



Project Newsletter No.1

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DEVCAT at a glance:

The DEVCAT project, funded by the European Commission (Research Fund for Coal and Steel) focuses on the development of high-dust SCR catalysts to improve the understanding of chemical and physical mechanisms in order to improve operational and lifetime performance of SCR-DeNO_x catalysts. SCR catalysts have originally been developed for the reduction of NO_x-emissions in power plants but today the discussion about greenhouse gas emissions and general emission reduction become a great issue in public acceptance of fossil fuel power plants as well as in terms of economic prospective. The mono-combustion of bio-fuels or the co-combustion of secondary fuels like sewage sludge for reduced CO₂ emissions and on the other hand side, the reduced NO_x-emission levels are new issues which influence the use of SCR technology. On one hand side the reduction of costs for the material and operation, the SCR performance loss caused by bio-fuels or co-combustion leading to accelerated deactivation and also the influence of the SCR technology on mercury emissions are important topics. On the other side the reliable operation of the high-dust SCR system is of major concern. The development of novel SCR catalysts and regeneration technologies facing these different topics related to emission reduction, reliable performance, detailed knowledge of reactions and mechanisms and the flexible application is the focus of the DEVCAT project.



Main project objectives:

- development of high-dust SCR catalyst for the application in bituminous coal-fired power stations as well as bio-fuel and co-combustion systems
- detailed investigation of the influencing parameters for catalyst activity, SO₂-SO₃-conversion and mercury oxidation
- development of new advanced regeneration methods for heavily blocked catalysts in order to extend the lifetime of the catalyst
- evaluation of modified catalysts on downstream flue gas cleaning devices (FGD)
- evaluation of developed catalysts under real flue gas atmosphere for validation of laboratory results and support of 3D-CFD model development
- extension of the applicability of existing 3D-CFD SCR model to cover also the utilization of bio-fuels and co-combustion of secondary fuels
- detailed investigations at full-scale SCR units for model validation

Available facilities:

- lab-scale catalyst production
- lab-scale micro reactor for catalyst tests
- bench-reactor for testing full scale catalysts
- technical-scale „power plant“ (burner, SCR, FGD) for real flue gas tests
- full-scale power plant SCR-reactors
- lab-scale FGD systems
- high-performance 3D-CFD catalyst model

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The project consortium:

Universität Stuttgart - Institut für Feuerungs- und Kraftwerkstechnik (IFK) is a non-profit educational and research organisation. It is active in the field of combustion systems in different scales (lab-, bench- and full-scale) and has experiences concerning the thermal utilisation of solid fuels (coal, biomass, waste, etc.). In the different framework programmes and energy related sub-programmes of the European Commission, the IFK co-ordinated, co-ordinates and participates in several projects, concerning the effective and environmentally friendly utilisation of solid fuels for heat and power production. Several national and regional projects complete this work. The IFK operates a fully equipped laboratory with a wide range of experiences in measuring heavy metals including mercury. The IFK is the coordinator of the DEVCAT project.



ENEL Ingegneria e Innovazione S.p.A is the major Italian power generation company providing around 40% of the gross domestic electricity production; the share of coal in the production fuel mix is 25% and this is to be increased to 50% in the near future. The Technical Research Area has more than 170 staff members, two research centres, four research stations and two chemical laboratories. ENEL Research R&D areas comprise environmental protection (emission and residue management), plant availability and energy security, hydrogen production and CO₂ capture. One of the main issues of the research activity is the reduction of micropollutants and ultrafine particulate matter from combustion flue gas. Much effort has been spent on mercury measurement and emission reduction both with full-scale campaigns and pilot tests.



Porzellanfabrik Frauenthal GmbH founded in 1921, has developed experience in high-tech industrial ceramics and it is one of the world leader in the production of ceramic honeycomb and plate type catalysts. Its products include: SCR catalysts, heat media for RTO applications, casting filters, diesel catalysts and oxidation catalysts. The company has been producing homogeneous extruded honeycomb catalysts since 1985 and continuous research and development has focused on improving products, adapting them for new customer requirements and applications.



EON New Build & Technology GmbH is a dynamic and innovative company which unites excellence in project management, project delivery and engineering to provide best-in-class services and competitive advantage. One department of E.ON New Build & Technology GmbH is active in the fields of activity are flue gas measurements for the control and basic engineering of electrostatic precipitators-, desulphuration und denitrification processes, setting of DeNO_x-plants to optimise the NH₃/ NO_x-distribution, examination of DeNO_x-catalysts to develop catalyst replacement strategies, regeneration of catalysts, material testing and -analysis and expert analysis and verification of guarantee values. They operate several lab- and bench scale catalyst and FGD test facilities.



EnBW Kraftwerke AG operates the major part of the generating capacities within the Energie Baden Württemberg Group. Being one of the most important utility companies in Germany, EnBW Kraftwerke AG produces around 71TWh while the installed power plant capacity amounts to about 14.000 MW. R&D work is carried out in the areas of highly efficient coal-fired power plants, power plant operation and diagnostics and reduction of air pollutants and CO₂. EnBW Kraftwerke AG has a long-term operational know-how of SCR DeNO_x catalysts and developed an on-site catalyst regeneration process.



RECOM-Services GmbH is a spin-off from the Universität Stuttgart in Germany. Since 1999 RECOM commercially applies 3D-combustion modelling for minimizing operating costs and technical risks in industrial furnaces and boilers. The company offers these engineering services to the power and process industry. The working areas include: Emission Control, Slagging and Fouling, Water Wall Wastage due to Corrosion, Fuel Mixing, Co-Firing of Secondary Fuels, etc. The proprietary 3D-CFD code RECOM-AIOLOS, applied by RECOM and jointly developed with the Research Group at IFK, is a reliable, fast, and cost-effective tool for design optimisation and problem solving. The predictive quality of the code has been assessed thoroughly with full-scale experimental data of numerous measuring campaigns. A large number of velocity, temperature and concentration data from in-furnace measurements of full-scale systems has been used to validate RECOM-AIOLOS predictions against real data from the field.



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