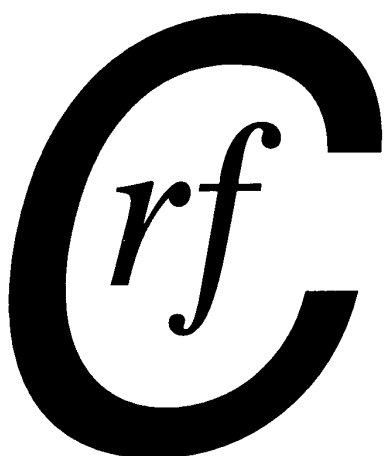


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NEWSLETTER

of the



*Coal Research
Forum*

Edited by: Dr Svenja Hanson

EDITOR'S COMMENTS:

Sorry about the delay in getting out this year's September edition. As most of you are probably aware of, September saw the 4th UK Meeting on Coal Research and its Application, and we were 'holding the press' to include a report fresh from it. It has been our biggest and best meeting yet, and I enjoyed it so much, I am already looking forward to the 5th in September 2004.

Apologies especially to the Coal Preparation Division, who had to wait even longer for the report on their meeting in June. This is just the sort of thing which would be avoided by replacing a three-times-a-year newsletter with a continuously updated web-site. Yet, few members took us up on the invitation to air their views on future shape, form and mode of distribution of the newsletter. To those select few 'Thank you' for your views, they have been thoroughly studied and –where possible- taken into account.

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Call for BCURA Proposals

The Industrial Panel has been established within the BCURA framework, to arrange and promote the funding of coal research at UK Universities at a pre-competitive level. In this second call for proposals, priority will be given to high quality proposals that address real problems facing producers and users of coal. BCURA seeks proposals that lie between “blue sky” and the commercial application stage, so proposers should be fully conversant with the current state-of-the-art whilst understanding the practical and financial limitations of turning the results of pure research into valuable contributions to society. Highest priority will be given to proposals which conform with the requirements of the government’s policy on coal-related research.

For details, please visit the BCURA website www.bcura.org.

Closing date is the 16th December 2002.

4th UK Meeting on Coal Research and its Application ICSTM, London, 16-18th September 2002

This years UK meeting was the held in London hosted by Imperial College. The three-day meeting attracted over 100 participants, not just from the UK, but from all over the world. It was our largest gathering yet, but despite the extra numbers, it proceeded smoothly, and retained the convivial atmosphere from previous years.

A **BIG THANK YOU** is in order to all involved in making it happen. Firstly, the organising committee who have been working tirelessly for over a year on getting the meeting off the ground: The chairman M.Cloke, the local organiser D.Dugwell, the secretary A.Thompson, the treasurer D. McCaffrey and two industrial representatives, W. Quick (Powergen UK plc) and E. Jamieson (Innogy plc). We are also most grateful for the sponsorship received from BCURA, TXU Europe, Mitsui Babcock Energy Ltd, Powergen UK and Innogy. And many, many thanks to all staff at Imperial involved in looking after us, from handing out name-badges and hints on switching on the projector to the truly excellent food (I must have put on at least a pound a day). On a personal note, also thanks to everybody who bought me a drink after the conference dinner, and to the person providing the paracetamol the following morning.

In total some 106 participant attended, although not necessarily simultaneously. 69 were from UK firms and institutions, 37 from overseas. Participants travelled from as far afield as Japan, Australia, the USA, China, Nigeria, South Africa and Chile, giving the national meeting a distinctly international feel. The largest non-UK contingent by far came from Spain, 11 altogether, leading us to speculate that maybe there is scope for instituting an Anglo-Hispanic meeting on coal research some time in the future. It was also nice to see an interest from Eastern Europe, with participants attending from Poland, the Czech Republic and Estonia. The turn-out from both industry and academia was good, and plenty of opportunities to exchange ideas between the two contingents arose during the sessions and especially during the so-called breaks.

The meeting was divided into 8 sessions. The entire Monday was devoted to combustion and combustion-related emissions, a total of 17 presentations presided over by three chairmen taking turns, M.Cloke, A.Thompson and P.Stephenson. Tuesday saw

carbonisation and preparation, beneficiation and handling chaired by J.Patrick in the morning. The afternoon was divided into co-firing with waste and biomass chaired by D. Dugwell and coal characterisation chaired by R.Kandiyoti. Wednesday started with other coal-related processes chaired by J.Williamson, moving on to modelling chaired by A. Williams and finishing with advanced monitoring techniques chaired by D.McCaffrey after lunch. This brought us to a grand-total of 52 oral presentations, not even counting in the 38 posters presented on Monday evening. It would have to be a very long article indeed to merely mention all of them, never mind doing justice to them. Hopefully, many contributions will make their way into the special edition of Fuel and can be fully appreciated by the interested public there.

