

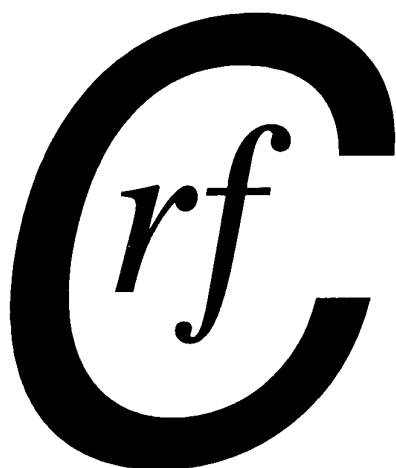
No. 37

May 2003

NEWSLETTER

of the

*Coal Research
Forum*



Edited by: Dr Svenja Hanson

EDITOR'S COMMENTS:

Once again the main feature of the spring edition is the AGM, and if you read the account of the 14th AGM you will find my name missing from the new Executive Committee. Yes, this is my 7th and last newsletter. As from September Alan Thompson will be taking over, and I'm looking forward to his first newsletter already. By the time it will be issued I will be teaching Chemical Engineering about 5000 miles from home, and the only way to keep in touch and find out what is going on in UK coal research will be e-mail and the CRF website. I hope you have enjoyed reading my newsletters at least half as much as I have enjoyed writing them. And I do apologize for only lasting for such a relatively short time compared with my predecessor, Alan Walker, who managed 25 editions (that's 8 years!).

The newsletter also features a very enjoyable meeting of the Advanced Power Generation Division at Cranfield University. A very topical read with most of the presentations addressing the issue of lowering carbon emissions. More on low carbon emission and catching CO₂ in the short feature on the Energy White Paper, and the one on two excellent presentations given after the formal AGM business was concluded. Believe me CO₂ C&S really is most in vogue, if you're not into it already, don't miss the boat.

And, last but not least, the annual look at funding of UK coal research concludes this newsletter. Should you have been missed out – complaints to my successor, please, I'm busy packing.

Contact Details:

[David McCaffrey](#)

The Coal Research Forum
P.O. Box 154
Cheltenham
GL52 5YL
Tel: 01242 236973
Fax: 01242 516672
E-mail: coalresearch@coalresearchforum.org
Website: <http://www.coalresearchforum.org>

Dr S Hanson
SChEME
University of Nottingham
Nottingham
NG7 2RD
Tel: 0115 9514198
Fax: 0115 9514115
e-mail:
svenja.hanson@nottingham.ac.uk

The 2003 AGM

This years AGM was held on the 15th of May and hosted by Innogy plc at their Didcot Power Station site. So first and foremost: A big thank you to Innogy and the local organiser Gerry Riley. Many thanks also to our long suffering Secretary Dave MacCaffrey whose many activities for the Forum over the year often are taken for granted. We would definitely notice if you stopped, Dave, but please don't. But the most special mention this year has to go to Allan Jones, who chaired the AGM as his last action as the out-going Chairman Industry. It truly is the end of an era. Allan has been on the Executive Committee ever since the CRF was conceived in 1989. For the past 6 years he has been Chairman Industry, and this is probably the best place to thank Allan for all the time and effort he has put into keeping the Forum on the right track. These efforts were not wasted, the Forum had another good year with plenty of activities achieving the objective of bringing together Industry and Academe. Since the last AGM there has been a Coal Preparation Division Meeting in Nottingham in June (see Issue 35), the hugely successful 4th UK Meeting on Coal Research and its Applications at Imperial College in September (also in Issue 35), and the Advanced Power Generation Division Meeting at Cranfield described in this edition. Additionally the Forum has co-sponsored a Meeting of the Combustion Institute and of the Institute of Physics. The Treasurer, Mike Cloke, reported that the finances are in good health, and that income exceeds out-goings, partially on account of a slight profit on the September conference.

