SynBioS technical description

How it all works: from water to hydrogen and then to biomethane

How does a plant like this work? And why did Hera decide to put one inside a purification plant?

During the first stage, the plant produces “green” hydrogen through electrolysis. To be more specific, the electrolyser, using renewable energy, separates the purified wastewater, producing hydrogen and oxygen. The latter is sent back to the purification tanks, while in the second phase, the hydrogen thus obtained becomes biomethane.

A wastewater purification plant serving large urban centres is provided with an anaerobic digestion plant which, fed with sewage sludge, produces a mixture of methane and carbon dioxide (referred to as biogas). This mixture is fed into a biological reactor, which contains bacteria able to produce additional methane by combining the carbon dioxide with the hydrogen obtained during the first stage. In this way, as the carbon dioxide disappears, pure biomethane is obtained that can be injected and used, for example, in normal gas networks. The entire process is completed very quickly, in such a way that biomethane is produced within a few seconds of powering the plant electrically.

The benefits of the plant, which brings together process efficiency, circular economy and emission control

In the future, the oxygen, separated from the hydrogen during the first stage, could enable the purification plant to increase its capacity to break down pollutants in the water. Oxygen is indeed needed to purify water, and this technology can provide it in a sustainable way.

This plant does not consume precious water, but is supplied with water already used by citizens and transported to the purification plant through the sewage system.

Excess renewable electricity (i.e. not immediately absorbed by the grid) is used without dispersion, fuelling the hydrogen production.

The city’s gas distribution network is used to transport a green gas produced using carbon dioxide (that would otherwise be dispersed into the atmosphere) which can therefore be directly used without requiring any adaptations whatsoever to the city’s distribution networks nor to the domestic or industrial user’s devices.