



METHANE PLASMALYSIS

Production of hydrogen and carbon black

Methane plasmalysis is the **key technology for producing large quantities of high-purity hydrogen from natural gas** with only a quarter of the energy required for electrolysis. With the methane plasmalysis process developed by Graforce, the methane (CH_4) is not broken down catalytically or at very high temperature, but rather **split into its molecular components hydrogen (H_2) and carbon (C)** using a plasma. For example, four kilograms of methane and 10 kWh of electricity produce 1 kg of hydrogen and 3 kg of elemental carbon.

When biomethane is used for plasmalysis, **carbon dioxide is removed from the atmosphere**. Thus, Graforce offers a real **alternative** to the controversial CCS storage of CO_2 .

CONTACT

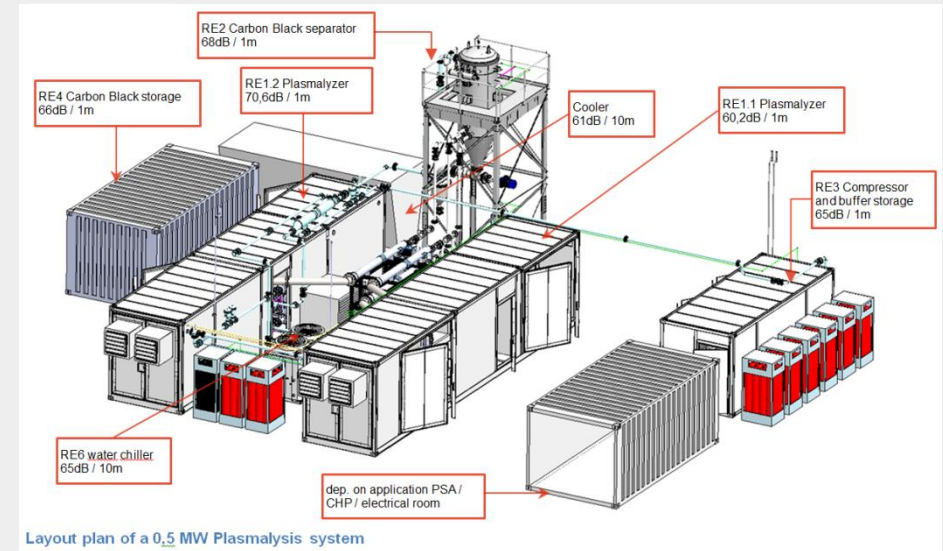
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PLANT SOLUTION

Graforce uses methane plasmalysis to decarbonize the natural gas. The resulting hydrogen in combination with a hydrogen CHP or fuel cell enables CO₂-free heat and power generation.

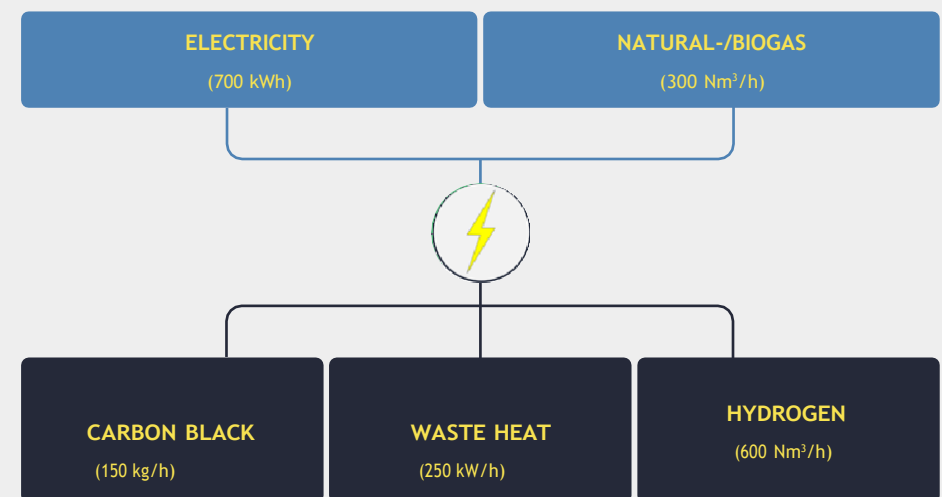
The solid carbon can be used as an industrial raw material, for the production of steel, carbon fibers and other carbon-based structures and materials, for example.



PLASMALYSE-TECHNOLOGIE

In methane plasmalysis, a non-thermal plasma is used to convert natural gas or biomethane into hydrogen and solid carbon with very little energy input and without producing CO₂. The non-thermal plasma is generated by a high-frequency electric field, which leads to the ionization of the methane. The electrons inside reach temperatures of 10,000 to 100,000 K (1-10 eV) and determine the decomposition process of the methane, while the gas temperature remains as low as room temperature.

With electricity from renewable energies, methane plasmalysis is just as climate-friendly as electrolysis, but at a much lower cost.



◎ APPLICATIONS

Methane plasmalysis plants with capacities from 115 to 6,500 Nm³ H₂/h have been designed for the following industries:

- >> Heavy duty traffic
- >> Steel industry
- >> Fertilizer industry
- >> Energy and heat industry



◎ SPECIFICATIONS

Feed:

Natural gas, biomethane

Measurements:

40 foot containers
(12192mm/2431mm/2900mm)

optional:

Container for compression
(4000mm/2000mm/2591mm)

Power range:

300 - 6.500 Nm³/h
(< 300 Nm³/h in container)

H₂ purity:

Usually 98% vol.
(optionally 99.9999% vol.)

H₂ delivery pressure:

Typically 1.4 - 25 bar

Resources:

For the production of 600 Nm³/h H₂ from natural gas, the following operating materials are required or produced:

- 300 Nm³/h of methane
- 700 kWh of electricity

By-product:

- 250 kW of heat
- 150 kg of carbon black

Carbon Black:

Purity: 98% by weight
(with natural gas as feed)
Particle size: 10-150 μm (depending on the plasma parameters)
Surface: 80 m²/g (BET nitrogen adsorption)

Product forms:

- Compressed powder
- Granules
- Pellets