The Executive Committee:

There were a few changes to the Executive Committee. Brian Ricketts (UK Coal plc) has taken over as Chairman Industry from Allan Jones (PowerGen plc). Ruth Poultney (Corus UK) has taken over from Ron Wilmers (also Corus UK), and Will Quick (PowerGen plc) is also joining as a new Representative from Industry. The Executive committee now has the following members:

Joint Chairmen:	Brian Ricketts (Industry) John W. Patrick (Academe)
Secretary:	David J. A. McCaffrey
Treasurer:	Mike Cloke Represented by Alan Thompson
Representatives from Industry:	Will Quick Mike K. G. Whateley Ruth Poultney
Representatives from Academe:	Dennis R. Dugwell Nigel V. Russell Jenny M. Jones
Seconded Members:	Gerry Riley Alan Thompson (Newsletter Editor)

Divisional Chairmen:

Chandu Shah has resigned as chairman of the Coal Preparation Division. A new chair has been proposed but is yet to be confirmed. Mike Cloke has also resigned from chairing the Coal Characterisation Division – any volunteers, please come forward!

Coal Research Funding in the UK

(also see article on Public Funding...towards the end of this edition)

Brian Ricketts introduced the BCURA Industrial Panel at last years AGM (issue 34) and followed it up with an update at this years. The second call received 21 applications, 5 of which have been funded, and 3 are held in reserve. The 3rd call is going out this autumn and it is under discussion to narrow the remit to make it more relevant to energy policy developments in this country.

Our customary guest from EPSRC this year was Peter Bates, who endeavoured to dispel the perpetual myth that coal funding was somewhat discriminated against by EPSRC. The success rate of funding applications over the last 6 years lies above average, and with the regard to the last year, it was a phenomenal 100%. Thus the question I was asking in my public funding review was answered: There are 2 new projects funded as coal technology, and there were 2 applications. We have given up on EPSRC as a funding source, and unless we want coal technology funding from that source to dry up completely the ball is in our court. We need to think of coal related projects that are fundamental and novel enough to qualify quickly!

In the wider field of energy research there is a lot of activity from UK funding bodies at present. The 2nd call of the Supergen Initiative, concerned with lifetime extension of conventional power plant, is shaping up. Discussions with four universities are under way. Carbon Vision is a joint venture with the Carbon Trust focussing on low carbon buildings and energy efficiency in industrial processes. The latest venture, with NERC and ESRC, 'Towards a Sustainable Energy Economy' seeks to establish a UK Energy Research Center and a National Energy Research Network. Expressions of interest are currently sought (until the end of May). More details can be obtained from the NERC web-site (www.nerc.ac.uk).

The Energy White Paper: Commitment to a low carbon economy

The long-awaited Energy White Paper was out in the open on February 24th, and you have to dig pretty deep to find any positive mention of coal; it is a part of the high carbon economy and therefore a thing of the past. Or is it?

It certainly did not make the headlines, the press release summing up the main points as follows:

- Cut carbon dioxide emission by 60% by 2050
- £350m investment in renewable energy
- "Aspiration" for 10% of energy to be renewable by 2010, and double that by 2020
- No new nuclear power stations - but a review of policy in 2005

The headlines variously divided into questions such as: How genuine is the greening of the government? Is the renewables target feasible? And, does the low carbon commitment apply to such sensitive issues as cars and aeroplanes?

To read anything regarding coal, you have to turn to the actual document, secondary sources failing altogether. Sections 6.56 ff deal with ‘handling the carbon consequences of coal-fired generation’. Without carbon removal, the paper predicts that coal will become very unattractive as an energy source, and that its contribution will be significantly reduced by 2020. It categorically states that if coal is to have more than a marginal role by 2015 generators will need to find economic ways of dealing with CO₂ emissions. It couldn’t be more clear: Coal is out unless CO₂ capture and sequestration is in. And the sooner it can be proven, not just in general, but in the UK, the better chance coal has for staying in the fuel mix of the future.

CO₂ Capture and Storage

At the AGM this year, held on the 15th May at Didcot Power Station, we had the pleasure of listening to two invited speakers on the very important and most topical subject of CO₂ capture and storage: **Jeff Chapman** from Trade Partners UK and **Philip Sharman**, a DTI International Technology Promotor. The presentations were met with great interest and a lively discussion session followed, which carried on well into the designated lunch break. If anybody still needed convincing that CO₂ sequestration is the way forward, this definitely should have done the trick. The summary from the session in brief would look something like this: The political will is there, the technologies have been proven, the economics are nowhere near as bad as was once thought – what are we waiting for ?

