No. 51 **January 2008**

NEWSLETTER

of the

Coal Research Forum

EDITOR'S COMMENTS:

On behalf of the Executive Committee I would like to take this opportunity to wish you all a prosperous New Year and to hope that you have enjoyed a peaceful and enjoyable Christmas.

2007 has, like most years, passed quickly from my perspective but this may just be an age-related phenomenon on my part. Although it has been a 'fallow' year as far as the Coal Research Forum Conference is concerned it has been quite busy behind the scenes with our venture into the Principality now confirmed with a visit to Cardiff University planned for early September 2008.

The CRF has also organised a number of interesting divisional meetings, several of which have focused on the low carbon future that is now regarded as essential if the effects of global warming are to be addressed.

The prestigious International Conference of Coal Science and Technology was hosted by the University of Nottingham and took place between 28th and 31st August 2007. Colin Snape chaired the organising committee which also contained a good representation of members of the CRF.

As Newsletter Editor I have noticed that more and more of the articles that I use are aimed at issues that will allow coal to continue to be used in the future. There is a recognition, albeit grudging in some parts, that electricity supplies are unlikely to be maintained without the continuing use of coal. In light of the broadening portfolio of electricity generation equipment I feel it might be interesting to include some of the more novel aspects of non-coal related generation in future issues.

Contact Details:

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

Dr Alan Thompson
The Coal Research Forum
Tel: 01332 514768
or 02476 192 569
E-mail:
alan.thompson5511@btinternet.com

"Understanding the Low Carbon Economy - A review of the Challenges and Opportunities for a Sustainable Future"

A Joint Meeting of the Coal Research Forum
with the Environment, Coal Utilisation and Energy Conversion Technologies Subject Groups
of the Institution of Chemical Engineers and the Energy Institute in association with the
Institute of Energy Research and Policy , University of Birmingham
held at the University of Birmingham
14th November 2007

This meeting was, in effect, Part II of an ill-fated two-day event planned for earlier in the year. The first part of this re-scheduled meeting took place on June 20th and was held at Rugeley Power Station, courtesy of International Power. It says much for the persistence of organiser Clive Hadfield that this event finally happened, although it must be said that he was ably assisted, as is often the case, by our diligent Secretary David McCaffrey.

The venue for the event was Lucas House which is on the campus of the University of Birmingham and thanks are due to Professor Richard Green and his staff for help in getting the show on the road.

The programme was a busy one and six sessions were shoe-horned into the morning session followed by five in the afternoon. The seminar was opened by a welcoming address given by Professor Michael Sterling, the Vice Chancellor of the University of Birmingham. Professor Sterling disclosed that there were over 100 people working on energy research at Birmingham and could not resist mentioning the successful bid of the Midlands consortium to host the Energy Technology Institute hub.

Dr David McCaffrey chaired the morning session which got under way with a talk entitled "Global Climate Change: an account of the scientific background" and was given by Dr John Murlis former Chief Scientist at The Environment Agency. Up-to-date information was presented from the latest reports of the IPCC and anyone listening to this talk could not fail to be convinced of the reality of climate change. Two questions were asked; Rob Gemmell (The Environment Agency) ask about sensitivity analysis and was told that a new report out soon had addressed this issue. Rex Harris (University of Birmingham) asked about public perception on this issue. This was recognised as important by authors of the current data and has been added to the agenda.

Professor Roland Clift of the University of Surrey gave his presentation which was entitled "Strategic pathways to a low carbon future". One of Professor Clift's key messages was that he felt that more use should be made of biomass for power and heat generation as opposed to its use as a transport fuel. This was, he felt, something that UK Government had appeared to overlook. More use should be made of small-scale, efficient and reliable biomass-fired CHP and there was a real need for efficient energy storage systems to allow best use to be made of renewable energy sources. Denis Dugwell (Imperial College) asked about the use of CHP in Sweden which was mentioned in Professor Clift's presentation. In reply Professor Clift stated that in Southern Sweden, where the climate is not too much colder than the UK, the best practice for UK buildings fails to meet the lowest standards for Swedish building regulations. There is, as such, the need for much retrofitting of buildings in the UK to improve their thermal performance.

Dr Rob Gemmell then gave a presentation entitled "Emissions trading- A financial instrument". In this he featured the monitoring and reporting of emissions and a historical

review of the first phase of the EU ETS. He then described phases 2 and 3 as far as they were known.

Mr Brian Nixon of Scottish Enterprise gave the audience an upbeat talk entitled "Helping Scotland realise its energy potential". It is very clear that the ample renewable wind and marine resources in Scotland are being investigated and a number of facilities are in place or soon will be to test the latest wind and tidal technologies. Mr Nixon also described the Hydrogen Office in Fife where solar panel and geothermal heat pumps are investigated. Also studied at this location are onshore wind turbines and the building itself uses fuel cells and energy storage to power itself.

Rex Harris stated that the big issue with offshore wind was its cost including high maintenance costs and asked whether permanent magnets had been considered. Mr Nixon conceded that maintenance was indeed critical and that a number of different gearboxes and drives had been investigated. Their current development partner Talisman is well-versed in offshore maintenance from its oil and gas exploration and supply activities but it was agreed that more development for offshore wind was vital.

