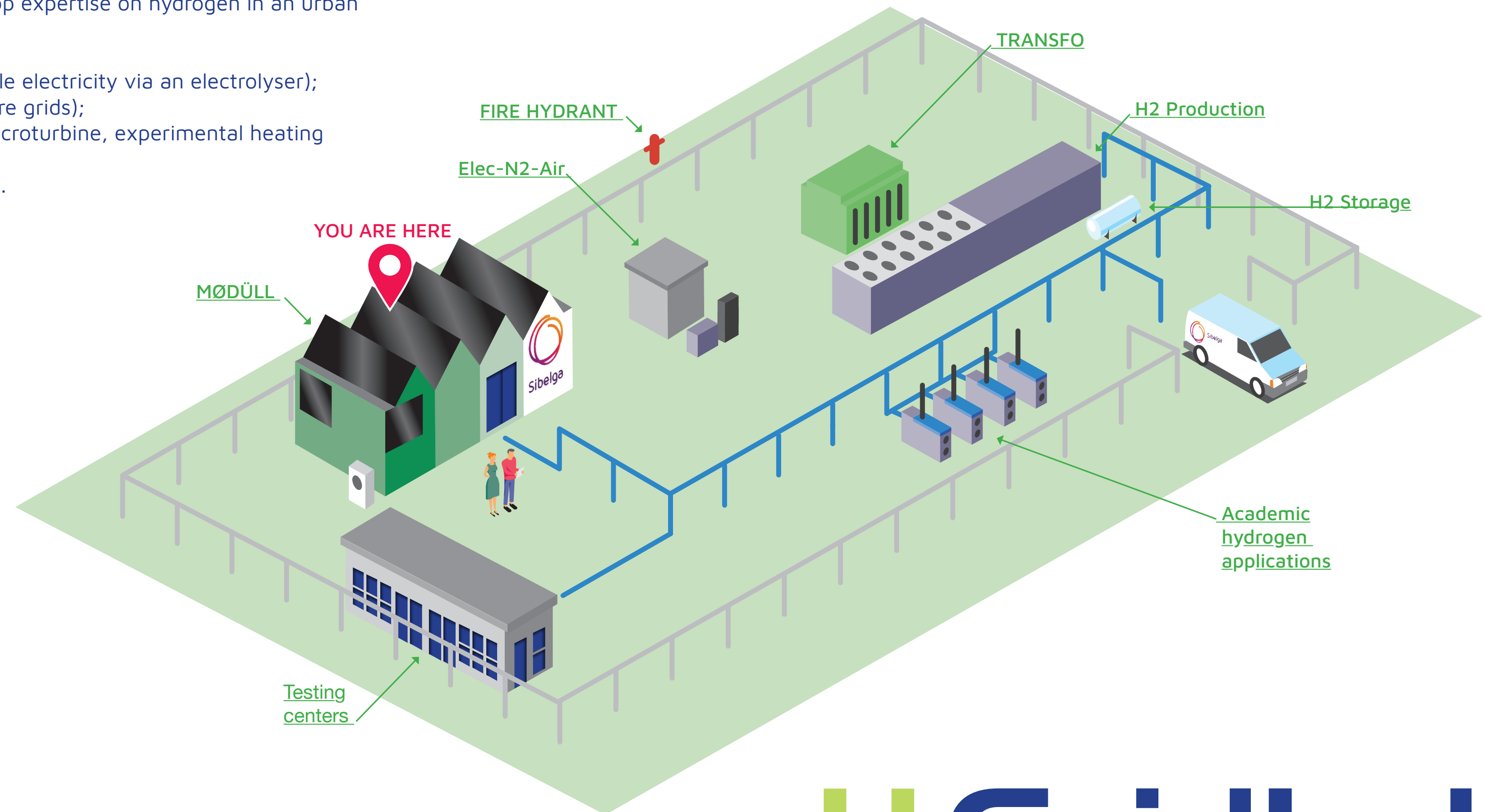


# The hydrogen living lab project (H2GridLab)

This interactive demonstration site aims to develop expertise on hydrogen in an urban environment.