Jeff Chapmans talk was entitled “Policy and Trading Aspects of CO₂ Capture and Storage”. He started from the premises that it is now widely accepted that climate change exists and that it is man-made. CO₂ accounts for 70% of the Greenhouse Gases (GHGs) and its level in the atmosphere has risen from 280 to 375 ppmv since the Industrial Revolution. Currently three times the level of CO₂ that can be absorbed (equilibrium level) is emitted, and energy demand is still on the increase. A number of energy strategies are available, like improving efficiency, increased used of Combined Heat and Power (CHP), new nuclear installations, renewable energy, use of hydrogen and other low carbon fuels and last, but not least, enhancing natural uptake of CO₂. It is unlikely, however, that pursuing any of these options, or even all of them, would solve the problem, unless CO₂ is also captured and stored. This need not be seen in the negative light of a costly problem though, but as a business opportunity. Captured CO₂ can be utilised, e.g. for EOR (enhanced oil recovery), can be traded as a commodity with other countries and can lead to a whole set of new technologies that could be sold worldwide.

The worldwide storage capacity for CO₂ is huge, as can be seen from the Table below, which I have hopefully reproduced accurately:

CO₂ Storage Capacity in Gt CO₂

(* unproven capacity)

	Depleted Oil Fields	Depleted Gas Fields	Unminable Coal Seams	Deep Saline Aquifers
Global	125	800	148	400 (10 000)*
North Sea	5.8	13.3	-	19.5 (716)*
UK	2.6	4.9	-	10.9 (240)*

For comparison, the total annual output of CO₂ from the UK is 0.55Gt, 0.2 of which originate from power generation. So there is plenty of room for all the UK CO₂ and some to spare for less fortunate neighbours. Or, to put it differently, the UK with its access to the North Sea has more than its fair share of these storage opportunities, and is thus in a good position benefit from a move to CO₂ storage. Some challenges are yet to be met. Apart from the initial investments needed there are a number of legal issues to be cleared, which created a lot of interest from the floor. It seems that environmental conventions designed to prevent the dumping of waste at sea could apply to CO₂ storage. And there is the question of who actually owns the CO₂ once it has found its way into a saline aquifer at the bottom of the deep sea. And will the public accept it, even if it may increase electricity prices?

Philip Sharman described the “Emerging Technologies and Economic Aspects of CO₂ Capture and Storage”. The technologies can be divided into three categories: Post-combustion, pre-combustion and oxyfuel. Post-combustion scrubbing is a well proven technology, conventionally employing amines, although newer technologies are emerging based on adsorption and membranes. It could be retro-fitted to existing plants or added to new supercritical pf or CCGT (Combined Cycle Gas Turbine) plants. Pre-combustion decarbonisation is a gasification option, where the gases are reformed and the CO₂ separated prior to combustion. It would fit in with IGCC (Integrated Gasification Combined Cycle) technology or could be retrofitted to existing CCGTs, either as coal gasification or as an additional step to decarbonise natural gas. Finally, the Oxyfuel option concentrates the CO₂ output by removing the N₂ from the combustion air, and by recycling some of the flue gas. It could be applied to either conventional or supercritical pf combustion.