A paper entitled "Carbon reduction by smarter appliances" was presented by Dr David Slater of RLtec. This involved the fitting of a low cost device to appliances such as refrigerators which would save energy by measuring the frequency of the electricity supply which is known to fluctuate slightly. The periods when it is above the design frequency could be detected and the refrigerator switched off thereby reducing energy. The controller would also be linked to the thermostat to ensure that an acceptable low temperature would always be maintained. When questioned about the cost of such a device Dr Slater indicated it would be <€1 per refrigerator.

Professor Richard Green rounded off the morning session with his paper "The economics of alternate fuels for power generation".

Following an excellent hot lunch the delegates streamed back to the conference room eager to hear the latest offerings!!

The afternoon session was chaired by Mr Clive Hadfield and first up was Mr Trevor Ford of The Energy Institute. His paper was entitled "Efficient use of energy, the management process and technology". The paper looked into ways in which management could get people to accept the need for energy efficiency and produced a number of facts and figures which certainly served to focus the mind on just how much energy is wasted and how it is relatively easy to make serious savings.

Mr Adrian Finn of Costain Oil, Gas & Process Ltd., then explained some of the "Guidelines for energy efficiency in the design of process plant" and provided a number of reprints at the back of the room for those seeking to read further into the subject.

"Fuel gas from waste" was the intriguing title of the paper given by Dr Paul Hamley of the University of Nottingham. Dr Hamley focused on the need to destroy wastes usefully and this could either be by conventional gasification or a technique which Nottingham have a significant amount of experience of, namely supercritical water oxidation (SCWO). The pros and cons of both techniques were discussed but SCWO appears to have some significant benefits.

Professor Rex Harris gave a talk entitled "Hydrogen and magnets: partners in the drive for sustainability". He explained that new high performance magnets containing neodymium iron boron showed much promise and had applications in wind turbines.

The last paper was presented by Dr Rupert Gammon and was entitled "Demonstration project of a carbon-neutral energy system"

This brought the formal proceedings to a close and Clive Hadfield gave a short closing address in which he thanked all of the speakers and the University of Birmingham for hosting the event.

"Fuelling Future Energy Needs"

A Joint Meeting of the CRF Coal Preparation Division,
Minerals Engineering Society Southern Group, South Midlands Institute of Mining and Minerals
held at University of Nottingham
21st November 2007

This meeting was held jointly by the Coal Preparation Division, the Minerals Engineering Society Southern Group and the South Midlands Institute of Mining & Minerals. The venue was the pleasantly located Staff Club tucked away in the corner of the campus of the University of Nottingham. Around 30 delegates attended the meeting and the welcoming address was given by Professor Nick Miles who is the Head of the School of Chemical & Environmental Engineering. Nick welcomed everyone to Nottingham and gave an overview of the current energy scenario and the challenge of minimising carbon emissions.

Mike Gurr, MES, SG Chairman chaired the morning session which included two extremely interesting and very relevant presentations. The first paper, entitled "The Legacy and Future of Coal", was given by Mr Philip Lawrence, the Chief Executive of The Coal Authority. This organisation was created after the mining interests were separated from British Coal and was expected to deal with the 'other parts' of the coal business. This was very diverse and the talk gave a fascinating insight into the varied and long lasting legacies which still have to be dealt with. These include the treatment of mine water pollution, subsidence, opencast licensing and the sale of former coal board properties.

The next paper was given by Mr Grant Budge, son of the eminent Richard Budge, who gave his paper "Powerfuels Hatfield Colliery – The Way Ahead". In the light of the UK Governments' recent decision to favour the development of post-combustion CO_2 capture and not IGCC one could have understood if the title had ended with a question mark!! Grant Budge gave an interesting description of the activities completed so far and planned for the site at Hatfield. He did concede that at present there were parts of the project which were on hold until a change of attitude with regard to the development of IGCC in the UK.

The afternoon session was chaired by David Eastwood, President of South Midlands Branch of IoM³. The first presentation entitled 'Sampling and Testing Protocols – The New Coal' by George Bradley, Field Services Manager, TES, Bretby. TES are now part of Environmental Services Group of Inspicio plc and the range of their testing and analytical services was described. The paper covered the types of bio-fuels now being used for power generation either alone or as part of fuel mixes. By 'New Coal' Mr Bradley meant biomass and had brought along a dozen or so different samples which had recently been analysed. He then described how some of the new materials had presented challenges in their analysis and how a series of new standards had been developed. Interestingly, tests are in place to determine the biomass content of certain waste streams as this will influence how they are viewed by the regulatory authorities.

TES Bretby are also the custodians of the BCURA Coal Bank which is a depository for a range of well-characterised coals which are available to academe or industry for study. Requests for samples should be made to Mr George Bradley, TES Bretby, P.O. Box 100, Burton-on-Trent, Staffordshire, DE15 0XD, Tel: 01283-554522, Fax: 01283-554431, E-mail: george.bradley@esgl.co.uk.

Mr David Dermott then gave a paper entitled "Coal Preparation Contracting and Equipment Supply". This was virtually the only paper which was truly on coal preparation and described the development of the Parnaby Cyclone and other coal preparation equipment. Mr Dermott then described some of the recent large contracts won by Parnaby for their equipment and where they were destined for.