The lab includes:

- on-site hydrogen generation (based on renewable electricity via an electrolyser);
- two testing centers (high and middle/low pressure grids);
- various hydrogen applications (piston engine, microturbine, experimental heating network) run by the universities;
- a small hydrogen grid to connect all the facilities.



The MØDÜLL you're standing in today is the very first building block of the living lab. In future, it will become the researchers' office, serving as a testing ground for residential applications running on alternative gases.

# H<sub>2</sub>GridLab

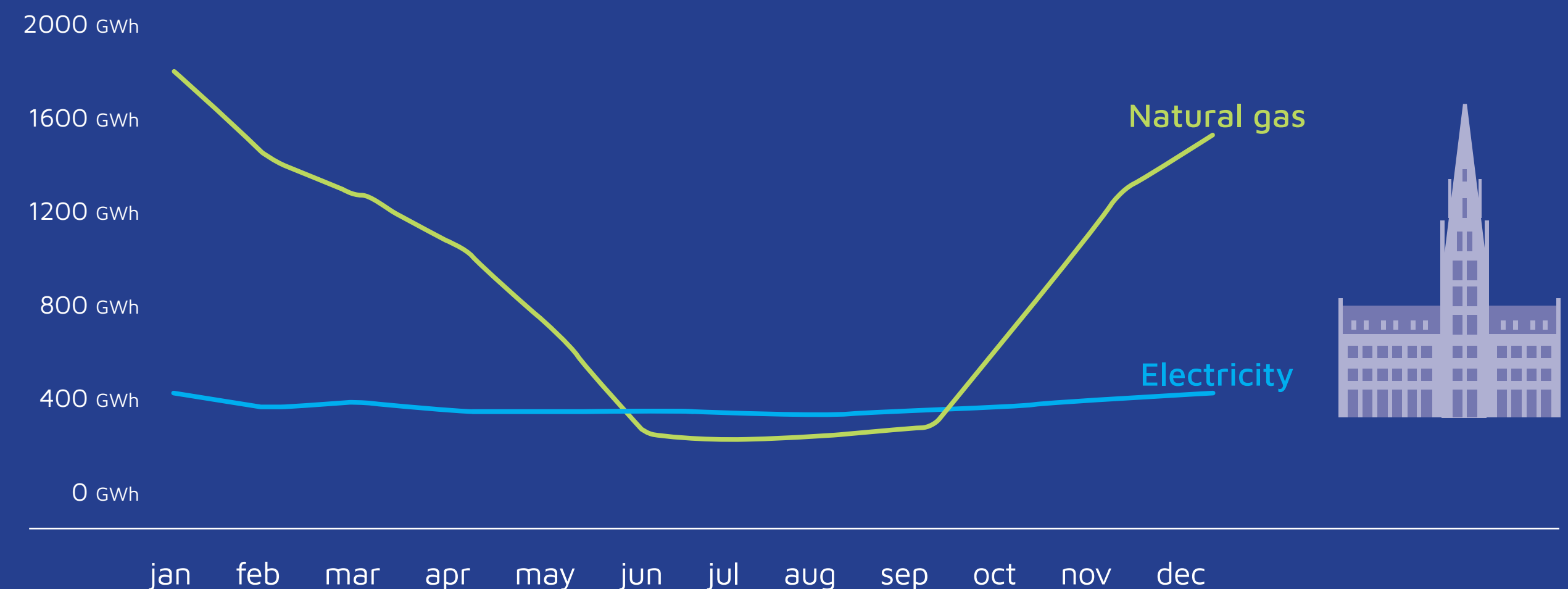
# Natural gas: a key asset for the energy system

A mix of natural gas and electricity is essential to meet our current energy needs, therefore the gas molecules will still play an essential role in the energy transition. In combination with electricity, we note the following benefits:

