TERMOTECNICA INDUSTRIALE
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Joint Meeting of the Italian and Spanish Sections of The Combustion Institute
Dedicated to Prof. Amable Liñán
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# Industrial Combustion Decarbonisation: What Has Really Changed, and What Will Actually Move $CO_2$?

***How real is fuel flexibility today as a decarbonisation option for industrial boilers and burners?***


Gianluca Rossiello

TERMOTECNICA INDUSTRIALE S.r.l.

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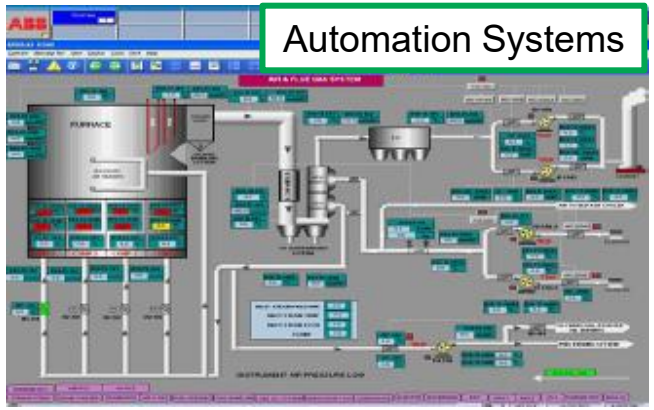
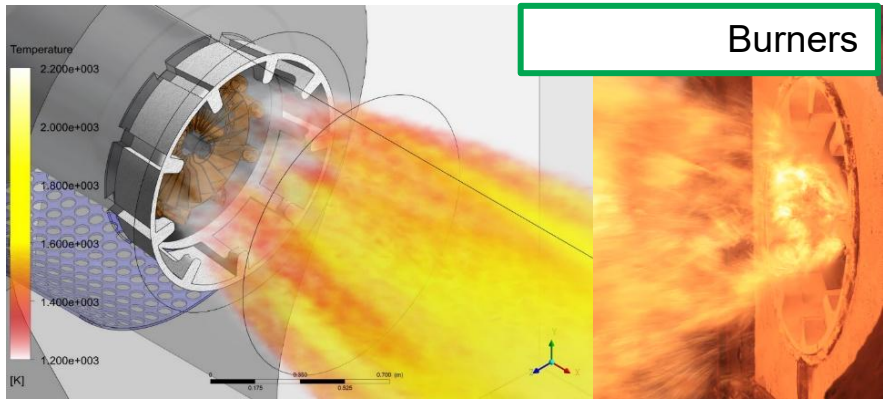
Termotecnica Industriale S.r.l. is an Italian company leader in design, manufacturing and implementation of customised solutions for energy systems in industrial and power generation plants.


Industrial Boilers


HRSG


Biomass and WTE/WHB Boilers


Automation Systems



Burners

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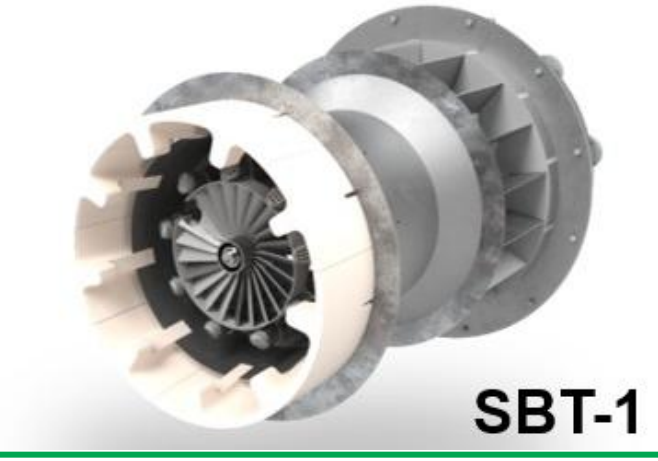
## 1. Recovery of Refinery Gases

- **Reducing flaring** and improving energy efficiency in the Oil & Gas sector
- Immediate reduction of energy consumption and $CO_2$ emissions
- **Challenge: management of highly variable fuels**

**TIN experience: SBT-1 Low-$NO_x$ burner** handling both high-calorific **gaseous** streams and low-boiling **liquid** fuels such as light naphtha (benzene)



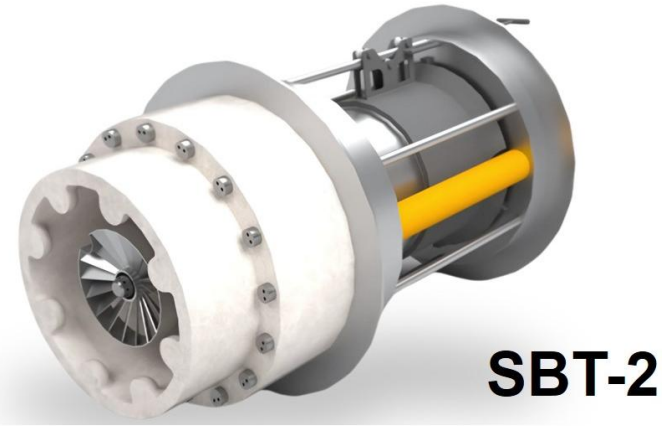

## 2. Use of Low-LHV Fuels

- Reduction of fossil fuel consumption through fuel integration
- **Challenge: stable combustion** with very low-LHV fuels

## 3. $H_2$-rich Fuels Integration

- Reduction of $CO_2$ emissions in industrial combustion
- **Challenge: reduce $NO_x$ emissions** in hydrogen-rich combustion

**TIN experience: SBT-2 Ultra Low-$NO_x$ burner** based on MILD combustion technology for both low-LHV and $H_2$-rich fuels



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## 4. Waste-to-Energy

- **Reduction of landfill disposal** and fossil fuel consumption
- **Challenge:** combustion control with highly variable **solid fuels**

**TIN experience:** Biomass and WTE boiler solutions for fuel-flexible steam generation

## 5. Electrical Heating

- $CO_2$ reduction, **energy savings and renewable grid balancing**
- **Challenge:** hybrid integration between electric and combustion systems

**TIN experience:** electric steam generation integration for hybrid energy systems

## 6. Steam Generator Revamping

- Avoiding new boiler construction and extending plant lifetime
- **Challenge:** adapting existing boiler to newly designed combustion systems

**TIN experience:** retrofit and revamping solutions for fuel-flexible steam generation

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## 7. Ammonia: the next combustion challenge

- **Carbon-free fuel vector with high decarbonisation potential**
- **Key issue:** $NO_x$ control and combustion stability remain critical challenges

**TIN perspective:** advanced ammonia combustion systems currently under development within R&D Department