An economic study estimated the cost per tonne of CO₂ captured based on a 8mt/year capacity for the retro-fit option to conventional pf plant (£19), retrofit to existing CCGT (£14), new IGCC (£13-34) and new CCGT (£21). Up to £8/t CO₂ need to be added for transport, the higher estimates assuming the building of pipelines. And finally there are the storage costs to be considered. The focus was put on geological storage, as the alternatives are not acceptable (injection into the deep oceans) or far enough developed (mineralisation, enhanced uptake). In the short run there are geological storage options available that offer some pay-back: EOR, EGR (Enhanced Gas Recovery) and ECBM (Enhanced Coal Bed Methane). Of these, EOR is very well proven and has been used in the US for many decades. Primary oil production leaves some 80% of the oil behind, and even with water flooding it still leaves 60-80% unrecovered. Thus it has long been considered worthwhile to extract the additional 4-8% EOR can yield. The UK North Sea oil fields are expected to continue producing until 2025/35. If EOR is initiated soon, it could be stepped up to dispose of some 140tCO₂/day in the 2010-2020 period, a unique opportunity not merely for ridding ourselves of the CO₂, but for gaining some otherwise unrecoverable oil in return. The same economic study adds another £1 on for injection into a depleted gas field or £8 for EOR. But for EOR some of the cost is off-set against the revenue gained from the additional oil, estimated at £24, so that for CO₂ capture and storage using EOR comes to an estimated £4-10/tCO₂. Two further steps are required before this can be compared to other energy options. Firstly, conversion from CO₂ captured to CO₂ abated, taking into account factors such as plant efficiency losses and energy consumed transporting and injecting CO₂. Secondly, quotes are usually given per tonne carbon abated. After the second conversion CO₂ capture and

storage with EOR is estimated at £48-183 /tC. This compares well with other options for carbon abatement such as off-shore wind (£160-480/tC), energy crops (£135-185/tC), wave power (£120-430/tC) and new nuclear plant (£105-180/tC). The point Philip Sharman was making very forcefully though is that this opportunity exists now and is not a wait-and-see option. If steps are not taken in the next 5-10 years to exploit this opportunity it will be lost.

In the ensuing discussion session, apart from a general fascination with the legal issues I could not quite share - although I am sure they are absolutely vital -, one very important question was asked: Is this all talk or is there a real government commitment to make CO₂ capture and storage happen in this country? In the run-up to the Energy White Paper, towards the end of last year, a fact finding mission, in which Philip Sharman too part as well as our new Chairman Industry Brian Ricketts, was sent to the US and Canada to report back on technological advances on CO₂ C&S over there. Their recommendations have largely been taken on board by the government. Well, apparently CO₂ C&S was the only issue marked as urgent in the White Paper!

For those amongst you who would like to read more, a full account of the mission by Brian Ricketts of UK Coal plc, COALPRO and the World Coal Institute can be found on the WCI website: <http://www.wci-coal.com/uploads/CarbonMissionReport.pdf> I found it most revealing and can definitely recommend it!

Combustion Characterisation and Ash Utilisation

A Combustion Division Technical Meeting, 15th May, Didcot Power Station

The afternoon of this years AGM was devoted to a technical meeting of the Combustion Division, chaired by Alan Thompson, the Division Chairman. The topic was PFA (Pulverised Fuel Ash) and its various uses, mostly in construction. A total of seven presenters imparted the views of industry and academe, the difference becoming clear by merely studying the titles of the presentations. The industry is very much concerned with the using the bulk constituents of the PFA, whereas three out of the four University-based presenters were seeking uses of the relatively minor carbon constituent, which is regarded more as the nuisance by the former.

The first three talks, well, four really, as one of the presenter took the floor twice, gave the industry's views, represented by Lindon Sear from the UK Quality Ash Association (whose web-site <http://www.ukqaa.org.uk> I can highly recommend) and by Ken Swainson and Bob Coombs from National Ash Ltd, the company dealing with the ash produced by Innogy, our hosts for the day. A blow-by-blow description of the talks would lead to a high degree of repetition, so I will concentrate on the main points. The central message clearly was that PFA is not a waste product, but a highly sought after construction material, especially some fractions of it such as furnace bottom ash. Apart from the light-weight building blocks this highly prized material finds its way into, PFA is used in various grades of cement, for grouting and for ground remediation/stabilisation. The quantities swallowed up by large-scale

construction projects can be impressive. For example, the embankments for the Selby by-pass were built up using in excess of 390 000 t of PFA.

The challenge to industry is to supply a material that is consistent in quality when and where it is required. This is by no means easy, as peak power demand and peak activity in the construction industry do not coincide, and furthermore, coal for a power station is selected for price and combustion characteristics, rather than for the ash it produced. Quality parameters depend on the intended use. For cement, carbon content (<7%) and fineness (< 45µm) are important, with the standards particularly interested in the deviation from the mean. For filling purposes, density and moisture content are of greater interest, as they determine how much settling may occur. To some extent, ash quality can be varied by hopper and bunker selection. The most intensively deliberated quality aspect appears to be carbon content, with a multitude of removal technologies existing at various stages of development from laboratory to fully commercial. These methods can be categorised as pneumatic (air-jet mill, vibrating fluidised bed), electrostatic (including tribo-), burn-out, flotation and microwaving.