What I found particularly noteworthy was the co-firing session, a new edition for this meeting. It appears that there now is interest in this relatively feasible way of introducing renewable energy into the existing generating infrastructure and thus reduce fossil fuel consumption. Most of the papers, with one notable exception, focussed on 'waste' rather than energy crops though. Sewage sludge seems to be a favourite, amidst many concerns about the effect on emissions and resulting ash properties. A second 'new' session had been considered to go with the co-firing one: CO₂ capture. Interest in presenting on this topic was considerably lower and two contributions, both from outside the UK, were included in the combustion section. The local contributions to the emissions part of that session appear to remain firmly rooted in the nitrogen question.

Several observers commented that the meeting was heavily focussed on combustion-related issues, which is true, but is also a true reflection of where coals commercial importance lies at present. Nevertheless, I did not feel that there was a dire shortage of non-combustion applications being presented on, especially with gasification not getting its own session and being integrated into the combustion one.

All in all, it has been an interesting and enjoyable three days. All the presentations, talks and posters alike, were of a high quality and very informative. I feel absolutely at a loss to single out any I particularly enjoyed, especially as I am certain I would be accused of favouritism. If I, for example, commented on the catalysed liquefaction work by M.W.Haenel, adding how good it is to see that liquefaction is still on the agenda, I would be accused of favouring my only fellow countryman present. If I chose R. Sakurov's PMRTA analysis-aided evaluation of the prospects of co-coking coal with plastics, I would leave myself open to complaints about bias towards somebody working in the same field. I would therefore like to invite the other 105 participants to mail me their opinions: Tell me what you liked or did not like about the meeting. What was your favourite topic or presentation (not your own, I hope...)? Did you learn something you found truly amazing and totally unexpected? Come on, have your say in the January edition!

Coal Preparation Division Meeting on “International Coal Preparation Reviews and Recent Developments”

The Coal Preparation Division held its first meeting since 1999 on the 19th of June at the University of Nottingham, the home ground of its recently elected new Chairman Chandu Shah. Despite competing with the beautiful weather, the holiday season and major sporting events, such as the Nottingham Open taking place just across the road from the campus, some 20 members assembled in the University Staff Club to listen to five high quality presentations. The morning was devoted to some recent coal preparation reviews commissioned by the DTI and supervised by ETSU. Steve Frankland (Dargo Associates Ltd) presented a review on the status of coal preparation in India, David Baillie (JMC Mining Services Ltd) considered China and Jon Brough (UK Coal plc) tackled the global picture. A common theme to all three presentations was the invitation to look beyond the UK and especially beyond the traditional markets in the ‘developed’ world. The coal production figures alone support this, and I have included them in Table 1. China outstripped the USA in coal production in 2000, and India was the third largest coal producer worldwide after China and the USA.

In the afternoon Paul Taylor (Bretby Gammatech Ltd) introduced a new coal quality monitoring technique and Douglas Brown (University of Nottingham) revealed how national and international standards for coal preparation, or anything else for that matter, evolve.

After a warm welcome to the University of Nottingham by our Chairman Academe, John Patrick, and the Divisional Chairman, Chandu Shah, Steve Frankland kicked off with his review of the status of coal preparation in India. Indian coal, as a general rule, appears to be of low quality. It is Gondwana coal, which is high in ash, but low in sulphur, chlorine and trace elements. ROM coal, mostly from opencast mining, often contains 40-50% ash, some finely dispersed and very difficult to remove. Up to recently cleaning was largely reserved for deep-mined coking coal to reduce its 25-30% ash content to 17-19%. With the pending introduction of the 34% rule – 34% being the maximum ash content for coal which would be allowed to be transported for distances greater than 1000km – coal cleaning is set to become more widespread. Predictions are that the coal cleaning capacity will increase to 100mt per year within the next 20 years. However, the demand is more likely to be for simple, cheap technologies and projects can be slow to get of the ground.

