Optimisation of Secondary Metallurgy Practices with Focus on Clean Steel
Dissemination of results from European research projects

European Commission

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European funded projects: a tool to support steelmaking customers in problem solving

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Introduction

- From ECSC to RFCS
- What is RFCS
- Priorities and Technical Groups

Why RFCS?

Problem solving & examples of application

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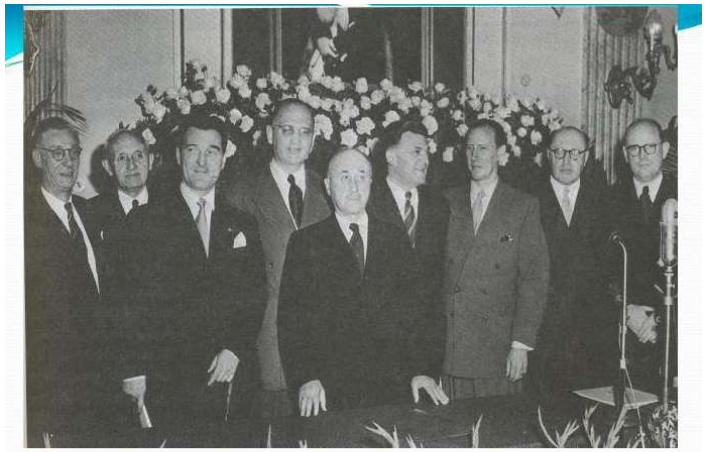
FROM ECSC to RFCS

ECSC Treaty established in 1952 with a duration of 50 years



Meeting of the High Authority in Luxembourg (June 18 1952). Left to right: Paul Finet, Lèon Daum, Enzo Giacchero, Franz Etzel, Jean Monnet, Albert Coppé, Kirk Spierenburg, Albert Wehrer e Heinz Potthoff.

ECSC* Treaty expired in July 2002, 23rd

1 Feb 2003: creation of the RFCS

RFCS yearly returns (60 M€, before crisis) used for R&D in Coal & Steel

Support competitiveness & sustainable development in the EU Coal and Steel industry

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RFCS – Figures

- RFCS Annual budget: **35-40 M €**
- Number of “Steel” proposals submitted: **140-150**
- Resubmission: **40%**
- Success rate: **18-20%**
- Number of “Steel” proposals funded/year: **30-35**
- Total budget of a proposal: **2-4 M €**
- RFCS funding/proposal: **1-2 M €**
- Duration: **36–42 months**
- N. partners/proposal: **4-8**

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Priorities

1. New and improved steel making & finishing techniques
2. RTD and the utilization of steel
3. Conservation of resources and improvement of working conditions

TGS 1: Ore agglomeration and iron making
TGS 2: Steel making processes
TGS 3: Casting
TGS 4: Hot and cold rolling processes
TGS 5: Finishing and coating
TGS 6: Physical metallurgy and design of new generic steel grades
TGS 7: Steel products and applications for automobiles, packaging and home appliances
TGS 8: Steel products and applications for building, construction and industry
TGS 9: Factory-wide control, social and environmental issues

TGC1: Coal mining operation, mine infrastructure and management, unconventional use of coal deposits

TGC 2: Coal preparation, conversion and upgrading

TGC 3: Coal combustion, clean and efficient coal technologies, CO2 capture

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WHAT CAN BE FUNDED?

Type of Activity	Description	RFCS co-funding	Duration	Consortium
Research projects	Investigative or experimental work	≤60%	No specific requirement (typical duration is 36 or 42 months)	Minimum three independent legal entities established in at least two different EU Member States
Pilot & Demonstration projects	Construction and/or operation of an installation at pilot or demonstration scale	≤50%	No specific requirement (typical duration is 36 or 42 months)	Minimum two independent legal entities established in at least two different EU Member States
Accompanying measures	Dissemination or promotion of knowledge gained	≤ 100 %	No specific requirement (typical duration is 18 months)	Minimum two independent legal entities established in at least two different EU Member States

Why RFCS?