- 🔋 Easy to store: Whereas electricity can be stored in batteries on a smaller scale, natural gas can easily be stored for long periods of time whereas electricity generation and demand must be perfectly balanced at all times by system operators;
- 🔄 Flexibility: Thanks to its ease of storage, natural gas can be used when needed e.g. when peak energy demand cannot be met by variable renewable sources;
- 🏠 High energy output: Brussels's natural gas grid meets more than 80% of the peak energy demand in winter (whereas the rest is met by the electricity grid);
- 📦 Easy to import: Natural gas can be imported from abroad – via pipeline or as LNG – more efficiently than electricity via cables. Green gas imports will help to diversify our gas source

**Gas is a flexible energy source that can be injected into the grid to help meet peak demand.**

Net input of electricity and gas into distribution grids in Brussels, 2021



Brussels's gas and electricity distribution grid operator Sibelga has embarked on testing the potential of alternative gases (biomethane, syngas and hydrogen) to "decarbonise" natural gas use. The Hydrogen to Grid National Living Lab (H2GridLab) will assess the potential role of hydrogen in Brussels's energy system. Sibelga's partners at H2GridLab are academic institutions (ULB, VUB) and Fluxys (Belgium's gas transmission system operator).

# Testing hydrogen-fed heating technologies in the MØDULL

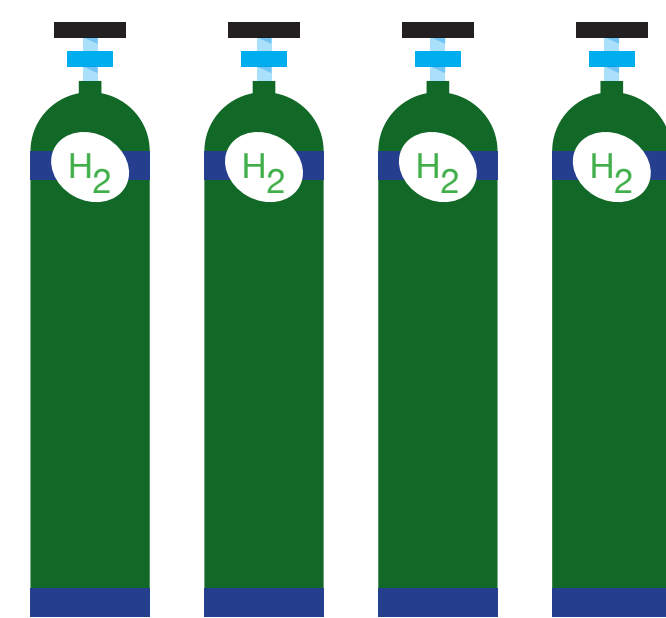
A key issue for Sibelga is assessing the potential requirements of its gas network to potentially allow for a smooth switch from natural gas to hydrogen. Estimating retrofit needs requires the on-site testing of various natural gas grid assets such as pipes, welding, valves and so on. Potential changes to the intervention protocols currently used to manage the grid will also need to be assessed.

In addition, Sibelga will test various heating technologies running on alternative gases. This will allow a better understanding of their technical constraints, on-the-ground performance, and overall suitability for Brussels's energy system. Deliveries of compressed hydrogen will eventually be replaced by on-site hydrogen production.

For its heating needs, the MØDULL includes a 'hydrogen hybrid heat pump', capable of running on either electricity (via a heat pump) or hydrogen (burned in a boiler). In this case, heat pump and boiler work together to optimise the efficiency of the overall system. The boiler runs when energy demand is high and outside temperatures are low, i.e. heat pump efficiency drops considerably.

By making use of both electricity and gas networks, hybrid heating technologies have two benefits: one, their flexibility allows for a higher share of renewable power in the energy system and two, they can reduce the impact of heating on the electricity grid during peak demand.

Hybrid technologies could help decarbonise gas in Brussels, especially in buildings which are hard to renovate due to urban or technical constraints.



Compressed H<sub>2</sub> tanks