Jon Brough looked at the global picture, which seemed quite a challenge, having just focused on the obvious, vast differences between countries. An interesting fact I was not aware of is that 80% of the coal mined worldwide comes from surface mining, using large, unselective equipment and thus posing different problems to the relatively selectively mined underground coal. In addition to the usual literature and web searches, 1000 questionnaires to coal preparation plants were sent out for the review. 39% of the recipients responded. Of these 27% used jigs, 68% cyclones, 17% flotation and 53% spirals. 61% of the responding plants cleaned the coal for power generation purposes, 11% for coking, 15% for domestic use and 27% for metallurgical use (presumably this adds up to more than 100% because some plants supply coal for more than one application). Most plants were large (81% > 1mt p.a.) and many were built 20-30 years

ago, although there was an upsurge in plant construction some 5-10 years ago. Almost all plants use some form of pressure or vacuum filtration (92%) for fine material, whereas coarse discard dewatering is less common (57%). The level of instrumentation and control on the plants is directly related to the complexity of the operations. Crushing, screening (stage 1) and coarse cleaning (stage 2) require relatively little control, with the control requirements increasing as fine coal cleaning (stage 3), froth flotation (stage 4) and size reduction (stage 5) are introduced. 86% of the plants that include stage 4 have PLC control. Most of these are situated in the 'developed' world. Commonly controlled parameters are density (73%), the addition of flocculants (62%) and blending (44%). Automation and control is likely to improve with advances in IT. New technologies, such as dry processing, could come into their own and fines processing and dewatering are attracting considerable research activity. Ultimately, coal preparation is economically driven and could receive a major boost if new markets for coal are explored, such as chemical feedstocks and liquid hydrocarbons.

In the third and final talk of the morning session, David Baillie dealt with the status of coal preparation in China. One thing that never ceases to amaze me about China is the sheer scale of everything. 1000 billion tonnes of coal reserves, with nearly 1000mt p.a. being mined and consumed internally (only 3% of the coal was exported in 2000). Most of this coal is bituminous steam or coking coal (about 75%), with the remainder equally split between lignite and anthracite. 66% of the energy demand in china is met by coal, which is almost twice the world average. Having no substantial oil or natural gas reserves, the country is heavily reliant on coal, which is used to a much larger extent by industry (38%) and households (17.5%) than in countries with such reserves where it is mostly confined to power generation. The prediction is that by 2050 the percentage of coal is to fall to 43% of the energy consumption, but, as the total consumption is predicted to triple, this would still amount to an increase of coal demand to 2.4mt p.a. Currently there are 38,244 mines in China, of which the majority (36,000) are very small Town & Village Enterprises (TVE's). Their number is on the decrease. In 1995 there were 72,000 such mines, many of which were closed when mines producing coal with a sulphur content above 3% were targeted. Whereas small mines would not immediately be recognised as an obvious site for preparation plants, much of the cleaning capacity in 2000 was in fact situated at TVE's (887mt out of a total capacity of 1600mt). Some larger plants have recently been installed at Key State Mines, and coal cleaning is actively being targeted. There are plans to build 33 new preparation and 2 major new blending plants, and to increase the capacity of 123 existing preparation plants.

Steve Ivatt (Future Energy Solutions), who had been involved in co-ordinating the reviews on behalf of ETSU, concluded the morning session by congratulating the presenters and other participants in the review on their very comprehensive work. In the ensuing discussion, much interest focused on investment and business opportunities in India and China. The mood, it seems, is moderately optimistic, but anybody embarking on projects in those countries is well advised to do his homework thoroughly.

After a surprising nice lunch (in the sense that anybody used to soggy sandwiches is usually surprised when presented with a freshly cooked and nicely presented sit-down meal), the afternoon session started with a presentation on monitoring and quality control. Paul Taylor described the AshProbe and LabAsh instruments, which rely on the natural

radioactivity of materials present in the inorganic part of the coal to determine the ash content quicker and easier than by conventional methods. The main challenge before using the AshProbe is to calibrate it for the specific task required, either in a stockpile that has already been analysed, or with samples taken at the time of calibration. A recent successful trial has been undertaken at Tselentis in South Africa, which was added to the list of countries where the technology has already been demonstrated, including Australia, China, India, the UK, the US, Mexico and Holland. LabAsh is a stationary laboratory equivalent of the probe and is currently tested at mines in the UK. Both instruments compare well with conventional methods and could make ash determination much quicker and more flexible, thus benefiting both, coal supplier and coal consumer.

Finally, Doug Brown shared his insights into the making of international standards. With coal having become a global commodity, it is becoming ever more important to have reliable international standards to work from. Often it is not even so much the question of how a parameter was determined than as to where, when and in which manner the sample was taken. Whereas the adherence to international standards is voluntary, it is now quite common to specify their use in contracts relating to the supply of coal. The complexity of arriving at international standards is staggering, and often years, if not decades, are required to arrive at the final version. Representatives from circa 130 national standard institutes are involved, together with a whole host of technical consultants. They are split into various committees by subjects. Coal and coke, for example, are dealt with by committee TC27. This is further divided into 3 groups and 4 subcommittees. When a new work proposal is received, a draft standard is drawn up and voted on. If approved, it obtains the status of a draft international standard (DSI). After a second round of consultation and voting it becomes a final draft international standard (FDSI), and finally after another round of consultation and voting it is adopted an international standard (IS). The method of developing a standard is by consensus, trying to make it workable for industry worldwide. Further information on international standards, including those appertaining to coal preparation, is available on the ISO website (www.iso.org), which can be a bit tricky to navigate. If anybody requires help, Doug Brown is willing to lend a hand.