The fifth paper of the day, following a short tea break, was presented by Dr Tony Parry, University of Nottingham, on 'Sustainable Construction Strategies'. Dr Parry demonstrated that the 'ecological footprint of man has been exceeded since 1980 and the excess is increasing rapidly (exponentially?). This means that we are all using resources quicker than we can restore them and releasing pollutants faster than we can absorb them. Panic! Tony explained how the Governments' lead on sustainable whole life values was being addressed by the construction industry by reusing build assets, minimise waste, clean construction and minimize energy use. He stressed the need for regulation within the industry and the ideology that the 'polluter pays'.

The final paper of the seminar was given by Dr Nick Evans of Loughborough University and was entitled Nuclear Waste Management – Storage and/or Disposal. Dr Evans was able to make this seemingly dull topic interesting. He explained the classification of nuclear wastes and gave an indication of the volumes to be managed, and also how and why and where underground nuclear waste repositories might be located.

The seminar ended at around 4.15pm and Andrew Howells, looking bronzed and fit from a recent trip to the Caribbean, thanked the speakers for providing a very varied and interesting series of talks. He also thanked the University of Nottingham for hosting the event and for providing an excellent buffet lunch and finally wished all of the departing attendees a safe journey home.

Impressions of the International Conference on Coal Science and Technology (ICCS&T), University of Nottingham

by:- Guillermo Gilabert, University of Kent

As a Ph.D. student, to attend the 2007 ICCS&T has been a great personal and professional experience despite the fact that I could stay only one day.

The East Midlands Conference Centre and its position at the core of the University of Nottingham's campus was a superb location for the conference. Ample spaces, number of rooms, a magnificent lecture theatre, it really provide me a first impression of being in a "proper" and well-organised international conference.

I was impressed with the technical level of the oral sessions. In one morning I had the opportunity to learn quite a lot about the combustion characteristics of different types of coal, the performance of new types of coal-combustion catalysts, the cost-efficiency improvement of re-burning processes by using gas natural substitutes and the experimental studies in combustions test facilities, not to mention, the important advances is coal gasification.

I was also pleased to attend a keynote lecture on Solid Looping Cycle and learn more about this new technology for coal conversion. This lecture showed me the continuous effort that the research community is successfully performing and also it taught me how an effective international collaboration can increase the technical advances in the coal science and technology field.

The poster session that I attended with my supervisors provided me the opportunity of receiving useful and motivational feedback from other researchers. The one to one conversations offered me an excellent occasion not only to discuss technical aspects in

detail but also to explore possible future collaborations with the Japan Coal Energy Centre and the Spanish National Coal Institute (INCAR) researchers.

Moreover, this conference really provided me the opportunity of attending high quality technical sessions. It gave me the chance of meeting experienced researchers from a diverse range of backgrounds and nationalities and also it gave me the occasion to meet other PhD students to share experiences and impressions. In general the conference was useful and interesting both personally and professionally and represented time and energy well spent.

by:- Mark Flower, Imperial College, London

The 2007 International Conference on Coal Science and Technology (ICCS&T) selected Nottingham University, and a British 'summer', rather than somewhere that was guaranteed to be nice and sunny (such as South Africa, where it will be in 2009) for its conference, and so with it being just a short trip up the M1, and even though I work with biomass, rather than coal proper, it was decided that I should attend.

With a poster abstract accepted, it was with some trepidation that I approached Nottingham – the first conference to which I would be presenting work. These concerns, however, were rapidly swept away as the car approached and entered the conference centre.

The first thing that struck home is how small the coal community in the UK is. I had only been in this field since the Coal Research Forum conference at the University of Kent last year (when I started my PhD), and yet, even in the car park, I recognised several people who had been there. On entering the conference centre the experience was repeated – everyone seemed to know everyone, even though the delegate list read like a world atlas. It was all a rather welcoming experience.

This, of course, was helped along by the conference organisers, who had arranged several receptions and dinners – including a civic reception with the Deputy Mayor for the leading researchers (sadly there wasn't room for everyone in the Town Hall). Being a relatively junior PhD student I and my peers were (rather happily for me) preferentially invited to a buffet on the tenth floor of the Britannia Hotel. I found this rather pleasant, since it accorded me the opportunity to meet with (and learn from) others who were in a very similar position.

The conference ran with four parallel sessions, with topics seeming to suit everyone. Not being able to understand many of the more in-depth presentations I tried to stick to the more general ones, especially those which were related to the work which I have been doing here at Imperial.

I found the co-firing presentations particularly interesting – a highlight being the Doosan Babcock presentation from Dr. Livingston. He did a particularly good job at conveying just how important investor confidence is in the current market, leaving me to ponder how difficult it must be for the generators to strike the right balance with the renewables obligation being adjusted every few years.

Many of the carbon capture and storage presentations were also of interest – since the remaining members of my group work in this field. I was rather pleased to be able to understand how they're work fitted into the bigger picture of the work that was being presented!

My primary reason for attending the conference was to present a poster detailing the work that I have managed to complete to date on BCURA project B80 – characterising biomass particle behaviour. It was with some relief that my poster session passed without mishap, and I was able to answer all the questions that were sent my way.