1) Because you can not have all the ideas that you really need;

2) Because together is better than alone;

3) Because invest in the future is always the best option;

4) That means that a new partner today can be a new business tomorrow.

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How RFCS?

1) Trust people that have always done this job;

2) Find a very good idea;

3) Find the most suitable partners;

4) Write your idea in a simple and clear way.

The most important thing is that benefits can not be only for you

The ideal project

A multicultural (nationality, background, mission, expertise, dimension, product, process, etc.) parntership, among some of the most crucial European Stakeholders of a precise sector (steel, cement, manufacturing, etc.),

dedicated to the solution of a tangible problem, in a way that can be technically and economically viable in a reasonable amount of time.

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ADDED VALUE OF PARTECIPATION TO RFCS PROJECT

- Reinforce the link among steel company, researcn centre and university
- possibility to visit plant and laboratories
- Possibility to improve or to test already existing technological solutions bringing incremental knwoledge
- Improvement of the skill of company employers

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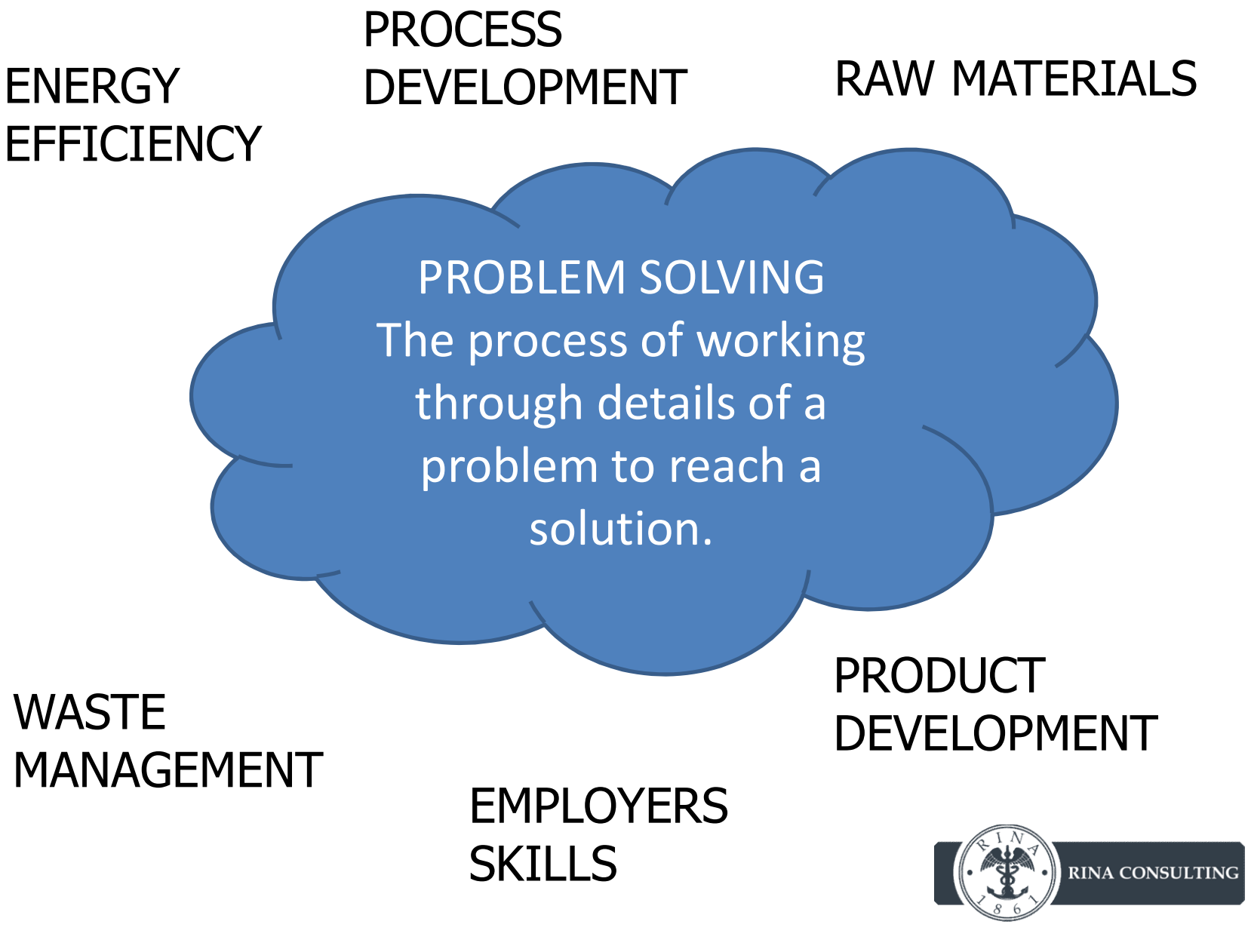