The meeting concluded with Steve Ivatt summing up and thanking the speakers for an interesting and stimulating day. It certainly has been an enjoyable meeting, covering a wide range of topics and even catering for the likes of the newsletter editor, who is anything but an expert on coal preparation. Chandu Shah finished by asking the members to come forward with suggestions for the next Coal Preparation Division meeting, regarding content, venue and timing (chandu.shah@nottingham.ac.uk). If I may add a personal thought, how about a site visit to a coal preparation plant? It might attract curious non-experts from the Forum membership and offer the opportunity to take research students in the field for a day out to see the real thing.

Table 1 Coal Production in 2000 (Data from the IEA)

Producers	Hard Coal (Mt)	Brown Coal (Mt)
People's Rep. of China	1171	-
United States	899	77
India	310	22

THE FINAL CONFERENCE OF THE EUROPEAN COAL AND STEEL COMMUNITY, (ECSC), LUXEMBOURG, JUNE 2002

In the week beginning 24th June 2002, there were a series of events held in Luxembourg to celebrate and acknowledge the ending of the ECSC Treaty, (1952-2002), on 23rd July 2002. The author, representing the Coal Research Forum and the British Coal Utilisation Research Association, attended some of these events. Luxembourg was a particularly appropriate venue for them since this is where the Treaty was originally signed on 18th April 1951 and where the first headquarters of this organisation was based. This Treaty, built on the three fundamental principles of reconciliation, solidarity and peace, was originally conceived by Robert Schuman, the then French Foreign Minister and Jean Monnet, later to become the first president of the ECSC as a means of promoting, modernising and unifying coal and steel production in Europe in the immediate aftermath of the Second World War. However, the Treaty, which came into force on 25th July 1952, was also intended to ensure that coal and steel production, two of the key strategic materials needed in the waging of wars, would be controlled and co-ordinated in such a way as to make future wars, particularly between France and Germany, both unthinkable and materially impossible.

From the ECSC seed came the European Economic Community, (EEC) and Euratom which were founded in 1957 and which has been developed and expanded to become eventually in 1992, the present fifteen-member state European Union, (EU).

The ECSC has been an important source of UK coal research funding since the United Kingdom became a member of the European Community in 1973.

There were several events taking place during the 4 day celebration, some with a greater or lesser relevance to coal and this review will cover only the “Coal Research” event which took place on Tuesday 25th and Wednesday 26th June, 2002. Even with this limitation, and in view of the volume of information presented at this event, this review will be an outline summary intended to inform the reader of the overall subject areas covered and the general flavour of the messages that were being presented. Those seeking more detailed information should consult the proceedings of this event which are due to be published shortly.

It should also be noted that the brief given to the speakers was to summarise progress over the last 50 years in specified subject areas with particular reference to the technical results achieved and their benefits and the contribution to these achievements resulting from ECSC funding. In this context, for those more familiar with the ECSC activities in recent years, it must be remembered that for the first 30-35 years of the ECSC treaty, coal-mining research accounted for more than 50% of the ECSC funding during that period. It is only over the last 15-20 years that coal utilisation research has predominated.

International Conference on Technology for Coal Mining, Preparation and Utilisation : Results of the ECSC Coal Research Programme

Ch. Cleutinx, Head of the “Coal and Oil Directorate, Conventional Energies, DG Energy and Transport”, gave the opening address for the first session of this event which had attracted some 150 participants from 14 countries. The first presentation entitled “The

Technological Revolution Underground – High Performance Mining from 1952-2002” was given by Dr. J. Czwalińska of Deutsche Steinkohle AG. Using mainly Germany as an example, the speaker described the achievements of ECSC funding over the last 50 years. In 1952, roofs were supported with wooden pit-props, blasting was common, pit ponies were still used, there was little mechanisation and the whole mining operation was very manual. This progressed in the 1960s to longwall mining and greater mechanisation including self-advancing powered roof supports and plane and disc shearers. The developments of micro-electronics were also important for communication and planning, and monitoring and control. By the 1990s, “virtual reality” computer programmes modelled the modern underground mine and were used extensively for the training of miners. During the period 1952 to 2000, there had been a significant reduction in the size of the German coal industry from a production of 470M to 87M tonnes per annum, a reduction of the number of employees from 1.65M to 63,200 and a reduction from 65% to 11.6% of coal as a primary energy source. However, a significant achievement during this period had been that output per man shift had risen from 1.4 tonnes in 1952 to 5.2 tonnes by the year 2000.

