



# 10 years of coal related research funded through the RFCS programme

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*Residual funds from the ECSC treaty (European Coal and Steel Community) allocated to DG ECFIN and RFCS in the treaty of Nice in 2002*

- **≈55 M€ per year (72% steel, 28% coal)**
- **≈50 grant agreements per year**
- **350 running contracts, (50 in 50 out)**
- **Supporting the competitiveness of European sectors**
- **Research, pilot and demonstration projects**

# Funding Distribution & Activities

**Total RFCS funding allocation for COAL projects  
from 2003 to 2012: 148 M€**



**SOURCING**

**CONVERSION**

**COMBUSTION**

**40%**

**59 M€**

**18%**

**26 M€**

**42%**

**63 M€**

# Coal Extraction (mining)

- *Improved mining technology*
- *Automation/Communication and sensors*
- *Improved modelling of geology and rockburst*
- *Better working conditions, emergency modelling, safety*
- *Geological storage of CO<sub>2</sub>*
- *Land recovery and post mine usage*

# Coal Conversion

- *Efficiency on coke-making process (exploring alternatives)*
- *Coke-battery optimisation and life extension*
- *Gasification technology (SYNGAS)*
- *Coal to Liquid/Chemical*
- *Underground Coal Gassification*

# Coal Combustion/Utilisation

- *Efficiency in boiler technology (high temperature operations)*
- *CO<sub>2</sub> lean technologies*
- *CO<sub>2</sub> capture retrofitting options*
- *Chemical Looping for CO<sub>2</sub> capture*
- *Coal/biomass optimisation*

# The RFCS Programme

*After 10 years of reaserch, has it been worthwhile?*

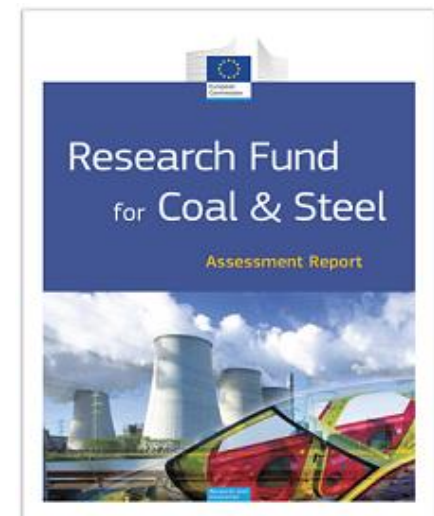
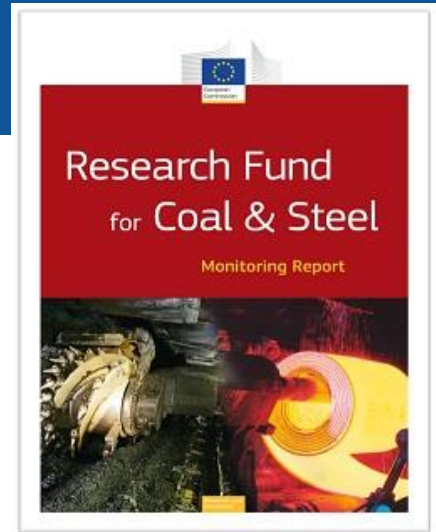
*What are the main benefits of the programme?*

# Monitoring and Assessment

*RFCS Legal basis (2008/376/EC)*

*Article 38*

- **Monitoring exercise of the programme Report was published in 2013**
- **Assessment of benefits from projects closed between 2002 and 2010**

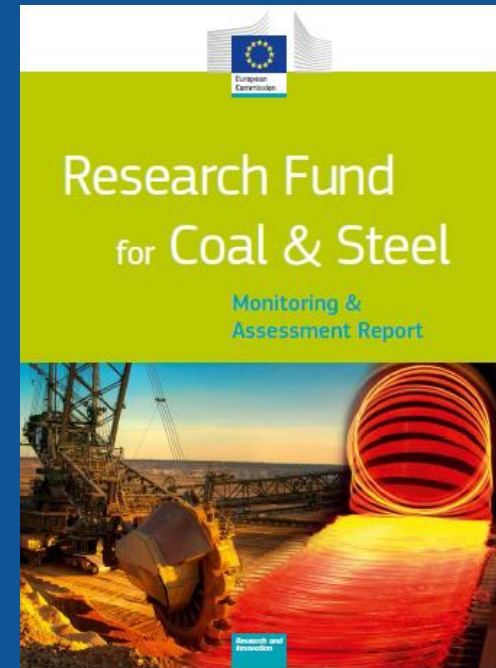




**Today, the RFCS  
Monitoring and  
Assessment report is  
published and available  
from:**

**EU Bookshop, or**

**RFCS web site**



## *Experts Committee ExCo appointed by the:*

- European Commission, Directorate General for Research and Innovation, Research Fund for Coal and Steel RFCS*
- Nominated by the Coal and Steel Advisory Groups*