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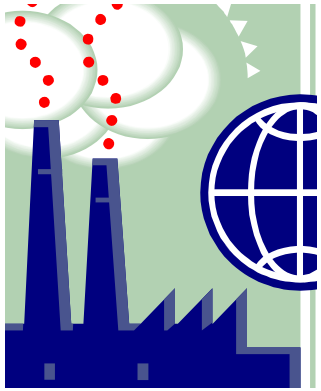
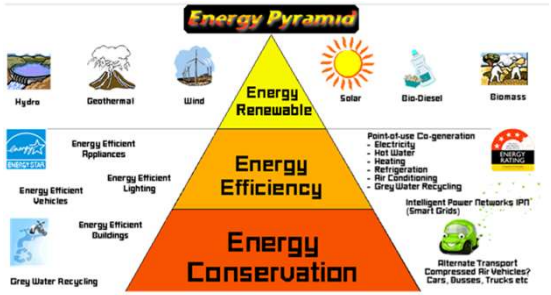
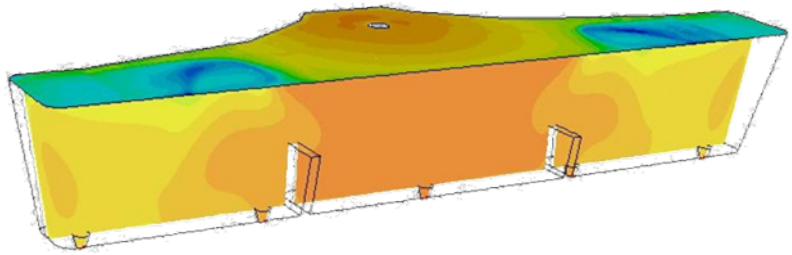
Problem solving & examples of application

SOME EXAMPLES

- ENERGY EFFICIENCY







- TUNDISH FLUID-DYNAMICS

- ENVIRONMENTAL IMPACT AND SUSTAINABILITY

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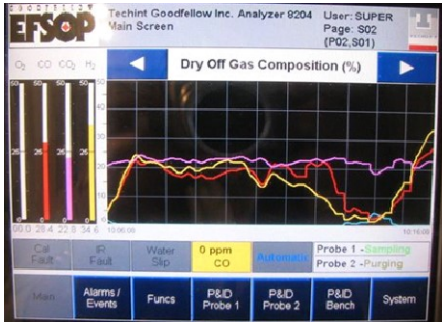
Problem solving & examples of application

ENERGY EFFICIENCY

Development of EAF dynamic models based on different logics.

- Off Gas Analysis
- Continuos temperature mes.
- ……..