Having established that low-carbon PFA is a useful, marketable construction material and that the technologies to keep carbon below the required minimum are commercially available, university research seems mostly to have moved on to finding a use for the unwanted carbon. Mike Cloke from the University of Nottingham described a new project that aims at testing if carbon from fly-ash could be used as a substrate to immobilise amines for novel CO₂ capture techniques. Dr Greatrex from Leeds University suggested that apart from the obvious use as a fuel, the carbon could be utilised as a reducing agent, e.g. in zinc smelting, as a catalyst or as an activated carbon. Tim Mays from Bath University proposes to investigate if the carbon could become a useful medium for hydrogen storage, as finding an efficient, low-cost material for that purpose still presents a serious challenge.

The fourth and final presenter from academe, Professor Dhir, returned to construction uses and the bulk of the PFA. As opposed to the industry, which focussed on the half of the ash already in demand, he considered the other half that is not yet gainfully employed. His argument was that the potential for PFA usage has not yet been achieved, and that much lower grades than was thought possible, including ash that has already been 'dumped' a long time ago, could be used under the right conditions. One interesting new angle Professor Dhir introduced was the question if PFA quality is affected by co-combustion with biomass. The short answer is, not at the levels of biomass addition currently common, of around 5%.

It was a very interesting, if somewhat long, afternoon, with a topic wide enough to fill a day or two. It was difficult to take all the information on board, but nobody will have left under the delusion that PFA is an unwanted waste. Oh, and if anybody fancies some blue sky research, it has as yet not been explained how those wonderful, perfectly formed cenospheres that make up some 0.7% of the ash and can be found floating on ash lagoons are formed.

Technologies for a Lower Carbon Dioxide Future

Meeting of the Advanced Power Generation Division, 18th March 2003, Cranfield University

The first divisional meeting in 2003 was held by the Advanced Power Generation Division and very topically took a closer look at technologies available to drag coal into the low-carbon future the policy makers envisage for us. The setting of Cranfield University was very fitting for the topic, as a lot of interesting research work supporting clean coal technology is carried out in their laboratories, and it presented a much appreciated chance to visit these laboratories. The Coal Research Forum would like to extend their gratitude to the division chairman Peter Sage and the local organiser John Oakey.

The morning was devoted to four very different presentations. In turn we were asked to consider energy policy in the UK (Brian Ricketts, UK Coal Mining Ltd.), underground gasification (Michael Green, UCG Consultant), Oxyfuel firing (Des Dillon, Mitsui Babcock Energy Ltd) and the economics of flue gas scrubbing for CO₂ (Jon Gibbins, IC London). Each single topic would easily merit a whole article for itself, and I apologise in advance for not doing them justice here. After a pleasant lunch we were asked to cast our mind even further afield to the Framework 7 round of European research funding (Andrew Minchener, Andalin Consultancy). Not an easy undertaking, as many of us have only just finished completing submissions for the 6th Framework. The main points of this presentation can be found in a separate article on the POWERCLEAN network. Last, but by no means least, those of us with a little extra time to spare were treated to a tour of the Powertechnology and Gas Turbine Laboratories at Cranfield.