The second presentation was given by Mr. P. Jackson of IMC Geophysics Ltd. and was entitled “Geophysical Exploration of Deep Coal Reserves – Past Improvements, Future Needs”. Bore holes have been used for centuries to determine the depth and position of coal seams. However, using this method of exploration, it is not possible to know of faults which occur outside of the borehole areas. A new longwall face costs between £10-20 million to set up and a fault of only 1–2 metres completely ruins the economics. From the 1970s, there were several 2D – seismic exploration techniques developed which improved the resolution of the depth and position of coal seams down to less than 1 – 2 metres. More recently the development of 3D seismic exploration techniques had further improved the resolution and information provided by this method. The speaker predicted that deep mining would continue, but against the background of increasing competition and environmental scrutiny which would need to be supported by advanced seismic monitoring techniques.

The last presentation of the morning session was entitled “Mining Environment and Ventilation” and was given by Dr. R. Bassier of Deutsche Montan Technologie GmbH, DMT. This presentation mainly related to underground methane emissions leading to fire and explosion problems. ECSC research had enabled the calculation of the gas content in different types of sites both deep and shallow, facilitated the understanding of the mechanisms of gas release and enabled advanced planning during mining. Methane drainage and ventilation to control gas emissions, including underground climate control to remove the heat produced from underground electrical machinery during mining, reduction of heat stress factors on miners, damp, improved dust control and air supply had also been studied under many of the ECSC programmes.

The first presentation of the afternoon entitled “The Challenge of Mining at Great Depth – Strata Control” and was given by Mr. W.E. Hindmarsh of Rock Mechanics Technology Ltd. The presenter described the many changes over the last 20-25 years in the methods of keeping roadways open at great depth, i.e. greater than 850 metres, from curved steel arches to rectangular roadways and roof bolts. These advances had led to significant safety improvements, particularly through stress measurement and management.

The next presentation was given by Mr. J. Carrasco of Asociacion Para la Investigacion y Desarrollo Industrial de los Recursos Naturales, AITEMIN and was entitled "Safety in Mines : An Integrated Part of ECSC Research". This presentation addressed the avoidance and confinement of underground fire, explosion and electrocution, where research was aimed at avoiding prolongation of a fire, raising the alarm and the evacuation of personnel. In the first part of the presentation, the general safety developments were discussed leading to part 2 with an analysis of the results of 8 specific ECSC projects. Statistics were presented which showed how this work had led to the reduction of deaths and accidents in the European coal mining industry.

The third presentation of the afternoon session was entitled "Managing the Environmental Impact of Coal Mining" and was presented on behalf of Mr. J-F. Raffoux by Mr. Pentel of the Institut National de l'Environnement Industriel et des Risques, INERIS. During the period 1991-2001, 20.3% of ECSC funding had gone to the environmental impact of coal mining resulting from excavation, transportation, dumping of wastes both during and after mining operations. The problems addressed by these projects had related mainly to subsidence, water issues and gas emissions, etc. There had been 28 research projects carried out during the above period on methane recovery, both from working and closed mines, treatment of mine waters, the reclamation of "mine lagoons", mainly for recreational use, the treatment of slag heaps and the re-use of slurries from coal preparation plants. Although great progress had been made in solving many of these problems, there were still problems to be solved such as gas emissions, the location of old mine shafts and subsidence etc., and therefore European assisted research needed to continue.

The next presentation was given by Dr. R.G. Jung of DMT Montan Consulting GmbH, and was entitled "Fifty Years of Development in Coal Preparation – A General Review" The presenter defined coal preparation as the conversion of the raw materials from mines to saleable and utilisable products. He reviewed the limited methods used in the 1950s, and the changes to wet treatment and dry treatment, the changes resulting from mechanised longwall mining and reviewed the methods developed during the period 1952-2001. For lump coal this was mainly the development of dense medium separation, and for fine coal, cell and column flotation and pneumatic separation. Developments in ash monitoring systems using radioactive sources, x-rays, microwaves and natural radiation from minerals were also discussed.