CFD of injection systems to obtains optimal slag foaming



Problem solving & examples of application

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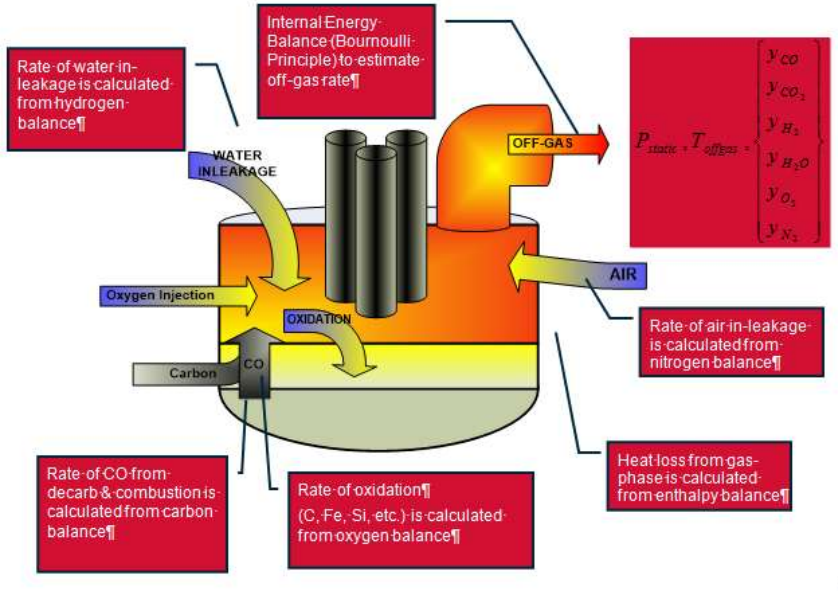
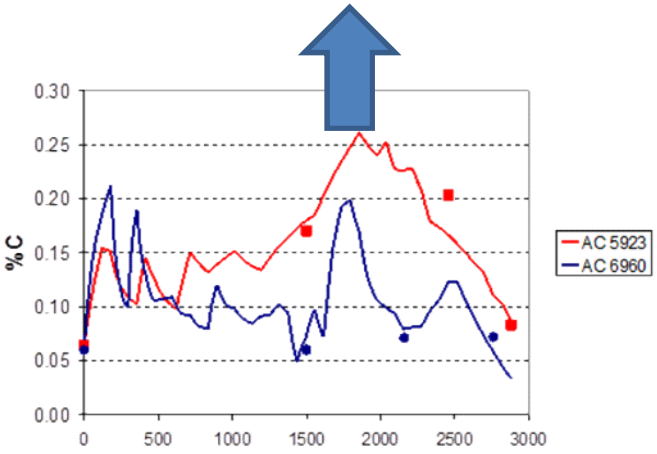
ENERGY EFFICIENCY

Offgas system developed by Eng. Company
What can I do with such data?
RFCS proved to be the right environment to develop and test modesl able to use profitably the data from the new sensor

Operating practice
Dynamic control system
.....





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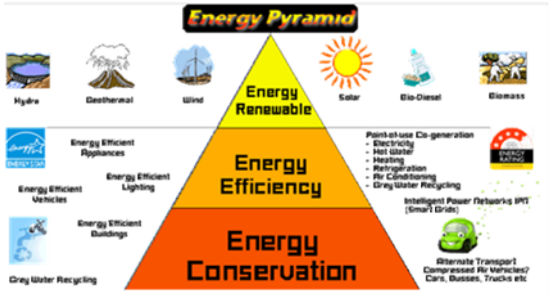
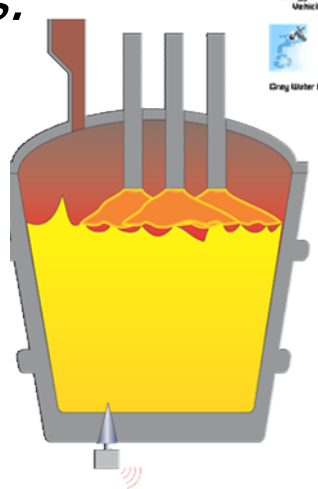
Problem solving & examples of application

ENERGY EFFICIENCY

Benefits for the steelmaking process: reduction of tap to tap time; target temperature at heat end