As with any conference one of the highlights is meeting with other people who are working, or who have worked within your area in the past. For me that meant meeting Dr. Nigel Russell (Sheffield), a former PhD student of Professor Jim Williamson of Imperial College's Department of Materials. Nigel's doctorate had been based upon the thermal deactivation and reactivity of high temperature coal chars, which meant that he had done a lot of work with the Imperial wire mesh. While his experience upon building one was limited (he only had to use one), he was able to provide some insights as to what I was trying to do, and how they used to do it.

Particularly his advice on how to get to generate a heat flux realistic to pf conditions was excellent (quite simply, don't!). He was using a DC system (high temperature and high heating rates), while I currently work with AC (which works best with low temperatures and heating rates). To reach the very high temperatures (in excess of 2,200^{0}C) he was forced to use a tungsten mesh – but not for very long, since there was a fear that the glassware, surrounding the apparatus, would melt! Of course all of these experiments were done in helium, meaning that practically none of the above techniques are transferable – however I find that it's only when I understand what has been done before (and why), that I can develop something new, and for that reason our conversation was incredibly useful.

Another useful conversation was had with Dr. David Waldron (Alstom Power) who, since I don't have a background in power generation, was able to connect me with the industrial need for the work I am doing. Before the conference I knew why I was doing what I was doing, now I understand (Ed.??????). For this I am very grateful.

Thanks must go to the Coal Research Forum, for making a grant available for me to attend. Whilst the conference was of great value it was quite expensive, and as such, were this grant not available, I would probably have found difficulty in attending.

24th Pittsburgh Coal Conference, Johannesburg, 10th-14th September 2007

The 24th Pittsburgh Coal Conference was held in Johannesburg, South Africa in September 2007. Unfortunately, there were relatively few UK-based participants this year but I was able to attend with the support of a CRF/IChemE travel bursary.

South Africans tend to offer a warm welcome to visitors and for me this started with a technical tour at Sasol's R&D facilities at Sasolburg. We were introduced to a cross-section of labs at this impressive site and also shown the larger rigs used for process scale-up. The range of techniques used to develop catalysts for Fisher-Tropsch processes and the insights into the value of the different stages in development offered by our guides was fascinating.

The conference 'proper' started with an evening reception offering the opportunity to recognise some familiar faces and meet some new people before the full technical programme began the next day. As well as a healthy compliment of South Africans, a wide range of other nations were represented including other African nations, as well as the USA, Australia, New Zealand, China and India.

Each day began with a plenary session providing an overview of important aspects of coal science and utilisation, from both academic and industry perspectives. As well as highlighting the increasing importance of clean coal technologies, including carbon capture, the speakers reminded us all of the importance to fundamental science, including coal characterisation.

The majority of the rest of the conference plan was devoted to parallel technical sessions with major themes including gasification and environmental impacts of coal utilisation. I presented my own work on site specific considerations for investment in pulverised coal

plants, including with carbon capture, in one of the first sessions so was then free to enjoy stimulation and debate around other presentations.

Of course, no international conference would be complete without a lively social programme. And this conference didn't disappoint. In addition to the planned activities, including a gala dinner including a cultural performance, participants enjoyed the opportunity to network during the breaks and lunches.

I am very pleased that I was able to attend this conference. As well as presenting some of my work, I was able to broaden my technical understanding of various aspects of coal science and utilisation. I also enjoyed the opportunity to meet new people from across the world. I hope that some of the conversations I had and presentations I heard will contribute to my developing work in this area.

CRF bursary report 2007
Hannah Chalmers
Imperial College London
October 2007

Combating Global Climate Change

Everyday there is another story in the news about global warming, our impact on the environment and the ways we can help to protect our world for future generations by reducing our 'carbon footprint'.

Dr Mercedes Maroto-Valer is helping to promote research that will do just that.

Academics from different disciplines are urgently looking at ways we can reduce the carbon we release into the atmosphere. These are collectively known as 'carbon capture and storage'.

In the past research has been hampered by a lack of collaboration between these disciplines of engineering and basic sciences.

To overcome this Mercedes is using major funding from the Engineering and Physical Science research Council to set up the Centre for Innovation in carbon Capture and Storage.

This Centre will bring together engineers, mathematicians, bio-scientists, geographers and geologists to encourage collaborative, creative problem solving in this important field.

It is hoped that this groundbreaking interdisciplinary research will be used to develop new products, processes and services which ultimately help toward the protection of our planet. Dr Maroto-Valer can be contacted on 0115 846 6893 and mercedes.maroto-valer@nottingham.ac.uk
See also www.nottingham.ac.uk/carbonmanagement

Midlands Consortium Comes Out Tops

24 September 2007
A £1bn research initiative to help combat global warming and secure the UK's future energy supply is beginning today, as David Clarke, the director of the new Energy Technology Institute (ETI), moves into his digs at the University of Loughborough's science park.

The prime minister proposed the ETI in his budget at the start of last year with the aim of boosting research and development in green technologies such as wind turbines for homes

and low carbon vehicles. It is backed with £500m from the government and the remainder is expected to come from big business, including BP, Caterpillar, EDF Energy, E.ON UK, Rolls-Royce and Shell.

Loughborough, along with the universities of Birmingham and Nottingham, which make up the Midlands consortium, beat 28 other applications to host the ETI. Dr Clarke, who is currently head of technology strategy at Rolls Royce, should feel at home at Loughborough. Its science park also hosts Rolls-Royce's fuel cell facility, as well as around eight other companies researching energy issues - most of which were spun out of the university.

