PlasmaAir AG

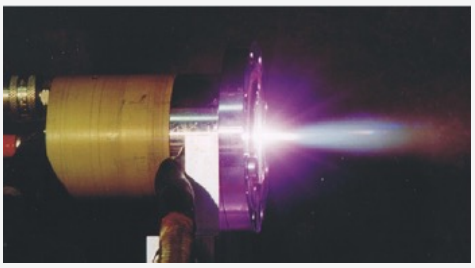
Technologies for the Transition to Sustainable Energy

THERMAL ARC HEATED PLASMA GENERATORS

- CFC decomposition in the chemical industry
- POU purification in the semiconductor industry
- thermal treatment of waste materials
- metal powder production
- hydrogen production by methane pyrolysis
- process heat source for high-temperature applications

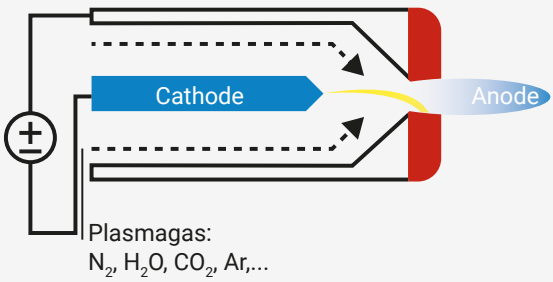
THERMAL ARC PLASMA TORCHES FOR ELECTRIFICATION OF HIGH TEMPERATURE PROCESSES

For more than 20 years, PlasmaAir AG has been producing arc-heated plasma torch systems for various applications.



Functional Principle
Electrical energy is coupled into a working gas via an electric arc. This energy input causes dissociation and ionization in the gas and as a result a plasma is generated.
The core of the created plasma plume can reach temperatures up to 20,000°C in the center and the average temperature in the plume of the in the gas stream coming out of the torch is 2000-6000 °C.

This high temperature gas stream acts as an effective heat carrier without the need of oxygen or combustion. Furthermore, reactive radicals formed from the working gas can facilitate chemical reactions such as the production of HF from CFC´s using steam as plasma gas. This feature offers potential for diverse applications in high temperature process engineering.



Power	10 – 100 kW, higher powers are in development
Working Gases	Ar, N_2, air, steam, CO_2, H_2, CH_4, NH_3

INDUSTRIES WE SERVE

Chemical Processing
Elevating sustainability in chemical processes, reducing reliance on fossil fuels

Waste Incineration
Contributing to sustainable waste management with efficient incineration powered by plasma torches

Semiconductor Industries
Point of use Abatement System with plasma incineration

Glass Manufacturing
Revolutionizing glass production with cleaner heating methods, minimizing environmental impact

Metallurgical Industry
Optimizing metal smelting and refining with advanced plasma torch solutions for energy efficiency

Cement Manufacturing
Transforming production methods for reduced carbon footprints and enhanced efficiency

30 kW plasma plant for CFC decomposition

STEAM AS PLASMA GAS

Water vapor compared to typical plasma gases is a very cost-effective working gas.
The chemical properties of water plasma supports various processes. The water vapor plasma torches are mainly used in CFC disposal and plasma pyrolysis, as well as a process heat source.

Torch	El. Power	Steam	Thermal efficiency
PBR 13	5-20 kW	0,5-2 kg/h	70-95 %
PBR 50	15-50 kW	1-5 kg/h	70-95 %
PBR 100	50-100 kW	4-20 kg/h	70-95 %