Energy consumption reduction





On a financed activity of order of magnitude of 300k€ (financed at 60%), for CSM, follow up of 2,5

Economic benefits for involved stakeholders (steel company, Eng. Company) difficult to quantify, but even higher

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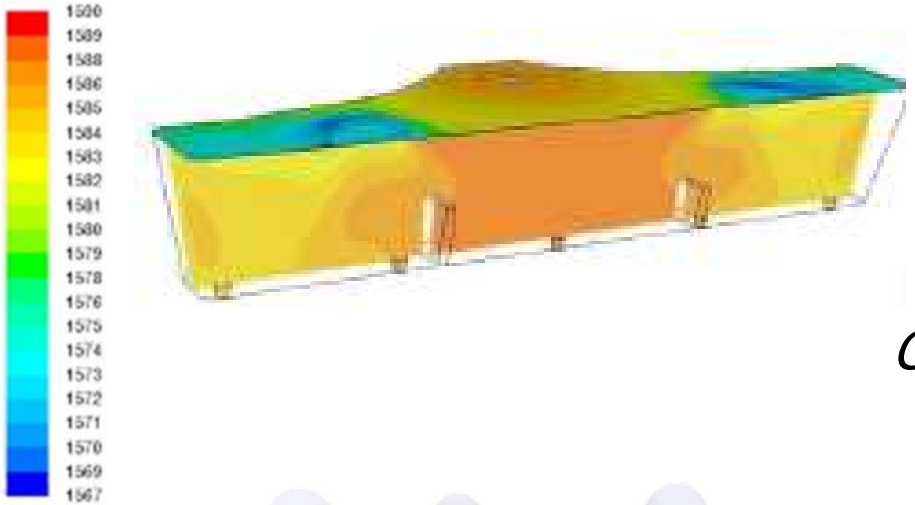
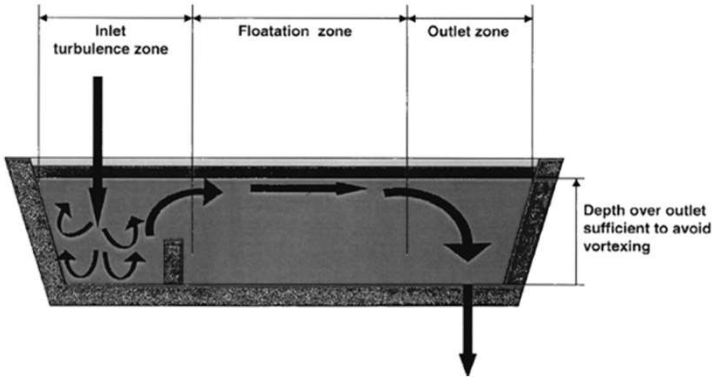
Problem solving & examples of application

TUNDISH FLUID-DYNAMICS

CFD and physical modelling to transform the tundish into a metallurgical vessel.





Obtained results: better solution tailoring for stakeholders (steelmakers, suppliers)

Steelmakers more 'pro-active' vs suppliers

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Example of benefits:

- ✓ *Stakeholders: reduction of downgraded steel (cost saving) + quality enhancement (added valued)*
- ✓ *Suppliers: increased higher-quality portfolio*
- ✓ *R&D Centers: increased portfolio (see example)*
- ✓ *Improved competitiveness*

- On a CSM financed activity of order of magnitude of 300k€, 2 M €
- follow up vs time
- New sector of activities generated
- Again, economic benefits for involved stakeholders but even higher