For the first talk Brian Ricketts changed the advertised title of 'Developments in IGCC' to the more general one of 'Clean Coal Developments in the UK'. A background knowledge of the White Paper on Energy, published in February this year, and the consultation process in the run-up to it were a must for this presentation, although he did highlight the main points concerning the future of coal very aptly. The argument centred around the conclusions of the consultation into the requirement for a clean coal demonstration plant in the UK; the conclusion being negative. It appears that the Government is keen on retrofitting CCT to existing plant and on advanced CCTs, advanced in this case mainly stands for the incorporation of CO₂ capture, but reluctant to embrace the building of new CCT plant. In his opinion that arises from underestimating the amount of coal-burn in years to come and overestimating the reduction in CO₂ emissions that retrofitting and an increase in renewables use can achieve. An alternative source splitting for power generation was proposed that increased coals contribution in 2010 from 32mt to 50mt a year and included one large IGCC plant (with CO₂ capture) in the equation. A list of possible new CCT projects in the UK was presented, mostly at the pre-planning or planning stage, but a few with completed Environmental Impact Assessments and planning consents in place that could be operational around the 2007/8 mark. It is, however, difficult for a company to make such a commitment, and a clean coal obligation, much in line of the renewables obligation, would be instrumental in precipitating such a development.

Moving on to the second presentation, Michael Green introduced the dti Underground Coal Gasification (UCG) initiative. UCG is not a new idea, but recent projects, such as the Chinchilla (Australia), Liuzhaung (China) and Alcorisa (Spain) ones, have presented sufficient advances to merit re-evaluation of the concept. The main differences to previous attempts are the current ability to access deeper seams (up to around 1,200m), whereas in the past only shallow ones were considered, and major advances in directional drilling. UCG ties in with carbon-reducing strategies in two ways: firstly, a syngas is produced that is already pressurised (the deeper the seam it originates from, the higher the pressure it emerges at) and lends itself to CO₂ removal. Secondly, it opens up coal seams that could later be used for CO₂ storage. The choice of a site is one of the major obstacles, trials conducted to date have taken place in sparsely populated areas without too much environmental constraints. Currently a careful survey is being carried out by BGS, the results of which will hopefully be obtained soon. The environmental issues remain to be resolved; to date it has not even been decided if UCG constitutes a form of mining or an industrial development. Interested parties wanting to explore the finer details of the initiative should watch out for a dti workshop on the topic planned for October this year.

Des Dillon introduced us to oxyfuel firing as the answer to zero-emissions power generation; zero-emissions also standing for the removal of CO₂, all other pollutants being thought of as having been dealt with successfully. The principle is simple: air is replaced by oxygen in the combustion process, producing a flue gas that, after drying, is mostly composed of CO₂, ready for storage (or utilisation). Overheating is avoided by recycling an appropriate amount of flue gases to mix with the oxygen and cool the flame. Although not yet demonstrated in large-scale power generation, oxyfuel firing has been used successfully in oil refinery boilers. There are two issues to be addressed: firstly, an energy penalty is incurred during air separation, and, to a lesser extent, during compression of the flue gas/product. This is reflected in the operating cost. Secondly, if the CO₂ is treated as a product, rather than waste, the retrofit option suffers from the possibility of air ingress, lowering the CO₂ concentration. This would not be a problem in new installations, especially if they were pressurised. Work remains to be done on flame properties and burner design, both by simulation and on test facilities (or, the 90 MW test facility at Renfrew the CRF Combustion Division had the pleasure of visiting in April last year), and, if I understood correctly, is about to be carried out with Framework 6 funding.

The fourth and final pre-lunch presentation was given by Jon Gibbins and considered flue gas scrubbing for CO₂ removal, not from a technical viewpoint – the technology being well proven – but from an economical one. He described it as one of the tools available to ‘play the market’, and that its advantage would lie in the fact that, once installed, the operation to some extent would be optional, thus adding further flexibility to the plant. The key question was if and when, or rather under which conditions, scrubbing would be cheaper than paying the penalty for carbon pollution. Obviously there are a lot of variables to consider, not least the choice of absorbent, basic MEA (methyl ethyl amine) or one of the higher priced specialist products on offer? Even more emphasis rests on the thermal optimisation of the integrated plant – where does the steam for regeneration come from, in what state is it taken and returned? I am sure the last word has not been heard on this, and it certainly was an interesting new perspective on the issue.

All in all we had an exciting morning, covering a lot more ground than during the average technology-based seminar. The feeling that was left behind by the variety of topics touched on was that if there is one thing we are not short of, it is options. If the will is there, so is the way or several ways even. CO₂ can be dealt with and coal need not be excluded from the brave, new world of the low carbon economy.

