

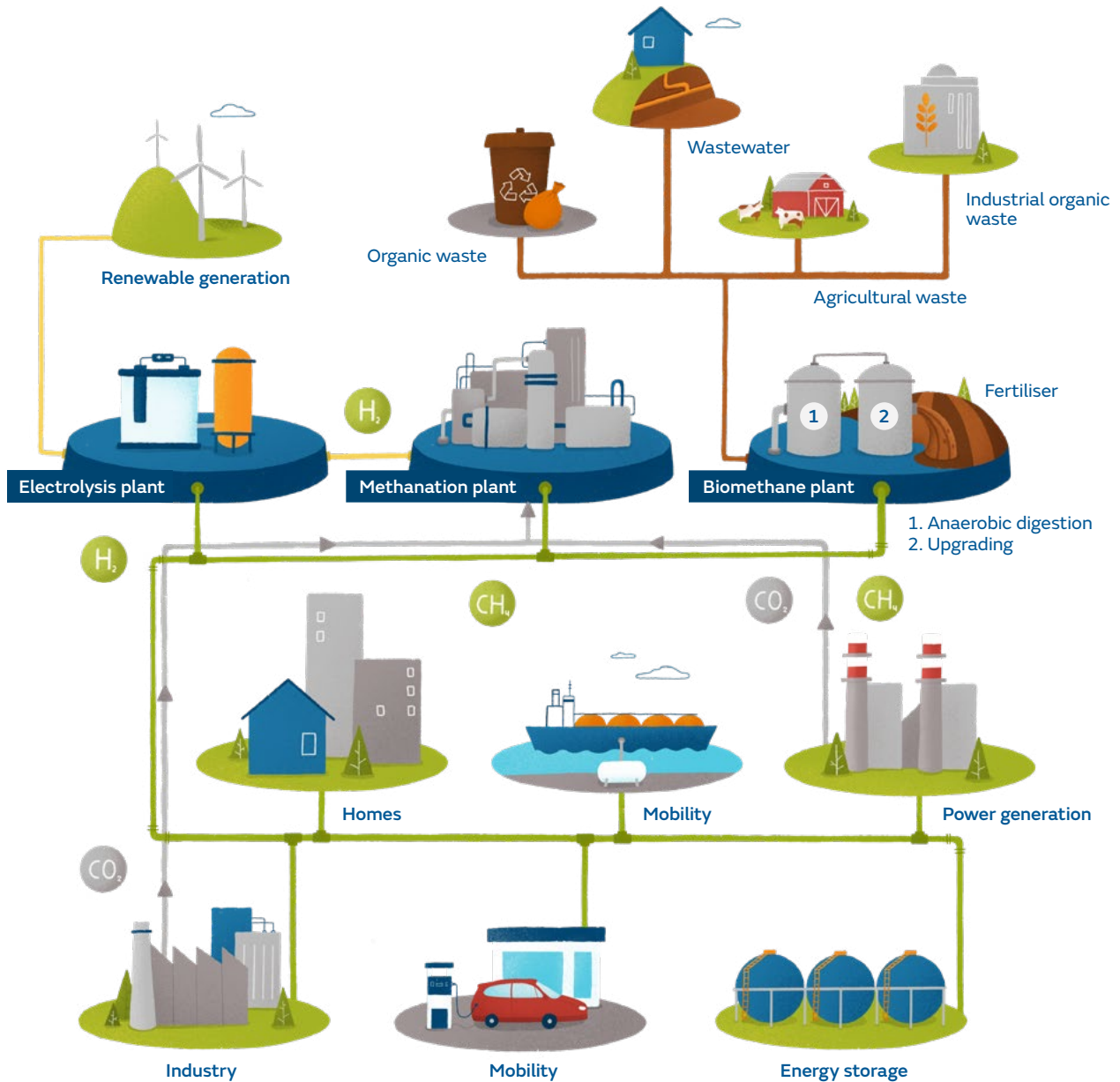
Renewable gas

Circular energy  
today for a **decarbonised**  
future



Naturgy 

## What is renewable gas?



Renewable gases are obtained from raw materials or renewable sources, and can be one of three types:

### Biomethane

From the anaerobic digestion of organic waste, such as domestic waste, industrial waste, purification plant sludge or livestock manure. After this digestion, it undergoes an “upgrading” process to achieve the conditions that make it fully compatible with current natural gas, meaning that it can be transported by the existing gas infrastructure. **The process generates a by-product which is an excellent fertiliser**, thereby fitting into the logic of a circular economy.

### Synthesis gas or syngas

Obtained by thermal gasification of waste, it allows any waste except glass and metal to be managed. However, the process is mostly applied to lignocellulosic biomass, such as forestry and agricultural waste, which could also help to prevent fires.

### Green hydrogen

Produced from renewable electricity through the electrolysis of water, it can be stored in existing gas networks without the need for batteries (in Spain, the gas system has the capacity to store the equivalent of 2 months of the country’s entire electricity consumption).

This option avoids the consumption of materials, energy and waste associated with the batteries and, unlike batteries, allows energy to be stored for long periods of time to make up for seasonal differences in demand in our country.

