GFELTI

FROM TESTING
TO DAILY USE

H2BURN®
TECHNOLOGY

- HIGH EFFICIENCY BURNERS FOR THE ECOLOGICAL TRANSITION
- ON-SITE TESTING ON FURNACES UNDER PRODUCTION
- POWERED BY METHANE, HYDRO-METHANE BLEND, HYDROGEN

- **The reduction of CO_2 emissions** in an energy-intensive industry like the steel one ranks among the most ambitious goals of 21st century industry. A challenging target GF-ELTI is aiming at thanks to the **H2BURN® project**.
- H2BURN® is the result of an experimental project, **completely Made in Italy**.
- Aim of the project H2BURN®: guarantee the possibility to use the blend composed by Hydrogen (H_2) and Methane (CH_4), or **Hydro-methane** blend, by generating it by the End User's site in a "flexible way" and by means of ad hoc equipment.
- The last tests were carried out on **two furnaces on an industrial-scale** (one heat-treatment and one experimental regenerative furnace) with an Hydro-methane supply able to go from H_2 10% to 100%.

H2BURN®
TECHNOLOGY

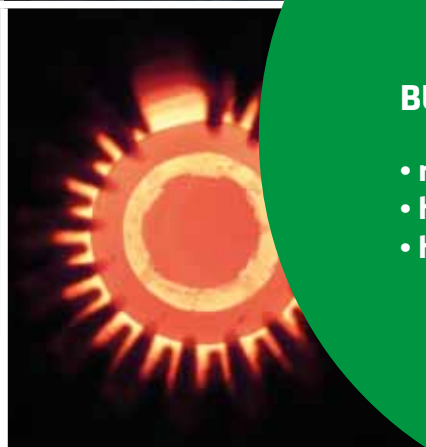
H2

HYDROGEN

TYPES OF BURNERS

Types of burners subject of experimentation

- Auto-recuperative burners on/off (100 kW each)
- Regenerative burners on/off with radiant flat flame (300 kW each)



BURNERS POWERED BY

- **methane**
- **hydro-methane blend**
- **hydrogen**

Plants subject of experimentation

Furnace C.40
Heat-treatment furnace

Furnace C.47
Experimental regenerative furnace

Furnace C.40

- No. 3 auto-recuperative burners powered by methane
- No. 3 auto-recuperative burners powered by hydro-methane blend (10÷100% vol. H_2)

Furnace C.47

- No. 1 regenerative burner powered by methane
- No. 1 regenerative burner powered by hydro-methane blend (10÷100% vol. H_2)

BURNERS CHARACTERISTICS

Auto-recuperative burners

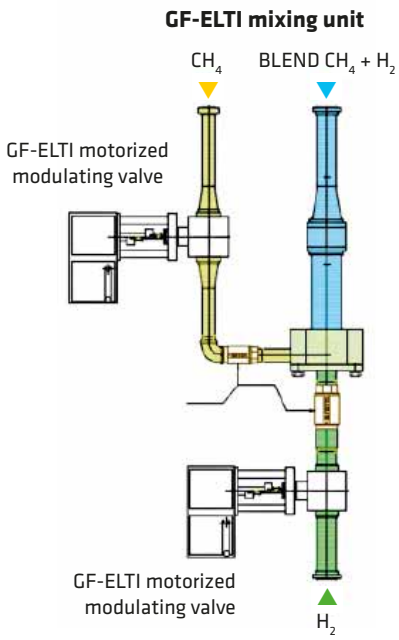
- **Internal heat exchanger** (finned metal body) crossed in counter current by combustion air and gases
- **Low NOx** (values under European Standards)
- **Fuel Consumption reduced by 15÷20%** if compared with traditional cold air burners
- **Operating temperatures:** ≤1200°C
- **Flue gases temperatures at chimney:** ≤ 450°C