Update on Publically funded Coal Research in the UK

Update refers to the article written a year ago for the 34th edition, and I shall have a brief look how many and what kind of coal projects have been funded in the past year. If I may make a recommendation for the next editor: This feature should really be moved to September. It is too early to get any 'official' information on EU funded projects, the ones set to start this autumn; as I am writing this I doubt whether even the Institutions carrying out the project know that they've been funded. This leaves EPSRC and BCURA to contemplate. And in summary, it has been a bleak year for EPSRC funding, but a good one for BCURA.

a) EPSRC

No coal-related projects have been awarded in the past 5 weeks. And, unsurprisingly, coal does not feature in the top 20 awards by size of funding. The coal technology section on the EPSRC web-site lists a grand total of 11 projects, which includes a contribution to setting up a Young Academics Network. So that makes 10 out of the 6138 projects EPSRC currently funds. Of these 10, eight were on-going, i.e. listed last year. The two new ones are:

* Investigation of Synergistic Activity During the Co-Pyrolysis of Coal and Biomass
University of Leeds, Department Fuel and Energy
1 January 2003 - 31 December 2005, £189,327
Principal Investigator: [Jones, Dr JM](#)

* Modelling the Uncertainty and Risks Associated with the Design and Life Cycle of CO₂ Sequestration in Coalbed Methane Reservoirs
Imperial College London, Environmental Science & Technology
1 September 2003 - 31 August 2006, £126,960
Principal Investigator: [Korre, Dr A](#)

A quick look through the 87 combustion-related projects, and a few other promising looking titles like mining, did not yield and potential 'hidden' coal projects.

b) BCURA

There have been two calls for proposals under the Industrial Panel regime now, and under each 5 projects have been funded. That amounts to five times the number of projects funded by EPSRC over the same period of time. The projects are listed in the table below:

	Organisation	Title	Start	Finish	University Project Manager(s)
B60	University of Greenwich	Three-Dimensional Visualisation and Quantitative Characterisation of Fossil Fuel Flames using Digital Imaging Techniques	1.09.02	31.08.05	Prof Y Yan
B62	University of Edinburgh	Large Scale Semi-Automated Tester for Rapid Assessment of Coal Handling Performance	1.09.02	31.08.04	Dr J Y Ooi & Prof J M Rotter
B63	University of Edinburgh	Experimental and Numerical Analysis of Turbulence in Interacting Low NO _x Burner Flows in Coal-Fired Furnaces	1.07.02	31.12.03	Prof W J Easson
B65	University of Nottingham	The Partial Removal of CO ₂ from Flue Gases using Carbon recovered from PFA”	1.10.02	30.09.05	Dr M Cloke, Prof C E Snape, Prof J W Patrick and Dr E Lester
B66	University of Greenwich	Direct On-Line Measurement of Wall Friction of Coal as an Indicator of Handleability	1.10.02	30.09.05	Dr M Bradley and Dr R J Farnish
B67	Imperial College, (CECT)	A Study of the Behaviour of Coal Injected into the Blast Furnace	1.10.03	30.09.06	Prof.R.Kandiyoti and Prof.D.R.Dugwell.
B68	University of Greenwich	On-line Measurement of Size Distribution and Concentration of Pulverised Fuel Using Digital Imaging Techniques	1.06.03	31.05.06	Prof.Y.Yan.
B69	University of Greenwich	Handling Characteristics of Biomass/Coal Mixes for Co-Firing : Measurement Techniques and Establishing Benchmarks	1.10.03	30.09.06	Dr.M.S.A.Bradley.
B70	Imperial College, (Mechanical Engineering)	Optimisation of Coal Fired Power Plant Performance when using Flue Gas Scrubbers for CO ₂ Capture	1.07.03	30.06.05	Dr.J.R.Gibbins and Dr.R.Crane.
B71	University of Glamorgan	Improved Design of Sparge Pipe Air Distributors for Fluidised Bed Combustion Systems	1.06.03	31.05.05	Prof.J. Ward, Dr.D.R.Garwood, Dr.T.Maksoud and Mr.M.Fisher.

c) The New Coal RTD Programme

Hopefully a list of projects funded by the EU in the first post-ECSC year will be available to be published by the time the September edition is due out. It is obviously too early to say if there is any noticeable change, but the web-site promises that “the programme will be managed according to principles similar to those applied for the existing ECSC RTD”. The budget allocated for financing coal and steel research is EUR 60 million for 2003 and EUR 60 million for 2004.