Peter Winter, director of enterprise at Loughborough, who helped lead the development of the winning bid, said the consortium spent over 2,500 hours working up the proposal. He said applications were judged on reputation, commitment to the ETI, facilities and energy research capability.

"I think we won because we demonstrated a strong consortium and we were focused on winning the bid first and in which university it would be sited second. We are providing a high-quality building that is well-situated and has good transport connections," he said.

The consortium's experience in energy research and its extensive list of contacts also helped clinch the bid, Winter said. The financial support offered by the west and east midlands development agencies, including agreeing to allocate future energy R&D spending in areas prioritised by the ETI, also helped.

"Energy is a key research priority for Loughborough and the consortium contains a lot of people with specific expertise on energy issues. If the ETI needs experts the consortium can provide them or help the institute recruit the best people for the job. The ETI will also have access to the consortium's worldwide network of contacts in the area of energy research," he said.

Although hosting the ETI's hub does not guarantee any funding for Loughborough from the institute, Mr Winter said the university will benefit from the increased focus on energy research that the ETI will bring.

"The ETI will provide an enormous stimulation to getting energy right. It's a very important issue now and universities should be adding to this the body of knowledge. Hosting the ETI is a good stimulation for that."

Funding for energy research in the UK has in the past been fragmented and has suffered from lower investment levels compared to other countries. Many potentially useful technologies fall between the funding gaps that exist between researching novel ideas and demonstrating and deploying successful technologies.

The Energy Technology Institute aims to help combat these problems. Involving industry in the ETI, including funding, management and drawing up its research agenda, ensures the activities funded and technologies discovered are relevant to industry and so are more likely to successfully and smoothly reach the market.

The government says: "The ETI will occupy the middle ground between the longer-term research funded by the UK's research councils [which allocate public funding for research] and the deployment of proven technologies. It will connect the best scientists and engineers in academia and industry in the UK and overseas... [and] will accelerate industrially applicable innovative energy technologies."

The ETI will fund applied research on a wide range of non-nuclear energy problems for ten years starting in 2008. Its budget will be held in a single pot, giving the institute around £100m a year to spend.

The lion's share of the ETI's coffers will be spent on a small number of multi-year research projects. These could include large-scale applied research projects undertaken in a few competitively selected universities, collaborative industry R&D, and commissioned activities.

The ETI is currently drawing up a detailed research strategy, which will be based around seven broad themes from which projects will be selected. The criteria for selecting projects will include the needs of industry, government and other funders. The seven themes are:

Large scale energy supply technologies

Here technologies will be developed to improve the efficiency of power generation and find sustainable approaches to reducing emissions from existing fossil fuel technologies.

Security of supply

A mix of energy technologies (excluding nuclear) will be developed to increase security and diversity of supply. Examples include fuel cells, bioenergy, and tidal power.

End use efficiency and demand management

The aim is to increase the efficiency of energy use and reduce energy demand, for example in domestic, industry and commercial buildings and energy intensive industrial processes.

Transport

Here sustainable transport fuels and transport management technologies will be developed, such as low carbon vehicle designs and alternative fuels.

Small scale energy supply technologies

Research will aim to increase options for smaller energy needs by developing new technologies that use locally available energy sources, such as wind power for homes.

Support infrastructure

The focus will be on developing sustainable energy infrastructure and supply technologies, including energy storage and increasing the number of people with relevant skills.

Alleviating energy poverty

By developing technologies that provide secure, clean energy, that can be deployed locally, the aim is to break the link between environmental harm and social development in the world's poorest communities.

The ETI will be governed by a management board drawn from core industry partners, public energy research funders, and other participants. The management board will set up a Research Advisory Board to provide advice on the selection of projects, the development and assessment of research programmes, and help ensure collaboration with other energy funders, including government departments and European programmes. Members of the advisory board will be drawn from industry, academia, public funders, non-governmental organisation, and other experts.

Dr David Clarke, currently head of technology strategy at Rolls-Royce, will provide day to day leadership and report to the management board.

The ETI intends to get down to business quickly. Giving itself just a few weeks to settle in at its new home, it plans to put out its first contracts in November or December.

Companies claim (UK) government rebuff will kill Clean Coal Plants

11 October 2007
A new breed of clean coal fired power plants may never get built in Britain, companies say, after the government ruled them out for cash help in favour of those using another technology. The government on Tuesday refused to give money to a number of "clean" coal plants hoping to win a competition for hundreds of millions of pounds in funding. Only those plants which could remove carbon dioxide after coal is burnt in power plants and then safely bury it underground will be in the running for the carbon capture and storage (CCS) prize. Unless rival project backers can persuade the government to change its mind over the next few weeks, proposals for removing the carbon dioxide before fuels are burnt using IGCC technology are unlikely to go ahead because the pioneer projects are likely to be expensive.

The UK arm of German energy giant E.ON, had hoped to win support for its CCS project at Killingholme in northern England. But the government's rejection of any pre-combustion project is the end of it. "It does effectively kill off the Killingholme project," a spokesman for E.ON UK said. E.ON is still in the running with its plan for a "clean" coal plant at its Kingsnorth power station in Kent, which was invaded this week by environmentalists opposing plans for a new coal-fired plant.