Regenerative burners

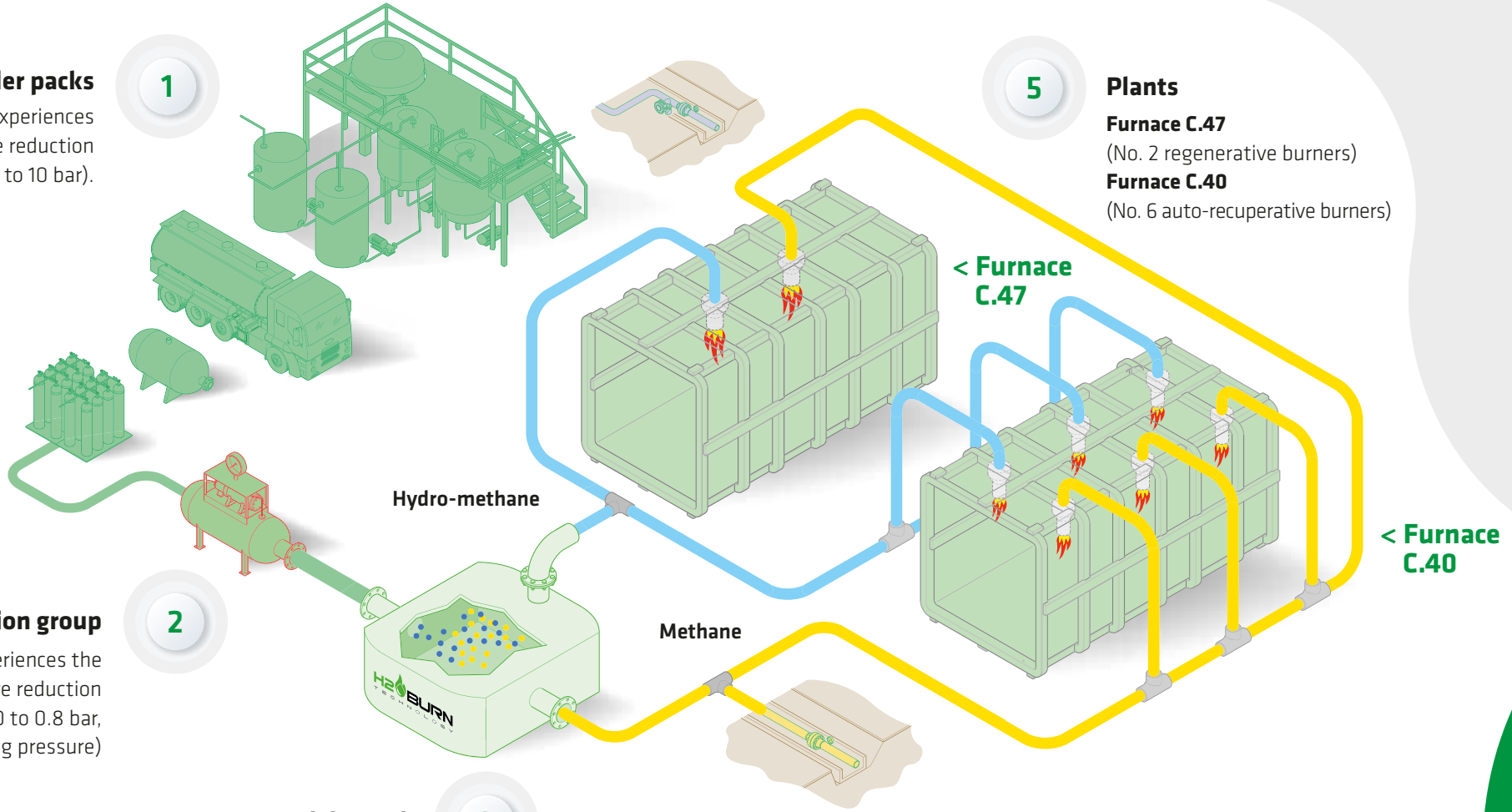
- Direct thermic exchange between a **ceramic mass (Accumulator)** and two gas fluxes **(discharged gases and burning air)**
- **Low NOx** (values below European reference parameters, despite high preheating temperatures of combustion air)
- **Fuel Consumption** reduced by 40÷50% if compared with traditional cold-air burners
- **Operating temperatures:** ≤1300°C
- **Flue gases temperatures at chimney:** ≤250°C

FLUID-DYNAMIC MIXER

- A dedicated Fluid-dynamic mixer has been designed and manufactured by GF-ELTI for the purpose of the test
- Starting from the availability of Methane and Hydrogen, the system is capable of generating, in real time, a specific hydro-methane mixture (10÷100% vol. H2), according to the desired value, which can be set via Supervision PC (also remotely)
- The flow rate obtained is progressively self-regulated from the System, in order to maintain the power of the burners constant
- Indeed, the increment of the Hydrogen in the mixture, necessarily involves the needs of increasing the flow rate, as a consequence of the low Hydrogen heating value, compared to that of the Methane (ratio 1 : 3.35 approx.)



BLOCK DIAGRAM



1

Hydrogen cylinder packs

The hydrogen experiences a first pressure reduction (from 200 to 10 bar).

2

2nd reduction group

The hydrogen experiences the second pressure reduction (from 10 to 0.8 bar, the working pressure)

3

Mixing unit

Mixing unit: methane-hydrogen mixture in order to obtain:

- H_2 % Vol. set in real time
- Flow rate variation aimed at keeping constant the power of burners

4

CH_4 from the grid

The methane is taken from the existent power grid

5

Plants

Furnace C.47
(No. 2 regenerative burners)
Furnace C.40
(No. 6 auto-recuperative burners)

10÷100% H_2

in the **hydro-methane** mixture, with the H2BURN® technology

VARIATION

% H_2

in **real time** completely automated

FINAL CONSIDERATIONS

The tests performed on the production equipment, which followed the one on single burners, have confirmed that GF-ELTI H2BURN® technology is ready to take up the challenge of the decarbonisation through the use of hydrogen.
The most recent experimental experience, which is added to the over 30 years' skills of the Company in designing and building systems powered by gas coke (waste gas from thermic processes of steel mills, which contains volumetric percentages exceeding 60%), makes GF-ELTI a privileged market partner in helping its customers towards the use of this "carbon free" energy source.
GF-ELTI has always been sensitive to environmental issues and has set as its goal the testing of progressively more innovative solutions on the furnaces of its own Heat Treatment Division, in order to make them available for its Customers once fully developed and tested.

From testing to a daily use of hydrogen

The GF-ELTI Heat Treatment Division

The GF-ELTI Heat Treatment Division (GFTT), as of today, against an annual volume of **50.000 tonnes of material** processed on behalf of third parties, is able to save approx.. **800 tonnes of CO_2 emissions**, thanks to the use of the self-recovery and regenerative combustion technology, compared to the "traditional" "cold-air" technologies. Once the market will be able to provide the **green hydrogen** in a sustainable way, GF-ELTI will progressively use the H2BURN® Technology to **decarbonise** the re-heating processes and the heat treatment on the equipment realized in-house.

GFELTI
MADE IN HEATALY

Italy - 24060 Sovere (Bg) - Viale delle Industrie, 1
Tel. +39 035 966500 - e-mail: com.elti@gfelti.com
www.gfelti.com