Challenges of EDEFU Project

Some facts and figures

- Manufacturing industries are responsible of nearly 1/3 of the world's energy consumption and 36% of its CO_2 emissions.
- International Energy Agency suggests a technical efficiency improvement potential of 18-26% for the manufacturing industry worldwide. These savings would equal 5-7% of total worldwide energy use and reduce CO_2 emissions by 7-12% worldwide.
- Non ferrous metals, cement, ceramics and glass industries are crucial for the economy of the UE countries and require a high consumption of natural resources and energy, producing a huge amount of waste and emissions.
- Processes involved in these Energy Intensive Industries share a common step where raw materials are heated in industrial furnaces to obtain a subsequently treated product.
- Traditional furnaces heated by coal or coke evolved towards new furnaces mostly heated by gas or electricity. However, these are still very high energy demanding furnaces.

Project Budget:
13,5 M€

Funding FP7:
8,4 M€

Project duration:
4 years (2010-2014)

Consortium

EDEFU
"New Designs of Ecological Furnaces"
FP7-NMP-2009-LARGE 3
Grant agreement nº 246335

Project Coordinator
TECNALIA, Ane Irazustabarrena
ane.irazustabarrena@tecnalia.com

Dissemination Manager
CIRCE, José Luis Vadillo, jlvadillo@fcirce.es

Exploitation Manager
KROWN: Igotz Arocena, iarocena@krownsa.com

tecnalia Inspiring Business
circe
Fraunhofer IFAM
cnrs
FAG Fundicion de Aluminio por Gravedad
vidrala
Marion Technologie
C-Tech Innovation
KROWN
bertin Technologies
CARBOLITE
LZH Laser Zentrum Hannover e.V.
CEMEX
JIESIA
CERApro® Hochtemperaturtechnik GmbH
vdz. Deutsche Zementindustrie
Calcinor
Kelsen
pairem

EDEFU

New Designs of Ecological Furnaces

European Research Project
FP7-NMP-2009-LARGE 3

edefu

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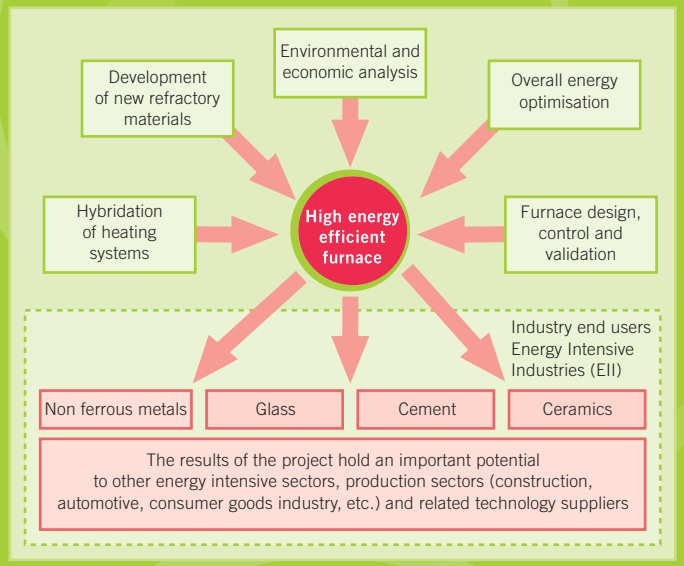
Breakthroughs

EDEFU



1 Heating systems:

Integrated hybrid heating systems *(Plasma heating, High resistivity heating, Radiant heat-microwave and biomass)* in order to reduce the energy consumption of the feedstock heating and melting.

2 Energy recovery solutions:

Waste heat reuse technologies, PCMs.

3 Refractory material:

New type of refractories to obtain compatible refractory materials with improved insulation characteristics.

4 Furnace design:

New methodology for the design of the furnaces based on the different starting specification and conditions for the selected applications.

RESULTS

EDEFU

Glass Industry

Microwave technologies applied to glass industry

Energy efficiency

Less than 1 kWh/Kg. **Savings of 25-28%** at melting

Emissions

Reduction achieved (although energy demand increased)

Economics

Interesting for **specific applications** (e.g. production of short and specific series)

Comercialization

High commercial potential expressed by end users and furnace manufacturers

Industrial feasibility of waste heat recovery systems in current glass sector processes

Ceramic Industry

Microwave hybrid heating has been demonstrated

Energy efficiency

75% reduction in the time taken for the sintering of bone china samples.
Energy Savings of 25-35% (up to 50%)
No reduction in product quality

Emissions

Reduction achieved due to the minimization of energy consumption

Economics

Interesting ROI for end users (< 4 years)

Comercialization

High commercial potential expressed by end users (possible reduction of cycle time per batch)

Cement Industry

Hybrid technologies: biomass gasification in cement clinker production

Energy efficiency

More efficient process but higher electricity demand

Emissions

Emissions reduced by 10%. Gasification and subsequent combustion of biomass involve lower environmental impacts

Economics

The economic feasibility depends on the price of electricity and the evolution of the technology

Comercialization

High commercial potential expressed by end users as low cost fuels are used minimizing GHG emissions

Aluminium Industry

Hybrid technologies (Plasma torch + High Resistivity Resistance) validated in industrial conditions

Energy efficiency

27% energy savings compared to conventional processes

Emissions

27% of reduction of CO_2 emissions related to conventional processes

Economics

Target achieved. **Suitable ROI for real budget** of single industrial scale demonstrator construction (6 years).
This ROI is expected to be lower when productivity aspects are taken into account and/or construction budget is lowered through mass production.

Comercialization

High commercial potential expressed by end users, furnace manufacturers and auxiliary industry firms

Refractory

A new refractory castable has been developed for the aluminium melting industry using nano technology.

Features:

- **Good chemical resistance: due to its high density.**
- **Good insulation properties: due to its low thermal conductivity <1W/mK at service Temp.**

From laboratory to industrial validation: