Renewable gas

Circular energy today for a **decarbonised** future
What is renewable gas?

There are three types of Renewable Gases which are obtained from non-fossil raw materials, residues or other bio-sources:

**Biogas**
Produced from the anaerobic digestion of organic wastes, such as domestic refuse, industrial organic wastes, waste water treatment sludges or livestock waste products. An excellent fertiliser subproduct is also produced in this process, and the production of biogas is great demonstration of the circular economy.

**Synthesis gas or syngas**
Obtained by thermal gasification of ligno-cellulose organic matter such as forest and agricultural materials and waste materials, which can contribute to forestry management and help prevent fires.

**Green hydrogen**
Renewable electricity is used to split water with electrolysis to produce green hydrogen that can be stored in the existing natural gas networks for very long periods reducing the need for battery storage (in Spain, the natural gas system has the capacity to store an amount of energy equivalent to two months of the country’s electricity consumption). This alternative avoids the use of raw of materials, energy and wastes associated with batteries and, unlike a battery, permits energy to be stored for very long periods, to cover the seasonal differences in demand.

Green hydrogen can potentially be injected into gas networks and mixed with natural gas at concentration up to a maximum of 20-30%. It can also be converted to biomethane by means of methanation, a reaction between H₂ and and waste CO₂ captured from industry or power generation. This biomethane can be injected into the natural gas system without any limitation.
Benefits and potential of renewable gases

- All renewable gases contribute to the reduction of greenhouse gas emissions (GHG) and have a key role to play in the decarbonisation of the energy system. The potential for reducing the emissions of GHG could reach 35 Mt CO₂eq/year, which will be equivalent to more than 15% of the total Spanish emissions predicted in 2030.
- Renewable gases produced from organic waste are not only carbon-neutral, but may even have negative CO₂ emissions, and act as a sink for the removal of GHG from the atmosphere. This is the case for biomethane produced from livestock excrements, a source that will emit GHG as it decomposes. The transformation of this waste material into renewable gases which can then subsequently substitute a fossil fuel could prevent the release into the atmosphere of 200% of the CO₂ emissions by substituting the fossil fuel.
- Moreover, this circular model has further advantages, improving the environmental management of organic wastes such as livestock slurries, slurry, manure, poultry droppings, waste water treatment sludges and the organic fraction of domestic waste products. It can contribute to avoiding the undesirable effects on biodiversity caused by water pollution, bad smells, etc.
- From the social perspective, renewable gases can support local rural development, securing local employment in agricultural environments. It also reduces the country’s dependence on external energy.

Naturgy’s renewable gas projects

Since 2014, Naturgy has participated in research and innovation projects with the goals to maximise the production of these gases, to determine and reduce their production costs and to encourage the injection of renewable gases into the natural gas network.

**Life Methamorphosis** (Lleida)
Transformation of pig slurry into biomethane.
This biomethane has been used to fuel two SEAT cars, one of which has covered more than 100,000 km running solely on this biofuel. It is foreseen that the biomethane produced will be injected into the local gas network in the future. Production 135 Nm³/h of biomethane (11.6 GWh/year), equivalent to the consumption of 2320 homes. Emissions avoided are 2900 t CO₂. Naturgy’s investment: €1.4 M.

**Unidad Mixta-Renewable gas activity** (A Coruña)
Treatment of wastewater sludge at the Bens waste water treatment plant. The biomethane is used to fuel a local bus circulating in A Coruña city that has covered more than 100,000 km propelled by the city’s own waste products. Production 65 Nm³/h of biomethane (5.5 GWh/year), equivalent to the consumption of 1100 homes. Emissions avoided are 1266 t CO₂. Naturgy’s investment: €1.1 M.

**Butarque waste water treatment plant** (Madrid)
Treatment of wastewater sludge to produce biogas and upgrading of biogas to biomethane with injection into the local distribution network since October 2019. This was the first time biomethane was injected in the distribution network in Spain. This is a reference project for creation of a model for “the Certification of Origin of Renewable Gases in Spain”. Production 56 Nm³/h (5 GWh/year), equivalent to the consumption of 1000 homes. Emissions avoided are 1266 t CO₂. Naturgy’s investment: €0.8 M.

**COSIN (P2G): Waste water treatment** (Sabadell)
Research project into the methanation of a waste biological CO₂ stream with H₂ produced by electrolysis using CO₂ catalytic hydrogenation technology. The renewable gas produced has negative GHG emissions. Naturgy’s investment: €0.8 M.

**Elena Landfill park** (Barcelona)
Project under construction which will harness the biogas generated in the closed landfill site and upgrading it to biomethane to eliminate the flaring of the biogas at the site. Treatment of up to 400 Nm³/h of biogas is expected during the first years of operation, equivalent to the consumption of 4000 homes. Naturgy’s investment: €2.2 M.