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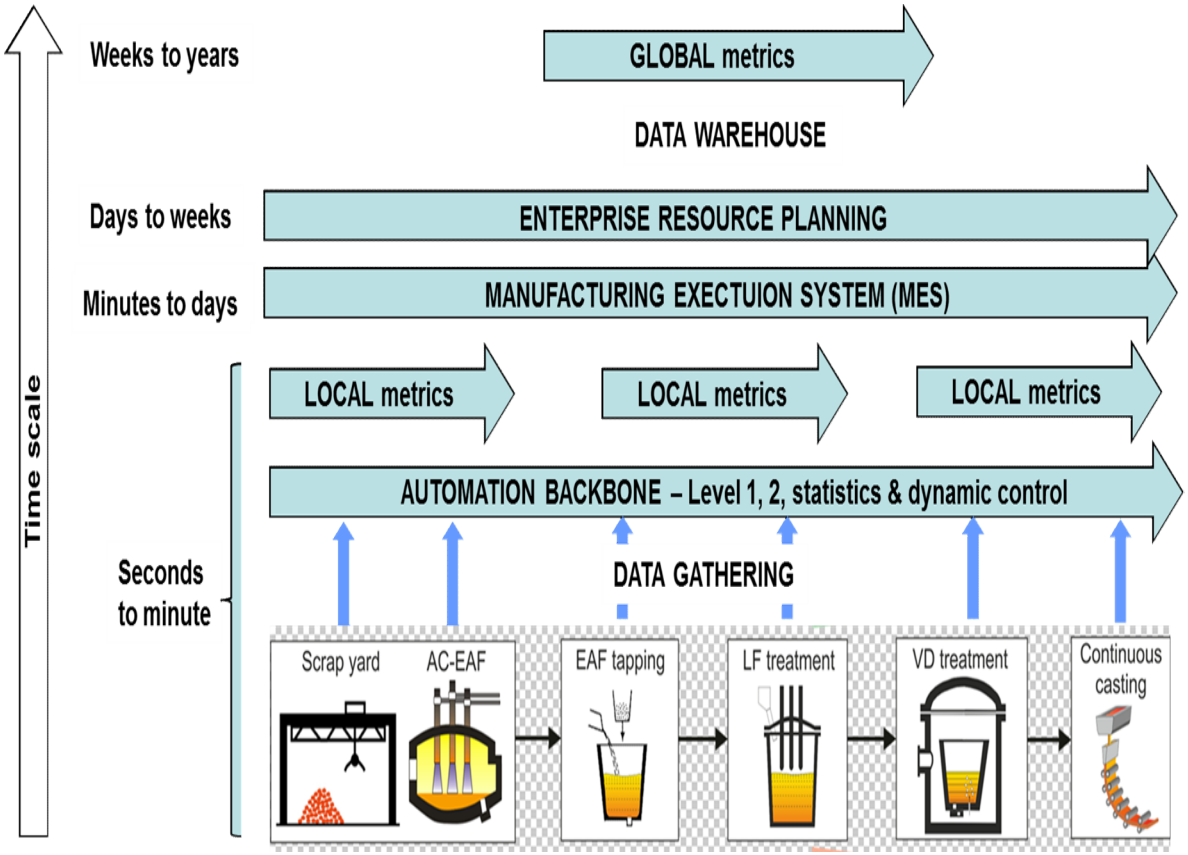
ENVIRONMENTAL IMPACT AND SUSTAINABILITY

EIRES project is focused on the assessment of the environmental impact of EAF steelmaking plants, considering emissions into air, water and soil, as well as energy, water and wastes management.

KPI selction in a epresentative metrics of

- Energy consumption
- Atmospheric emissions
- By products
- Material efficiency
- wastes
- Water consumption