Centrica has not yet ditched its plan to build a billion-pound coal plant in northeast England to remove the gas primarily responsible for climate change and then stash in underground before burning the coal. But a spokesman for Britain's biggest domestic energy supplier said it would be difficult to justify without government aid. "The government decision does place a question mark over the economics of our project at Teesside," a spokesman for the company said.
For more.....
http://uk.reuters.com/article/reutersEdge/idUKNOA13586620071011?pageNumber=3

Coal viewed by scientists as a major challenge

22 October 2007
The proliferation of coal-burning power plants around the world may pose "the single greatest challenge" to averting dangerous climate change, an international panel of scientists reported Monday. Governments and the private sector are spending too little on research into a partial solution — technology to capture and store the carbon dioxide emissions from such plants, the group said. The study by 15 scientists from 13 nations, "Lighting the Way: Toward a Sustainable Energy Future," was commissioned by the governments of China and Brazil and is the product of two years of workshops organized by the InterAcademy Council, the Netherlands-based network of national academies of science. The 174-page report details current and developing technologies, and government incentives and other policies that could lead both the developed and developing world to clean, affordable and sustainable energy supplies. "The first thing it says, really, is that conservation and energy efficiency will remain for the next couple of decades the most important thing the world can do to get on a sustainable path," said co-chairman Steven Chu, Nobel Prize-winning physicist and director of California's Lawrence Berkeley National Laboratory. Such steps are urgently needed, the panel said, not only to cut back emissions of carbon dioxide and other gases blamed for global warming, but also to extend basic energy services to 2 billion poor people worldwide and reduce the potential for international conflict over energy resources. The report took note of the growing role of coal-fired power plants in some countries, "despite increased scientific certainty and growing concern about climate change." China expects to open one new coal-fired plant per week over the next five years. In the United States, plans for more than 150 new coal plants have been announced since the late 1990s, although some recently have been scrapped or delayed because of climate and other concerns. For more visit……

http://ap.google.com/article/ALeqM5itu3eeUnmGmvQWWkqwmNoCCEzFeg

More efficient CO_2 separation membrane developed

16 October 2007
A new plastic membrane could be key to making biofuels a viable and clean fuel alternative to natural gas and coal. The membrane could be a major advance in carbon capture -- it's four times better than current technologies at separating out CO_2, one of the main culprits in global warming.

The plastic acts as a molecular sponge, allowing only carbon dioxide to pass into it, while preventing larger molecules like methane from following suit. "We've made a better mousetrap," said Benny Freeman, a University of Texas at Austin professor and co-author of a report on the material in *Science*. The plastic can handle 500 times more fuel than regular membranes while separating out molecules more efficiently, Freeman said. Rising energy costs and an increased focus on pollution control have led scientists around the world to study semi-permeable membranes which separate molecules from each other. Several teams in the United States, Europe and Australia**,** are working on CO_2 separation membranes.

An international team from Hanyang University in South Korea, UT-Austin and the Commonwealth Scientific and Industrial Research Organisation in Australia developed the new natural gas filtering bioplastic. Natural gas is actually fairly clean to process and burn. But collecting it damages the environment, and like all fossil fuels, limited supplies exist. As a result, many environmentalists advocate using "biogas," which can be made from manure and other types of waste.

The problem -- which could be addressed by the new plastic -- is it contains high levels of CO_2**.** "The development is important in the context of the production of next-generation carbon-negative biofuels," wrote Biopact**,** a clean technology website. Using a carbon capture system, biofuels manufacturers could sequester naturally occurring CO_2, reducing the amount of total carbon dioxide in the atmosphere. Clean energy companies would like to scrub CO_2 out of the fuel but carbon capture has been costly for fledgling ventures. "It's too expensive to take the CO_2 out," said Carsten Weber, project engineer for American Biogas, a subsidiary of the German company Ambico. "We modify our generators to run with the CO_2 in the biogas." The new technology would be much cheaper than current alternatives, Freeman said. "You need 500x less membrane to treat the same amount of gas, so you could reduce your capital costs enormously," said Freeman. While the researchers have shown that plastic can filter natural gas (and any other fuel containing methane), it might also work for making cleaner-burning coal, filtering water and in hydrogen fuel cells.

The most immediate application of the technology, however, is increasing the efficiency, and cutting the costs of natural gas processing plants. The seven natural gas processing plants in the United States already purify CO_2 out of mostly methane raw gas using membranes made of cellulose acetate, one of the first bioplastics. Then they release that CO_2 into the air. According to a Department of Energy report, natural gas processing in 2004 produced a fairly meager 0.13 million metric tons of CO_2. By comparison, Antarctica's roughly 1,000 temporary residents generated 0.24 million metric tons of CO_2 in the same year. The real environmental benefit of the plastic will come if it's used with biofuels, which could be just a few years away. "We're at the initial scientific discovery phase. It will take a couple years to get it off the bench and into pilot studies," Freeman said. "Field deployments would be five or six years from now."
http://www.wired.com/science/planetearth/news/2007/10/bio_plastic

Gas-forming bugs active in coal

11 October 2007
Three years ago, Luca Technologies, a start-up in Golden, Colo., discovered that micro-organisms in U.S. coal fields are converting--in real time--large hydrocarbon molecules into methane, a natural gas. The obvious entrepreneurial reaction? Harness those "bugs" and put them to work producing natural gas in underutilised oil and coal fields, decided Luca Technologies Chief Executive Robert Pfeiffer.