Applications of Steam Plasma

80 kW steam torch in operation

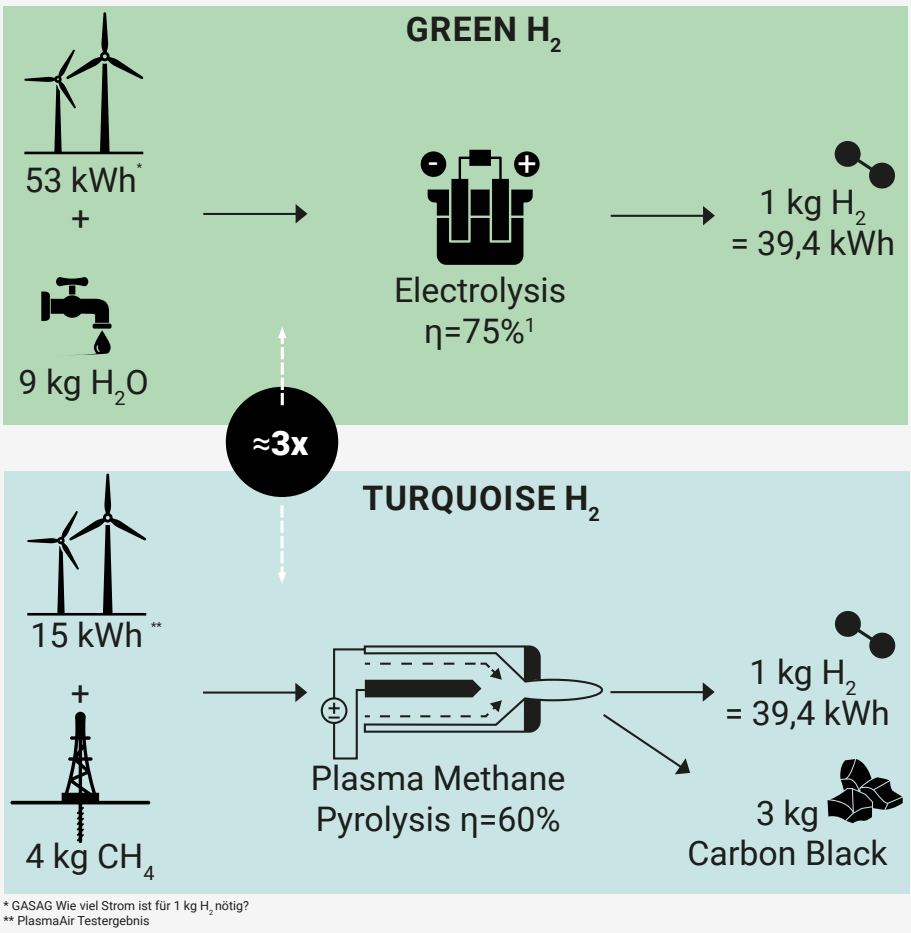
CO_2 reduction in cement industry

Conditioning of pyrolysis gas

2 x 50 kW CFC decomposition in chemical industry

METHANE AS PLASMA GAS

Pyrolysis of CH_4, Production of Turquoise Hydrogen

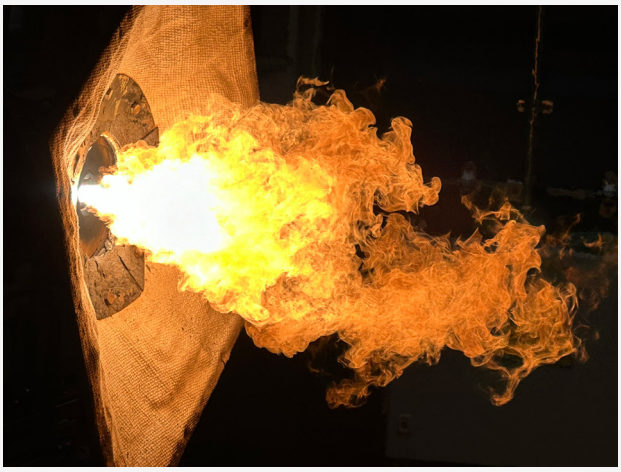


* GASAG Wie viel Strom ist für 1 kg H_2 nötig?
** PlasmaAir Testergebnis

A 100 kW el. prototype was developed and validated in collaboration with Uniper Hydrogen GmbH.

The system consists of:

- 100 kW plasma torch using methane as plasma gas
- peripherals wich are installed in a container as a modular design
- high temperature reactor
- gas cooling unit
- dry filter for collection the carbon



100 kW hollow cathode torch with 100 % methane as plasma gas

Technology demonstration reactor for methane pyrolysis

HYBRID PLASMA TORCH FOR HIGH TEMPERATURE PROCESSES

By using Hydrogen/Methane as plasma gas and adding oxygen a combination of electrical and chemical heat as a high temperature heat source is created.