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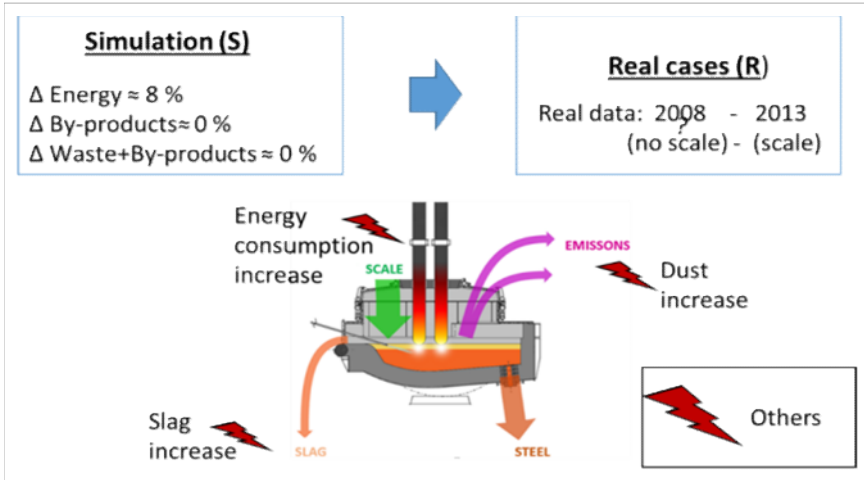
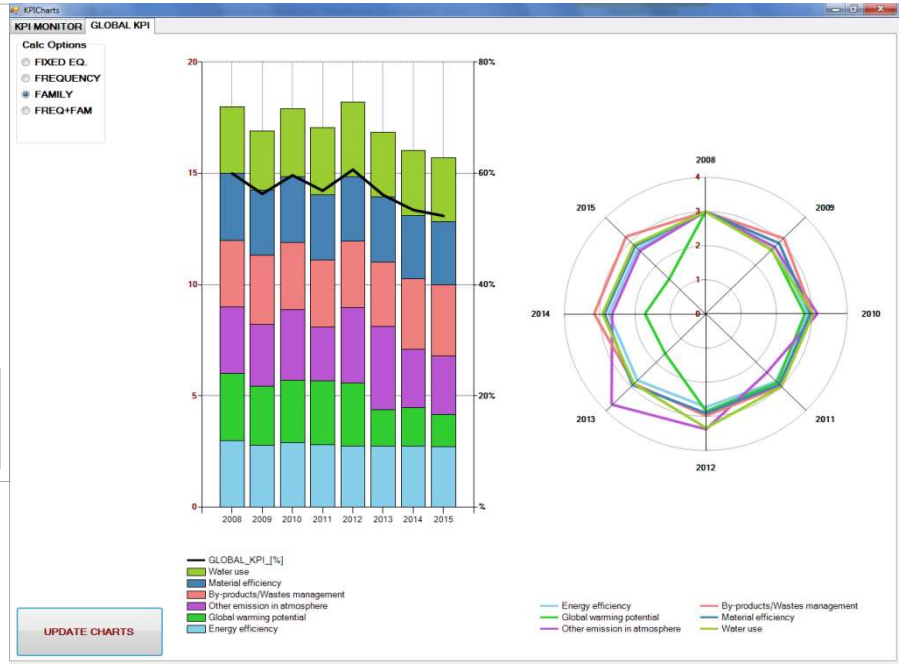
Problem solving & examples of application

ENVIRONMENTAL IMPACT AND SUSTAINABILITY

Industrial Case study
Starting from 2011 Tenaris Dalmine systematically introduces rolling mill scale in the EAF as scrap substitute





Effects

Energy consumption increase (+13%)
Scrap consumption decrease (-3%)
all the scale reduced to iron in the EAF
no carry over in slag or dust occurred.

Form the overall environmental point of view, the advantages in terms of increased efficiency in material reuse substantially overcome the negative effect of the increased energy consumption.

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ENVIRONMENTAL IMPACT AND SUSTAINABILITY

Industrial Case study
Starting from 2011 Tenaris Dalmine systematically introduces rolling mill scale in the EAF as scrap substitute

Energy consumption:
Scale utilization increases energy consumption (real and simulation analysis) $\Rightarrow$ the major influence in the energy KPI is due to the introduction of the scale in the furnace

Waste + by products:

- Simulation case : there is no sensitive variation in waste & by products amount
- The scale does not increase the waste generation and perfectly substitute the scrap input.

The tool can be use as a decisional support for future operative changes

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Thanks for your attention

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