Odds & Ends

Last Year in Italy

Have you ever logged into the web-site of Assocarboni, the General Association of Coal Operators in Italy (<http://www.assocarboni.it/english/homepage.htm>) ? It’s well worth it, it must be the greenest coal-related homepage I have seen. It literally is green, with a lovely picture of rolling green hills in the Italian spring. And maybe this is partly why: Their 2002/2 newsletter features an article about how they are now

friends with Friends of the Earth, or Amici della Terra as they are known locally. Quoting: "On 30 May 2002, in Rome, a meeting organized by Assocarboni and Friends of the Earth was held to present the report entitled: "Energy Transition: the Role of Coal" and produced by Friends of the Earth. An absolute novelty came from this meeting: for the first time, an environmentalist has wished for a greater use of clean coal in electric energy production during the transition phase to renewable sources."

Since Italy rejected the use of nuclear power it aims to bring the percentage of coal used closer to European standards and exploit it at least by 25% instead of current 10%. In fact, coal consumption in Italy is increasing, 14% up in 2002 from 2001 levels, and increased coal use is seen as a way to reduce electricity bills. Assocarboni was seemingly so taken that it has hired Barabino&Partners to engage in a spot of PR on coals behalf. If it works it may rub off, one can always hope. Oh, and they'd really like a go at building an American-style Clean Coal R&D pilot plant for the production of hydrogen through coal gasification.

Student Bursaries for the 2003 ICCS

In the January Newsletter I included an announcement of student bursaries for the 2003 ICCS. It seemed a bit early to start thinking about the International Conference on Coal Science in November then, but by now the acceptance letters have been out, and if you've got a talk or poster to give, you'll know about it. It's really about time to start thinking about funding the trip and the Coal Forum wants to help:

Up to 6 travel bursaries for up to £250 are on offer to bona-fide full-time students wishing to attend the ICCS 2003. To apply, please send the abstract submitted to the conference with a brief supporting letter from your supervisor to:

**Prof. J.W. Patrick
SChEME
The University of Nottingham
Nottingham
NG7 2RD**

The bursaries come with no obligations to the recipient other than to supply a short essay about his or her impressions of the conference to the Newsletter for inclusion in the January 2004 edition.

CALENDAR OF COAL RESEARCH MEETINGS AND EVENTS

Date	Title	Location	Contact
12 June 2003	Meeting of Coal Conversion Division/Work of Industry to Academe	Monkton Coke Works, near Barnsley	Prof J W Patrick, SChEME, The University of Nottingham, Nottingham, NG7 2RD Tel: 0115-951-4175 Fax: 0115-951-4115 E-mail: john.patrick@nottingham.ac.uk
15-19 Sep 2003	20th annual international Pittsburgh coal conference	Pittsburgh, PA, USA	Pittsburgh Coal Conference, University of Pittsburgh, School of Engineering, Dominion Center for Environment and Energy, 1249 Benedum Hall, Pittsburgh, PA 15261, USA Tel: +1 412 624 7440 Fax: +1 412 624 1480 Email: pcc@engr.pitt.edu Internet: www.engr.pitt.edu/pcc
Monday 13th October 2003	52nd BCURA Robens Coal Science Lecture	The Royal Institution, Albermarle Street, London	Mr J D Gardner, BCURA Company Secretary, Gardner Brown Ltd., Calderwood House, 7 Montpellier Parade, Cheltenham, GLOS, GL50 1UA Tel : 01242-224886 Fax : 01242-577116 E-mail : john@gardnerbrown.co.uk
2-6 Nov 2003	International Conference on Coal Science	Cairns Convention Centre, Qld., Australia	12th ICCS, PO Box 268, Toukley, NSW 2263, Australia Tel: +61 2 4393 1114 Fax: +61 2 4393 1114 Email: iccs@aie.org.au Internet: www.aie.org.au/iccs