Research Fund for Coal & Steel

Monitoring & Assessment Report

Assessment of benefits from the RFCS Research Programme
Monitoring & Assessment Report of the Research Programme for the

Research Fund for Coal & Steel

Assessment of benefits from the RFCS Research Programme
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The Research Fund for Coal and Steel (RFCS) provides funding for high quality research projects which support the competitiveness of the European Coal and Steel industries. The programme covers core production processes; new products and applications, quality control, utilisation and conversion of resources, safety at work; environmental protection by reduction of emissions from coal use and steel production, and social issues.

**A MONITORING AND ASSESSMENT REPORT OF THE RFCS RESEARCH PROGRAMME HAS BEEN PUBLISHED**

The report shows the benefits to the European Coal and Steel sectors from funding by the European Commission through the Research Fund for Coal and Steel (RFCS) research programme.

A Monitoring and Assessment exercise of the RFCS Programme covering the period 2003 - 2010 was carried out by an Expert Committee. Information from the Commission’s statistical data, responses of 103 beneficiaries and other stakeholders to a comprehensive questionnaire, exchange with all the members of the Technical Groups and the experts' own experience, were used. In total 198 projects were completed during the period 2003 - 2010. Experts identified a set of 78 projects they considered as the most significant and promising regarding the assessment of benefits. A final sample of 46 projects was selected for deeper assessment. (Figure 1).

![Figure 1. Selection of projects for in-depth assessment (Source: RFCS Monitoring & Assessment report)](image)
ASSESSMENT EXERCISE

Quantitative and qualitative benefits provided to the beneficiaries, the coal and steel sectors and the society by the RFCS projects, were identified and analysed.

QUANTITATIVE BENEFITS

Out of the 46 projects selected for the in-depth assessment, 23 were identified as providing the most direct and non-ambiguous financial benefits in terms of increased productivity, new or improved marked shares and cost reduction. With reference to the 23 selected projects, benefits were quantified at the level of the partners involved.

Actual benefits for the project partners

EUR 1 of RFCS co-funding has resulted in a benefit of EUR 3.3/year

The corresponding total accumulated benefits over time were also estimated based on reasonable assumptions and are of the order EUR 400 million. This is a clear indication of the potential of RFCS projects to generate large benefits over time.

In addition, estimations were made of the potential total benefits that could be generated if the project results would be extended to all relevant industrial contexts across the European coal and steel sectors. This is compared with the typical annual RFCS funding.

Potential total benefits for the sectors

EUR 55 million/year of RFCS co-funding has the potential to generate benefits of EUR 684 million/year across the European coal and steel sectors.

To capture these potential benefits, additional efforts and budget must be spent at the company level for implementing the relevant technological solutions.

Figure 2. Potential benefit (EUR million/year) of the assessed projects in the different production areas for the Coal and Steel Sectors (Source: RFCS Monitoring & Assessment report)
QUALITATIVE BENEFITS

All 46 selected projects generated achievements in terms of knowledge. To a smaller extent, they generated recommendations, new processes and practices, numerical models, new solutions and products, and measuring devices (figure 3). A short description of each selected project is given in Annex A of the Assessment report.

MONITORING EXERCISE

The scope of the monitoring exercise was to monitor the implementation and operational aspects of the RFCS Programme.

MAIN RESULTS

- The objectives of the Programme are of high relevance for both sectors and suitable for the future
- The allocation of the annual budget to the sectors, the share of allowable actions and the participation rules are adequate
- The system of advising bodies is effective
- The implementation of the RFCS is, in general, rated “good”
- The degree of dissemination is high
- The impact of the RFCS Programme is rated high.

Recommendation: The overall approach of the RFCS Programme appears successful and should be maintained.
GENERAL INFORMATION ABOUT THE RFCS

The Research Fund for Coal & Steel (RFCS) gives funding of over EUR 50 million every year to innovative projects to enhance the safety, efficiency and competitive edge of the EU coal and steel industries. It was created in 2002 to build on the successes of the European Coal and Steel Community. This visionary common market helped unite nations, reinvigorate the European economy and lay the foundations for the European Union as we know it today.

The Research Fund for Coal & Steel unites researchers from across Europe to work on cutting-edge projects that will benefit not only the EU’s 600,000 coal and steel workers but all citizens.

FOR MORE INFORMATION

Monitoring and Assessment Report on EU Bookshop:

Individual reports from the Monitoring and Assessment exercise of the RFCS Research Programme:

RFCS website: http://cordis.europa.eu/coal-steel-rtd
EXAMPLES OF KEY PROJECTS

NEW MECHANISATION AND AUTOMATION OF LONGWALL EQUIPMENT (NEMAEQ)

European coal producers are facing the challenge that the productivity in underground operations is lower than in mines overseas as a result of the structure and depth of the deposits in Europe. Automation and mechanisation are thus key factors for increasing the productivity. The project NEMAEQ aimed at improving the mining equipment for coal extraction and creation of drivages and at the same time reducing the production costs.

The project resulted in the development and implementation of full shearer loader equipment (see picture), facilitating the complete extraction process without any manual operation. Beside the introduction of new technology, another success of the project is the significant effort on the reliability of the components, the data communication systems and the software tools in this harsh environment. The project has fully proven that, even in a very difficult and challenging environment, the automation of mining procedures is now possible. The benefits resulting from this project include:

- The automated shearer has raised the extraction productivity per man shift up to 55 per cent. The resulting cost reduction leads to potential benefits of EUR 45 million/year.