European  
Commission

## Assessment Screening of All Projects - Selecting Process

198 projects  
closed between  
2003 and 2010.  
All projects were  
assessed

78 projects  
identified by  
Technical  
Groups as  
promising for  
benefit  
evaluation

46 projects  
selected for  
in-depth  
assessment

23  
projects  
assessed  
In detail

Global screening by TG  
experts with short  
questionnaire  
(2011)

Projects described and  
analysed by TG  
Rapporteurs  
(2011)

In-depth Assessment by TG  
Rapporteurs  
→ interview coordinators  
→ long questionnaire  
(2012)

## *In - depth assessment of the selected projects - Financial Returns*

*Financial Returns estimated at the project level for the beneficiaries*

- *productivity improvement*
- *cost reduction - resource savings (energy, materials, workforce)*
- *new market share*

Quantified **proven** benefit  
evaluated by **beneficiaries**

**Conservative** assumptions  
concerning possible  
**dissemination** in EU

**POTENTIAL** benefit for the  
EU Coal and Steel Sectors

# Examples of financial returns (Coal sector)

## **Coal Mining (NEMAEQ)**

- ***New mechanisation and automation of longwall mining equipment***

Productivity increase with a fully automated shearer loader system

→ 1.5 M€/y/longwall; potential 45 M€/y (EU)

Cost reduction: decrease of labour cost, increase of running time

→ 0.1 M€/y/longwall; potential 3 M€/y (EU)

## **Coal Conversion (IMPECABL)**

- ***Improving coke battery life through integrated monitoring***

Capital cost net reduction of 10% at the beneficiary. This is a contribution to the total production cost.

Based on the European coke production and assuming only 5% reduction for the sector → potential 0.75€/t or 32.25 M€/y

**This exercise can be repeated for each of the 23 projects**

## Benefits from the 23 selected projects

Quantified benefits at the level of the beneficiary

From **31M€** of **RFCS** co-funding ➡ **103M€ per year** real benefits

Each **1 €** of **RFCS** co-funding ➡ **3.3 € per year**

Based on reasonable assumptions by independent experts, the potential benefits from the 23 projects ➡ **684M€ per year**

Estimated benefits accross the sector

**55 M€ per year of RFCS** co-funding ➡ **684M€** potential benefits

***Top 5 Benefits for the Coal and Steel Sectors and society  
From the in - depth assessment of the selected RFCS projects***

- 1 • Development of new knowledge, training and education**
- 2 • Enhancement of European competitiveness, economical benefit**
- 3 • Environmental benefit, sustainability (use of coal & steel)**
- 4 • Development of new applications and new market share**
- 5 • Improvement of health, safety, working conditions**

## **NEMAEQ 2006-2009 2.2 Mio€ -**

### **A fully automated coal shearer and collection system for longwall mining**



Coal/rock distinction; collision avoidance, less maintenance and downtime

Used a wide variety of sensors: Infra red; RADAR; impact sound sensors.

Wireless communication and when necessary fibre-optic links.

Networked sensors and dedicated software .

Cost reduction through: productivity increase; decrease of labour cost, increase of running time