The last presentation of the afternoon session was entitled "Results Obtained by ECSC-funded Lignite Research" and was given by Dr. W. Renzenbrink of RWE Rheinbraun AG. The presenter described the development of on-line analytical methods and the production of lignite coke for the treatment of industrial waste water and waste gas cleaning. He also described the development of the High Temperature Winkler Coal/Lignite Gasification process and the developments in hot gas filtration.

The first presentation of the second day of this event was given by Dr. R. Alvarez Garcia of the Instituto Nacional del Carbon, INCAR and was entitled "Coke Quality for EU Blast Furnaces". The presenter described the importance of coke quality for EU blast furnaces, particularly resulting from the reduction in the number of blast furnaces and coking plants during the last 50 years and particularly during the last 15 years. One of the main

objectives had been to prolong the life of coke batteries, the alternative being to build conventional coke ovens or alternative coking systems of which three types were described. The presenter described the position in Asia, the U.S.A. and India. Reminding the audience that the 3 purposes of coke in the blast furnace were as a source of heat, for chemical reduction and for the physical support of the furnace bed, where currently the latter was the most important area for research. The presenter made several comparisons between the properties of cokes produced from coals from several different countries and referred to the effects of stock-piling and weathering.

The next presentation entitled “Improving Coke Oven Performance and Working Life” was given jointly by Mr. D. Vogt of the Centre de Pyrolyse de Marienau and Dr. F. Huhn of DMT. The speakers noted that the construction of coke oven plant represented high capital investment and that the research objectives of today were to extend coke oven life from 30 years to 50 years. Other important objectives had included the reduction of coke oven emissions, charging issues related to pre-drying and pre-heating of coal prior to coking, coke pushing, and wall damage and deflections. The speakers noted that considerable advances had been made over the last 50 years, particularly regarding the reduction of the environmental impact of coke production and several important objectives had been achieved.

The third presentation was given by Dr. A.J. Minchener of EMC Environmental Engineering Ltd. and was entitled “Advanced Power Generation Technologies”. The speaker highlighted many of the challenges in this field that had led to significant achievements being obtained. These included the reduction of SO₂ and NO_x emissions to meet present and future emissions legislation, the minimisation of CO₂ emissions and the maintenance of EU industrial competitiveness in a global market. The speaker described the PFBC combined cycle process, integrated gasification combined cycle gas processes, which included entrained bed, (Buggenheim and Puertollano), fixed bed (BG Lurgi), and fluidised bed (HTW) processes, and hybrid systems such as the Air Blown Gasification Cycle. Aspects such as control systems and gas cleaning which cut across all of these technologies were also discussed. Future research needs included the need for further work on existing technologies and the development of alternative technologies to maintain coal as a strategic energy source, meet ever more stringent environmental requirements and maintain the leading position of the EU in coal utilisation technologies, particularly in developing markets such as China and India.

The next presentation entitled “Ash Disposal and Utilisation” was given by Mr. J. Blondin of SNET-Cerchar. The speaker presented statistics on the trends of production and use of ash up to the 1980s, for the 1990s and for the year 2000 onwards for bottom ash, fly ash, pulverised fuel ash and gypsum from FDG plant. He highlighted a number of success stories regarding ash utilisation in the cement and plaster industries and in the synthesis of zeolites. Particular reference was made to EU ash disposal rules and directives, particularly regarding land fill, (including leaching and trace element issues). He concluded by reviewing future research needs.

The next presentation, authored by Dr. A.J. Minchener and Dr. D.G. Richards of EMC Environmental Engineering Ltd. and entitled “Prevention of Slagging and Fouling” was given by Dr. Minchener. After defining the differences between fouling and slagging, the

speaker explained why their study was of particular importance and in particular due to the high cost implications arising from increased plant maintenance, lower efficiency and unplanned outages. The research strategies had included fundamental studies of the mechanisms of fouling and slagging, the development of probes and predictive tools and the use of indices. Laboratory and pilot scale pulverised fuel combustion studies to simulate full-scale pf combustion were described which included the optical access drop tube and the ash deposition rig. The main achievements were described and the requirements for future studies.

The last presentation of this event was entitled “The Contribution of the ECSC to Research on Pollutant Formation and the Development of Control Technologies” and was authored by Dr. V.J. Cortes Galeano and Dr. L.A. Salvador Martinez of Asociacion de Investigacion y Cooperacion Industrial de Andalucia, AICIA and was given by Dr. Cortes. The speaker described the position in 1982 where most emphasis was on particulate removal using electro-static precipitators with little de-NO_x or de-SO_x activities. Following this, there were several EU directives regarding emissions and this area became a high priority for ECSC research during the mid-1990s. The speaker noted that there had been more than 90 projects in this area supported by the ECSC which could be divided into 5 categories. 1) Primary measurements, 2) End of pipe technologies, 3) Coal blends/coal bio-mass combustion, 4) CO₂ emissions reduction, and 5) Global effects technologies, (fluidised beds and gasification plants). The speaker analysed the results of these projects and highlighted the better knowledge of pollutant formation and optimisation of prevention measures which had accrued from this research.