Now some big backers are betting that Luca's technology will pay off. In late September, Pfeiffer raised a combined $20 million in venture funding in a Series B round led by superstar Silicon Valley venture firm, Kleiner Perkins Caufield & Byers, with participation from Oxford Bioscience Partners and BASF Venture Capital America, an arm of German chemicals giant BASF. The latter firm invested $3 million in Luca last year. Ray Lane, managing partner at Kleiner Perkins, is joining Luca's board, as is Michael R. Pavia, entrepreneur-in-residence at Oxford Bioscience Partners. The investment is one of the first Oxford Bioscience has made outside the life science and health care arena. For more information see.
http://www.forbes.com/home/technology/2007/10/10/kleiner-perkins-green-technology-cz_kd_1011gassybugs.html

New method of studying ancient fossils points to carbon dioxide as a driver of global warming

17 September 2007
A team of American and Canadian scientists has devised a new way to study Earth's past climate by analysing the chemical composition of ancient marine fossils. The first published tests with the method further support the view that atmospheric CO_2 has contributed to dramatic climate variations in the past, and strengthen projections that human CO_2 emissions could cause global warming.

In the current issue of the journal *Nature*, geologists and environmental scientists from the California Institute of Technology, the University of Ottawa, the Memorial University of Newfoundland, Brock University, and the Waquoit Bay National Estuarine Research Reserve report the results of a new method for determining the growth temperatures of carbonate fossils such as shells and corals. This method looks at the percentage of rare isotopes of oxygen and carbon that bond with each other rather than being randomly distributed through their mineral lattices.

Because these bonds between oxygen-18 and carbon-13 form in greater abundance at low temperatures and lesser abundance at higher temperatures, a precise measurement of their concentration in a carbonate fossil can quantify the temperature of seawater in which the organisms lived. By comparing this record of temperature change with previous estimates of past atmospheric CO_2 concentrations, the study demonstrates a strong coupling of atmospheric temperatures and carbon dioxide concentrations across one of Earth's major environmental shifts.

According to Rosemarie Came, a postdoctoral scholar in geochemistry at Caltech and lead author of the article, only about 60ppm of the carbonate molecular groups that make up the mineral structures of carbonate fossils are a combination of both oxygen-18 and carbon-13, but the amount varies predictably with temperature. Therefore, knowing the age of the sample and how much of these exotic carbonate groups are present allows one to create a record of the planet's temperature through time.

"This clumped-isotope method has an advantage over previous approaches because we're

looking at the distribution of rare isotopes inside a single shell or coral," Came says. "All the information needed to study the surface temperature at the time the animal lived is stored in the fossil itself." In this way, the method contrasts with previous approaches that require knowledge of the chemistry of seawater in the distant past--something that is poorly known.

The study contrasts the growth temperatures of fossils from two times in the distant geological past. The Silurian period, approximately 400 million years ago, is thought to have been a time of highly elevated atmospheric CO_2 (more than 10 times the modern concentration), and was found by the researchers to be a time of exceptionally warm shallow-ocean temperatures--nearly 35^{O}C. In contrast, the Carboniferous period, roughly 300 million years ago, appears to have been characterised by far lower levels of atmospheric carbon dioxide (similar to modern values) and had shallow marine temperatures similar to or slightly cooler than today-about 25^{O}C. Thus, the draw-down of atmospheric CO_2 coincided with strong global cooling.

"This is a huge change in temperature," says John Eiler, a professor of geochemistry at Caltech and a co-author of the study. "It shows that carbon dioxide really has been a powerful driver of climate change in Earth's past." The title of the *Nature* paper is "Coupling of surface temperatures and atmospheric CO_2 concentrations during the Palaeozoic era." The other authors are Jan Veizer of the University of Ottawa, Karem Azmy of Memorial University of Newfoundland, Uwe Brand of Brock University, and Christopher R. Weidman of the Waquoit National Estuarine Research Reserve, Massachusetts
http://www.physorg.com/news109258277.html

'Too late to avoid global warming,' say scientists

19 September 2007

A rise of two degrees centigrade in global temperatures – the point considered to be the threshold for catastrophic climate change which will expose millions to drought, hunger and flooding – is now "very unlikely" to be avoided, the world's leading climate scientists said yesterday.

The latest study from the United Nation's Intergovernmental Panel on Climate Change (IPCC) put the inevitability of drastic global warming in the starkest terms yet, stating that major impacts on parts of the world – in particular Africa, Asian river deltas, low-lying islands and the Arctic – are unavoidable and the focus must be on adapting life to survive the most devastating changes.

For more than a decade, EU countries led by Britain have set a rise of two degrees centigrade or less in global temperatures above pre-industrial levels as the benchmark after which the effects of climate become devastating, with crop failures, water shortages, sea-level rises, species extinctions and increased disease.

Two years ago, an authoritative study predicted there could be as little as 10 years before this "tipping point" for global warming was reached, adding a rise of 0.8 degrees had already been reached with further rises already locked in because of the time lag in the way carbon dioxide – the principal greenhouse gas – is absorbed into the atmosphere.