Green hydrogen can be injected into gas networks, up to a maximum of 20-30% of their capacity.

**Through a methanation process, H<sub>2</sub> is combined with CO<sub>2</sub> captured from the generation industry and transformed into methane**, unlimited amounts of which can be injected into the gas system.

## Benefits and potential of renewable gases

- All renewable gases **contribute to reducing greenhouse gas (GHG) emissions** and are key to the decarbonisation of the energy system, as they avoid CO<sub>2</sub> emissions from the natural gas that they replace. The GHG emissions reduction potential could reach 35 Mt CO<sub>2</sub>eq/year, i.e., over 15% of total emissions forecast for 2030 in Spain.
- Renewable gases produced from organic waste **are not only carbon neutral but can also even have negative CO<sub>2</sub> emissions**. They act as a sump and remove greenhouse gases from the atmosphere. This is the case of biomethane from livestock manure, the current processing of which causes GHG emissions. The transformation of this waste into renewable gas can avoid emitting into the atmosphere 200% of the CO<sub>2</sub> that would have been emitted by the replaced fossil fuel.
- In addition, this circular model has other advantages, such as **improving the environmental management of organic waste** as conflictive as: livestock manure, slurry, manure, chicken manure, sewage sludge or the organic fraction of household waste. It also avoids the unwanted effects that this waste has on people and biodiversity caused by water pollution, unpleasant odours, etc.
- From a social point of view, **it supports local rural development, job creation and populations in agricultural and livestock farming environments**, reducing foreign energy dependence and therefore the country's energy bill
  - The injection of renewable gases into the natural gas network is a **major milestone in the decarbonisation process**, mirrors developments that are already being seen in different European countries and is a **perfect example of the concept of a circular economy**.

## Naturgy's renewable gas projects

Since 2014, Naturgy has been developing innovative projects to understand and reduce production costs, and boost the injection of renewable gases into the gas network:

### Life Methamorphosis <sup>(Lleida)</sup>

#### Transformation of pig slurry into biomethane.

Biomethane is used to power two SEAT cars, one of which has driven more than 100,000 km on this fuel alone. It is also injected into the gas network. Production of 135 m<sup>3</sup>/h of biomethane (11.6 GWh/year), equivalent to the consumption of 2,320 homes. Emissions savings 2,900 t CO<sub>2</sub>. Naturgy Investment: €1.4 M



### Mixed renewable natural gas unit <sup>(A Coruña)</sup>

#### Treatment of wastewater sludge from the Bens

WWTP. Biomethane fuels a bus providing regular services in A Coruña, which has travelled more than 100,000 km powered by the city's own waste. From mid-2021 biomethane will be injected into the natural gas network. Production of 65 m<sup>3</sup>/h of biomethane (5.5 GWh/year), equivalent to the consumption of 1,100 homes. Emissions savings of 1,356 t CO<sub>2</sub>. Naturgy Investment: €1,1 M



### Butarque WWTP (Madrid)

**Treatment of sewage sludge and upgrading to biomethane** with injection into the natural gas distribution network, for the first time in Spain, in October 2019. Benchmark project for the creation of the “Template for Renewable Gas Certificates of Origin”. Production of 56 m<sup>3</sup>/h (5 GWh/year), equivalent to the consumption of 1,000 homes. Emissions savings of 1,266 t of CO<sub>2</sub>. Naturgy Investment: €0.8 M

### COSIN (P2G): WWTP (Sabadell)

**A biomethane production research project** using CO<sub>2</sub> catalytic hydrogenation technology. It uses H<sub>2</sub> produced by electrolysis and CO<sub>2</sub> from a biological source, resulting in a renewable gas with negative GHG emissions. Naturgy Investment: €0.8 M

### Elena Landfill (Barcelona)

**A project under construction that will take advantage of the biogas generated at the landfill**, which will no longer be flared and will instead be upgraded to biomethane for injection into the gas distribution network from mid-2021 onwards. Treatment of up to 400 m<sup>3</sup>/h of biogas in the first few years of operation, equivalent to the consumption of 4,000 homes. Naturgy Investment: €2.2 M

Other **projects that inject biomethane into the network run by Nedgia**, the Naturgy Group’s gas distribution company, are:

### Biogasnalia (Burgos)

**A project through which a livestock company recycles organic waste** by producing biomethane and injecting it into the Burgos natural gas network. Injection of 16 GWh/year, equivalent to the gas consumption of 3,200 homes.

### Torresantamaría (Lleida)

Production of biomethane from organic waste from a major livestock farm. In the preliminary phase, 30 GWh/year will be injected into the Lleida gas network by the end of 2021. A further 90 GWh per year will be injected in 2022 during the course of the second phase. As a result, 24,000 homes are powered by renewable gas.

### Hostalets de Pierola (Barcelona)

A project where biomethane produced by Catalonia’s largest landfill is recycled for injecting into the gas network. In service since the end of 2022, with an estimated biomethane production of 70 GWh/year, it is equivalent to the gas consumption of 14,000 homes.



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