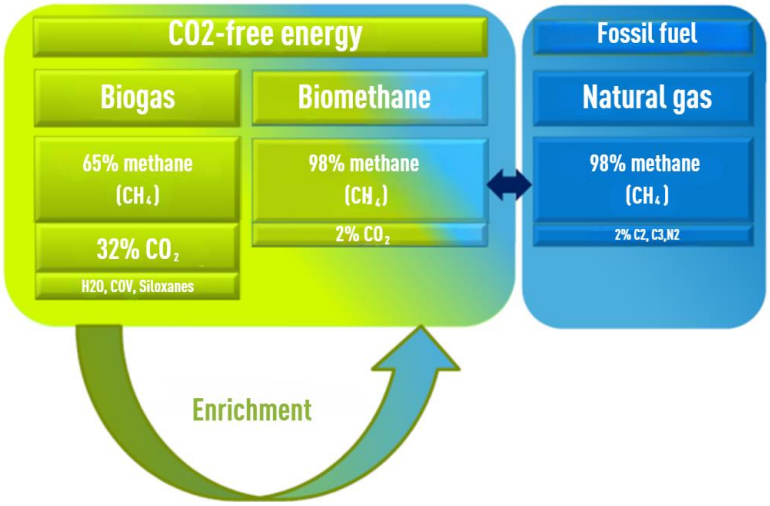
# ClimateAdvanced® **Treatment**

# Membrane-Based Biogas Upgrading System

VALOPUR® Biogas *Upgrading* System

## DESCRIPTION OF THE TECHNOLOGY

Biogas can be obtained from organic waste in many environmental facilities through an anaerobic digestion process. Biogas is primarily composed of methane and carbon dioxide, along with smaller amounts of other gases such as nitrogen and oxygen, and impurities like hydrogen sulfide ($H_2S$), Volatile Organic Compounds (VOCs), or siloxanes. Due to its high calorific value, this gas **can be upgraded or enriched through a process** where methane is separated from the aforementioned compounds. This results in **biomethane**, a gas equivalent to natural gas but of **non-fossil** origin**.**




SUEZ AIR & CLIMATE has extensive experience in biogas treatment and collaborates with Prodeval and uses the VALOPUR® **membrane upgrading** system to produce high-purity biomethane.

The different permeation rates of the molecules contained in biogas determine their varying diffusion speeds through the membranes, making it possible to separate $CH_4$ (low diffusion rate) from $CO_2$.


## ADVANTAGES AND BENEFITS OF THE SOLUTION

Highly **reliable and robust** membrane technology; currently the best-selling solution

Unlike other technologies, it **generates no** waste

**Compact system**

All equipment (except pretreatment) is housed within a container

**Easily adaptable technology to design flow modifications** without incurring significant costs as it only involves increasing or decreasing the number of membranes

## KEY FIGURES

**>99%**

**$CH_4$ recovery rate**

**<1%**

**methane loss** in off-gas

**~0.3 kWh/Nm³**

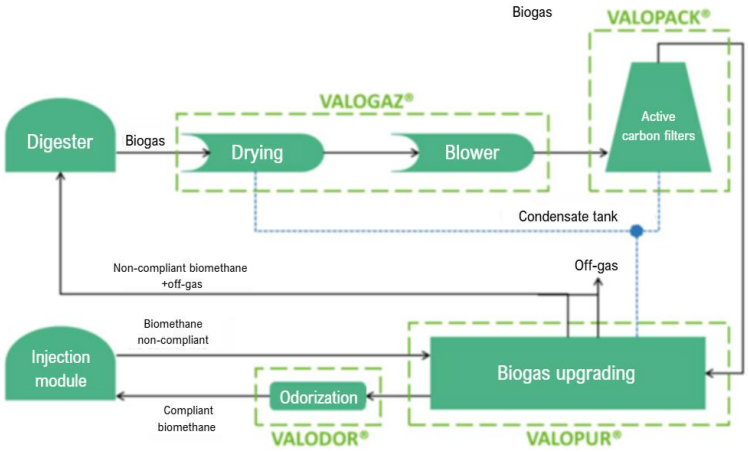
**low electricity consumption**

## DESIGN AND EFFICIENCY DATA

To perform an upgrading, the biogas is first **purified** to remove potential contaminants, such as $H_2S$ and siloxanes. The moisture is then **condensed** by cooling the gas stream to 5°C. Once dried, the biogas is directed to the next stage with **a blower**, where an activated **carbon filter** eliminates any remaining traces of $H_2S$ and VOCs.

Next, the clean biogas enters the **upgrading** phase, during which $CO_2$ (which can be liquified and reused) is separated from $CH_4$. For this, it is compressed to an operating pressure between 4 and 16 barg and **passes through the various membrane modules**. The number of membrane stages may vary depending on the required purity and quantity. For higher **purity and better recovery**, a 3-stage membrane system is ideal. However, for smaller biogas flows, upgrading can be performed in a single step, reducing costs.

Finally, if necessary, the biomethane can undergo an odourisation process, which involves saturating it with the **odorous** compound THT.




## INDUSTRIAL APPLICATIONS

The technology provided by SUEZ AIR & CLIMATE produces biomethane suitable for applications such as:

- Injection into the existing natural gas grid to meet industrial and residential energy needs
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- Compression to 200-250 barg for use as biofuel in public or private vehicles, truck fleets, buses, etc
- Liquefaction of biomethane for the production of Bio-LNG to be used as fuel.


SUEZ

**AIR & CLIMATE**

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