The conference succeeded in demonstrating the benefits gained through the 50 years of ECSC funded coal research. The significant developments which had occurred as regards mining techniques and conditions, coal preparation and beneficiation, and coal utilisation, were the outcome of co-operative programmes which led to the continuous development of ideas and techniques. As a long established industry the progress was achieved, not through dramatic discoveries, but through a succession of incremental steps overall to some major developments.

Overall, all authors of all of the papers had emphasised the benefits obtained from coal research over the last 50 years resulting from the contribution by ECSC funding.

The Closing address was given by Ch. Cleutinx, Head of the “Coal and Oil Directorate, Conventional Energies, DG Energy and Transport”, who emphasised the important role of the coal research funded by the ECSC. The recognition of this success was an important factor in determining the continuation of funding for coal research by the European Commission.

In addition to the “Coal Research” event, the author also attended part of the “Steel Research” event entitled “Steel Research from ECSC to the Future” on the afternoon of Wednesday 26th June and the Round Table Conference entitled, “What can be learned from 50 Years of ECSC in Industrial and Social Matters” on the morning of Thursday 27th June. There were also other events such as the laying of flowers at the Schuman Memorial and a number of cultural events including amongst others, performances at various locations around Luxembourg of a male voice choir of miners from the Asturias

region of Northern Spain, the Grimethorpe Colliery Brass Band and a concert by the Luxembourg Philharmonic Orchestra

Dr. David J.A. McCaffrey
Secretary of the Coal Research Forum
BCURA Technical Officer
July 2002

ECSC Projects funded 2000-2002

Following my laments on the difficulties of finding up-to-date information on ECSC projects that is sufficiently detailed to extract the UK partners and their share of the funding, help was indeed forthcoming. Many thanks to Keith Wilkonson, who supplied the data from which the following table has been extracted. Hopefully this is now a complete list of coal research funded by the ECSC in its last three budget years. 74 projects were funded over 3 years to the tune of some 16.2mEuro. They are currently being undertaken at 16 different companies and 11 universities.

Project Title	Company / Institution	Aid / Euros
2000		
Improvement of safety, reliability, and perational life of electrical and electronic equipment used in hazardous explosive atmospheres	IMCTS	443,940
Improved understanding of reinforcement behaviour/testing	RMT	510,600
	UK Coal	196,380
Advanced geotechnical instrumentation for detecting rock failure and monitoring support loads	RMT	480,600
	IMCG	193,140
Reduction of energy consumption in coal mining through optimized belt conveyor systems	U. Nottingham	65,580
	UK Coal	42,180
Fire fighting systems	IMCTS	292,080
	U. Nottingham	138,780
Assessment and sustainable reclamation of mine sites for post mining use	IMCTS	406,080
	IMCTS	307,800
	ICSTM	108,480
	Wardell Armstrong	51,780
	U. Nottingham	132,180
Characterization of coal-wash slurries and their impact on fine coal preparation	CRE Group	103,020
	MI	318,480
Advanced demineralization of high sulphur coal by bioleaching and bioflotation	CINAR	69,540
Advanced demineralization of coal	U. Nottingham	224,820
Improved manufacture of coke for non-ferrous applications with environmental, operational and market benefits	U. Strathclyde	250,020
Development of measures and tools for improvement of coke oven operation related to aspects of carbon deposits	U. Nottingham	171,480
Super Coke 2000	U. Nottingham	195,720
The safe and effective preparation of coal and biomass for furnace combustion (COBIFLASH)	ICSTM	200,340
On-line measurement of particle size in fine coal transport systems	CRE Group	156,540