Methane/Hydrogen against atmosphere
operation point: 50 kW electrical power; 50 kW chemical power

Application:
The EU-Founded GIFFT Project

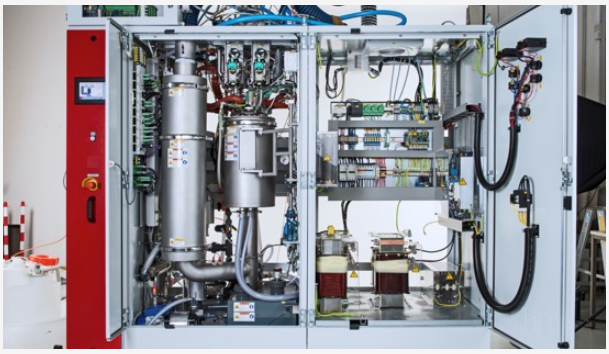
Revolutionizing the Glass Industry with Sustainable Technology

Transforming Glass Production for a Greener Tomorrow

GIFFT
Sustainable Glass Industry

Decarbonization: Aims for a 75% reduction in CO2 emissions per tonne of glass produced. Energy Efficiency: Improves overall energy efficiency in glass production. Economic and Environmental Benefits: Utilizes low-cost, locally available biogenic residues, contributing to circular economy principles.

NITROGEN AS PLASMA GAS



In the Semiconductor Industry the burn and wet technology for exhaust gas cleaning is an established technology. This technology is based on neutral gas burners for the incineration of a CFC containing gas coming from the production of chips. To decarbonize these process, nitrogen plasma torches can substitute the neutral gas burners. Within the last several years, 10 units were built and qualified in industry in the production process. The electrical input power of the torch is 5-30 kW.

15 kW plasma system for semiconductor industy

Point of use (POU) abatement systems in semiconductor industries

- disposal of SF6, NF3, CF4, silanes
- greenhouse gas in nitrogen with up to 600 slm
- high degradation rate > 95%
- no flammable gases
- small and compact systems

AIR AS PLASMA GAS

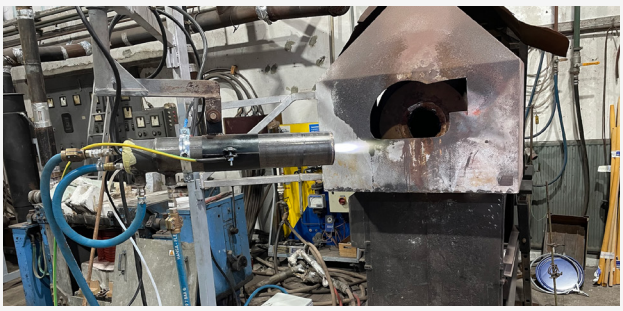
60 kW Air Plasmagas

Using air as a plasma gas is cheap and available anywhere. The contained oxygen is used to support chemical processes (plasma cutting, combustion). The PlasmaAir AG has developed an air plasma source, that can be used as a pilot burner for coal power plants.

CO_2 AS PLASMA GAS

7 kW CO_2 plasma torch

CO_2 as a plasma gas can be used as heat carrier in processes where CO_2 can be cycled to avoid emissions (Cement Industry).



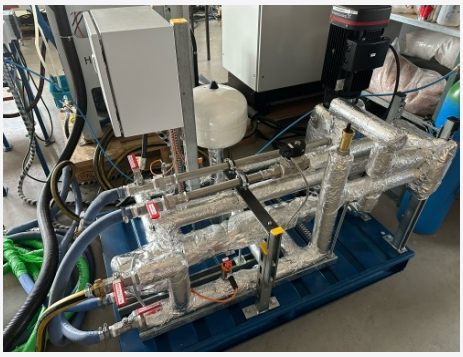
Test of a 50 kW CO_2 plasma torch in a reactor for cement production

PERIPERAL EQUIPMENT

Power supply with 120 kW, modular setup

Power supply including Process control unit

Gas and steam supply



Cooling system for the torches

OUR TEAM

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