- The successful outcomes of the project contributed to a better competitiveness of the coal mining industry which tries to overcome the lower prizes of foreign coal imports.

- The manufacturers of mining equipment in Europe could strengthen their position with regards to the global market by being able to offer highly advanced mining technology.
FIRE SAFETY OF STEEL STRUCTURES (CLUSTER OF 6 PROJECTS)

Up until the end of the 20th century, fire safety of building structures was checked by applying the conventional ISO approach of “standard fire” to individual structural components. This simplified approach models fires as a uniformly distributed phenomenon which heats a room at the same rate. In reality, fires actually have a period of increasing heat and then decreasing heat, and the vast majority start locally and then spread. These simplifications make this approach very unfavourable for steel buildings as it prescribes expensive and oversized fire protection for steel beams even where it is not needed.

A series of RFCS projects developed the alternative “Natural Fire Safety Concept” (NFSC), based on the determination of the actual fire progress, on the definition of scenarios for different types of buildings and on the simulation of the behaviour of the whole structure subjected to fire and not only of individual components. As a consequence, the protective mechanisms actually needed for the structure and the people staying or working inside the building were analysed and determined in a more accurate and scientific way. Greater protection is therefore recommended by NFCS where it is truly needed, and less where it isn’t. Altogether, this leads to better fire safety with reduced investments.

The NFSC concept has been welcomed by the scientific community and by practitioners such as architects and construction engineers. It was finally accepted in the relevant Eurocodes and included in the national annexes, meaning that real buildings can be now designed based on it. In parallel, large efforts have been dedicated to provide training and educational material for the ease of use of the NFSC by the engineering offices and contractors. A network of consulting engineers, involving design offices in 15 European countries, has been established, providing expertise and experience in the field of structural design in case of fire.

The total funding granted by the European Commission to the involved partners is nearly EUR 5 million. The outcomes have clearly contributed to increase the market share of steel in building and construction. According to the NFSC network, a total of about 100000 t of steel has been used in Europe through the design with NFSC, during the period 2008-2010. This figure leads to a total potential margin of EUR 10 million over the considered period of 3 years for the European steel sector.

The Natural Fire concept also allows steel material to be used in structures where previous building regulations based on the ISO approach did not allow its use, for instance for open car parks in France. Sales figures in the year 2009 amounted to the use of 6900 t of steel sections in open car parks in France implementing the NFSC, with an estimated total margin of EUR 0.69 million for steel producers only in the considered year.

Picture 2. Planning of collapse mechanisms based on NFSC: the collapse shall be non-progressive and in the direction of the fire.
ULTRA LOW CO₂ STEELMAKING (ULCOS) AND THE HISARNA PROCESS

ULCOS is a consortium of 48 partners (all major EU steel companies, energy and engineering partners, research institutes and universities) from 15 European countries that have launched a cooperative R & D initiative to enable drastic reduction in Carbon dioxide (CO₂) emissions from steel production. Supported by the European Commission, the aim of the ULCOS programme is to reduce the CO₂ emissions compared to today’s best productions routes by at least 50 per cent.

The first ULCOS project (called ULCOS I) was aimed at identifying and studying a wide spectrum of processes at all steps in the steelmaking process which would lead to such a reduction in CO₂ emissions. The ULCOS I project started in 2004 and was funded under FP6 to a value of 19 million € and the Research Fund for Coal and Steel (RFCS), also to a total value of 19 million € spread over several smaller projects. During ULCOS I, more than 70 methods by which CO₂ emissions could be reduced, some clearly more credible than others in achieving the objective, could be identified and investigated.

ULCOS I has then selected four process concepts that could achieve the targeted reduction of CO₂ emissions, and that are now being investigated at Pilot stage in projects co-funded by the RFCS. One of the four breakthrough technologies identified is the HIsarna process, a novel production route that consists in direct smelting of iron ore with coal. In the traditional blast furnace route, iron ore and coal cannot be used directly, they have to be transformed into lighter, porous materials that are sinter or pellets (from iron ore) and coke (from coal). These two transformation steps that conventionally require their own plants, are no more needed with the HIsarna process, where iron ore, coal and oxygen are fed directly in this new type of furnace.

The latest pilot trials held in June 2013, have proven that the HIsarna process is viable, and showed many advantages compared to traditional routes; Not only does it produce as an exhaust gas almost pure CO₂ (which makes it a good candidate for Carbon Capture & Storage), but the process allows a great flexibility in the production rate and also in the quality of the raw materials used.

Being initially developed to face the challenges of climate change, this process could as well be a great asset in the competitiveness of European steel producers.
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The Research Fund for Coal and Steel was established in 2002 to support the competitiveness of the European Coal and Steel sectors by supporting research, pilot and demonstration projects.

In accordance with the legal basis of the Research Fund for Coal and Steel (Council Decision 2008/376/EC) the Commission shall carry out a monitoring exercise of the Research Programme, including an assessment of the expected benefits and a report shall be issued by the end of 2013. To this end an Expert Committee was established in 2011 following nominations by the Coal and Steel Advisory Groups in order to assist in this exercise.

This report represents the outcome of the Monitoring and Assessment exercise and contains the recommendations from the Monitoring exercise regarding the way to improve the research programme implementation and the assessment of the benefits delivered by the projects completed between 2003 and 2010.

*Studies and reports*