	U. Teesside	326,760
Improved coal utilisation strategies by standardization and wider use of CRE Group drop tube furnace evaluation methods		116,700
Efficiency, plant damage and NO _x optimization for power plants operating with variable loads and coals (VAR-OPT PROJECT)	PowerGen	292,980
Decreasing the cost of power generation by improved utilisation of low volatile coals	PowerGen	290,100
The abatement of environmentally unfriendly species in combustion and gasification processes	U. Newcastle	235,140
Atmospheric impact of particulate matter from solid fuel combustors (PANAMA)	ICSTM	229,380
		6,550,620
2001		
Improved roadway and face end support techniques	U. Nottingham	309,120
	UK Coal	154,020
	U. Nottingham	191,640
On-line analysis of coal	U. Nottingham	272,280
Laboratory and pilot-scale tests to assess coke quality and coking pressure. Comparison with industrial tests	EMC	201,900
	U. Nottingham	185,520
Significance and control of selected aspects of coke quality and coke oven operation	U. Nottingham	215,460
Improvement of coal combustion performance and reuction of NO _x emissions (ICOREM)	Innogy	237,990
	EMC	76,920
Prediction and control of slagging and fouling in coal-fired plant	Innogy	154,500
	U. Portsmouth	158,700
Particulate removal from flue gas : improving the performance of electrostatic precipitators	U. Nottingham	234,420
	PowerGen	36,720
Capture of CO ₂ in coal combustion	Cranfield U.	136,425
Optimisation of the global environmental impact of coal fired power plants	EMC	264,000
	Fluent	261,360
Application of boiler advanced control for optimisation of P.C. CML combustion through primary measures (ABACO)		95,940
Environmental enhancement of coal utilization systems using optimised & novel hybrid gas filtration methods (OPTI-FILT)	EMC	304,200
	Glosfume	168,480
	U. Bristol	109,980
Coal combustion in CO ₂ -rich flue gas; an approach to industrial application in power stations	U. Leeds	492,060
Development of a carbon-in-ash notification system (CARNO)	EMC	152,640
	Innogy	332,340
	British Energy	98,340
Measures to improve availability and reduction in operating costs of coal and biomass burning power plants	U. Bath	216,840
		5,257,383
2002		
Improved roadway drivage and ground control under high stress conditions	RMT	375,000
	U. Nottingham	300,360
Extending utility and service life of underground data transmission	MRS�	323,400

networks and other data processing equipment		
Improving performance by virtual reality training	U. Nottingham	276,720
	IMCGC	60,060
	MRSL	50,400
	Camborne	39,240
	H&SE	143,340
Improved rock stress measurement and analysis for planning of RMT underground coal mines		529,740
	U. Nottingham	270,330
Development of tools for managing the impacts on surface due to changing hydrological regimes surrounding closed underground coal mines	U. Nottingham	300,360
Total utilisation of coal preparation fines	U. Nottingham	413,040
Possibilities of the carbonisation process for the recycling of carbon containing materials	U. Nottingham	184,320
Minimisation of the environmental impact of coke oven emissions	U. Newcastle	335,100
Coking pressure generation and moderation	Corus UK	342,660
	U. Nottingham	200,160
Co-combustion of meat and bone meal in coal power plants	EMC	240,540
		4,384,770

CALENDAR OF COAL RESEARCH MEETINGS AND EVENTS

Date	Title	Location	Contact
9th October 2002	"Advanced Sensors & Instrumentation Systems for Combustion Processes" organised by the Institute of Physics	Rutherford Conference Centre, London	Ms Leah Zeto Conferences Department Institute of Physics 76 Portland Place London, W1B 1NT Tel: +44 (0) 20 7470 4800 Fax: +44 (0) 20 7470 4900 Email: leah.zeto@iop.org http://physics.iop.org/IOP/Confs/SIS/
14th October 2002	51st BCURA Coal Science Lecture "Recent Advances in Coal Science and their Applications", by Prof. Jim Williamson of Imperial College	The Royal Institution, Albemarle Street, London.	Mr J Gardner Gardner Brown Limited Calderwood House 7 Montpellier Parade CHELTENHAM GL50 1UA Tel: 01242 224886 Fax: 01242 577116 Email: BCURA@gardnerbrown.co.uk
21-23th October 2002	International Conference on Clean Coal Technologies for our Future	Sardinia, Italy	Clean Coal Technology Conference, Sotocarbo SpA, c/o Centro Servizi CNISI, 09010 Portoscuso(CA), Italy Tel: +39 0781 509047 Fax: +39 0781 508349 Email: cct2002@tiscalinet.it Internet: www.iea-coal.org.uk/cct2002
6-9 November, 2002	2002 China International Hi-tech Symposium and Exhibition on Coal Chemical Industry and Conversion	Beijing International Convention Centre	Room 3001/3003, West Building No. 16, Qiqu, Hepingli Beijing 100013, P.R. China Contact Person: Ms. Zhang Yuan and Mr. Han Wenxue Tel: 0086 10 64217764 Fax: 0086 10 64225383 E-mail: chinaccf@asiabchem.com.cn Or visit our website: Http://www.chinaccf.com
2-6 Nov 2003	International Conference on Coal Science	Cairns Convention Centre, Qld., Australia	More details will be available soon