**OPTIMINE 2011 - 2014**

**2.3 Mio€**

***Process Optimisation and increased efficiency through electronic ICT***



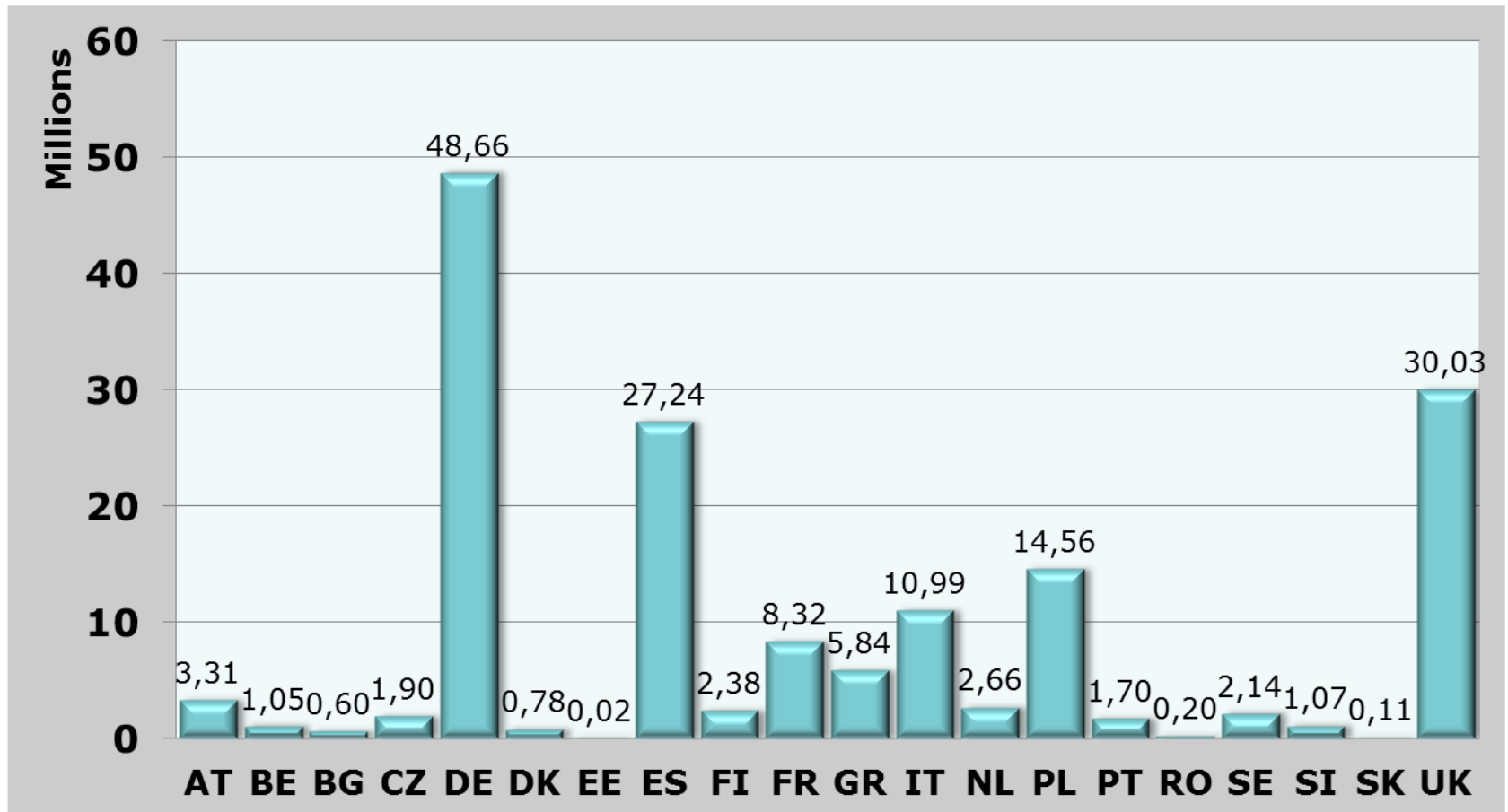
A demonstration project, which aims at integrating, installing and operating the newest ICT applications at an industrial-scale

Active location tagging, Personnel tracking, access control, machine communication, conveyor monitoring etc.

Internet technology applied to optimise the efficiency and safety of mines



# Funding Coal Projects 2003 - 2013



# Success Stories

[http://cordis.europa.eu/coal-steel-rtd/home\\_en.html](http://cordis.europa.eu/coal-steel-rtd/home_en.html)



## **CFB800 – An effective option for cleaner coal plants**

Cleaner, cheaper, more effective, secure and independent. Have you ever heard about "Circulating Fluidised Bed" (CFB) technology?



## **OXYMOD – Cleaner power thanks to mathematics**

Mathematical modelling has in recent years proven to be a useful and cost-cutting tool for designing and modernising coal-fired power plants. The OxyMod project – supported by the European Union (EU) Research Fund for Coal and Steel (RFCS) – has striven to extend existing combustion modelling capabilities to oxy-fuel combustion conditions. This should lead to preparation and pre-engineering of large demonstration power plants in Europe using modern and clean oxy-fuel CO<sub>2</sub> capture technology in the near future.



## **LIGPOWER – Cost-saving cleaning in power plants**

Lignite is a soft brown fuel with the characteristics of coal and turf combined. It also plays an important role as a competitive energy source in the power generation of many European countries. However, the specific properties of lignite lead to relatively low softening and melting temperatures, resulting in deposits forming in the boiler during combustion. Machines known as sootblowers have traditionally been used to alleviate the situation but were not entirely effective. A new solution was urgently required.



## **HUGE – How underground coal fires are spurring clean energy**

Coal is seen today as the ugly sister of power sources: it is old-fashioned, dirty, costly to mine, and the most easily accessible supplies are close to exhaustion. But a research project could change that by offering a mining prospect that is safe, based on abundant resources, and promises clean fossil fuel energy for generations. And it would do that by igniting a coal seam deep underground.

# Project Synopses

[http://cordis.europa.eu/coal-steel-rtd/home\\_en.html](http://cordis.europa.eu/coal-steel-rtd/home_en.html)

- **Summaries of RFCS Projects : 2003-2012** 

Please note that in this Summaries you will find a direct link to the final reports published by the EU Publication Office on EU Bookshop (<http://bookshop.europa.eu/>)



Collection of about 550 projects (2003 – 2013),  
Completed projects have direct link to final report.