The IPCC said yesterday that the effects of this rise are being felt sooner than anticipated with the poorest countries and the poorest people set to suffer the worst of shifts in rainfall patterns, temperature rises and the viability of agriculture across much of the developing world.

In its latest assessment of the progress of climate change, the body said: "If warming is not kept below two degrees centigrade, which will require the strongest mitigation efforts, and currently looks very unlikely to be achieved, the substantial global impacts will occur, such as species extinctions, and millions of people at risk from drought, hunger, flooding."

Under the scale of risk used by IPCC, the words "very unlikely" mean there is just a one to 10% chance of limiting the global temperature rise to two degrees centigrade or less.

Professor Martin Parry, a senior Met Office scientist and co-chairman of the IPCC committee which produced the report, said he believed it would now be "very difficult" to achieve the target and that governments need to combine efforts to "mitigate" climate change by reducing CO_2 emissions with "adaptation" to tackle active consequences such as crop failure and flooding.

Speaking at the Royal Geographical Society, he said: "Ten years ago we were talking about these impacts affecting our children and our grandchildren. Now it is happening to us."

"Even if we achieve a cap at two degrees, there is a stock of major impacts out there already and that means adaptation. You cannot mitigate your way out of this problem. The choice is between a damaged world or a future with a severely damaged world."

The IPCC assessment states that up to two billion people worldwide will face water shortages and up to 30% of plant and animal species would be put at risk of extinction if the average rise in temperature stabilises at $1.5^{O}C$ to $2.5^{O}C$.

Professor Parry said developed countries needed to help the most affected regions, which include sub-Saharan Africa and major Asian river deltas with improved technology for irrigation, drought-resistant crop strains and building techniques.

Rajendra Pachauri, the chairman of the IPCC, said that 2015 was the last year in which the world could afford a net rise in greenhouse gas emissions, after which "very sharp reductions" are required.

Dr Pachauri said the ability of the world's most populous nations to feed themselves was already under pressure, citing a study in India which showed that peak production of wheat had already been reached in one region.

Campaigners said the IPCC findings brought added urgency to the EU's efforts to slash emissions. John Sauven, executive director of Greenpeace, said: "The EU needs to adopt a science-based cap on emissions, ditch plans for dirty new coal plants and nuclear power stations that will give tiny emission cuts at enormous and dangerous cost, end aviation expansion and ban wasteful products like incandescent lightbulbs."

Plus two degrees: the consequences

Africa: Between 350 and 600 million people will suffer water shortages or increased competition for water. Yields from agriculture could fall by half by 2020 while arid areas will rise by up to 8%. The number of sub-Saharan species at risk of extinction will rise by at least 10%.

Asia: Up to a billion people will suffer water shortages as supplies dwindle with the melting of Himalayan glaciers. Maize and wheat yields will fall by up to 5% in India; rice crops in China will drop by up to 12%. Increased risk of coastal flooding.

Australia/New Zealand: Between 3,000 and 5,000 more heat-related deaths a year. Water supplies will no longer be guaranteed in parts of southern and eastern Australia by 2030. Annual bleaching of the Great Barrier Reef.

Europe: Warmer temperatures will increase wheat yields by up to 25% in the north but water availability will drop in the south by up to a quarter. Heatwaves, forest fires and extreme weather events such as flash floods will be more frequent. New diseases will appear.

Latin America: Up to 77 million people will face water shortages and tropical glaciers will disappear. Tropical forests will become savanna and there will be increased risk of coastal flooding in low-lying areas such as El Salvador and Guyana.

North America: Crop yields will increase by up to 20% due to warmer temperatures but economic damage from extreme weather events such as Hurricane Katrina will continue increasing.

Polar regions: The seasonal thaw of permafrost will increase by 15% and the overall extent of the permafrost will shrink by about 20%. Indigenous communities such as the Inuit face loss of traditional lifestyle.

Small islands: Low-lying islands are particularly vulnerable to rising sea levels with the Maldives already suffering land loss.

http://environment.independent.co.uk/climate_change/article2976669.ece

China's drive for wealth means end of our low-carbon dreams

October 17, 2007
Hu Jintao wants to make every Chinese twice as rich by 2020. He has done it once – in just five years, income per capita doubled to $2,000 (£983) - and the only obstacle in the Chinese President's path is the fuel needed to stoke the boiler in China's locomotive.

The president needs more copper, iron ore, zinc and natural gas. Above all, he needs more coal to keep the power stations humming nicely and more oil for Chinese cars and lorries. China accounts for more than a third of world demand for coal and the price in Australia soared this year as the People's Republic switched from being an exporter to being an importer. If Mr Hu had a message for the world in his address to the Communist Party National Congress, it was this: we will burn our coal and, if we have to, we will burn yours, too.

What does this mean? Put bluntly, it means that the Kyoto treaty on greenhouse gas emissions is dead and so is any prospect of persuading Beijing to bind itself to other curbs on carbon emissions. We can stop kidding ourselves that China will sign up to any green thingy that hinders his party's ten-year plan to get rich quick. Instead, the ravenous demand for minerals and metals will continue and the desperate land grab by Chinese state companies in their pursuit of resources in Central Asia, Africa and Canada will become more politically embarrassing.

Until now, we in the West have been able to sit back and watch the global energy game passively on our Chinese-made flatscreen television sets. We could pretend that wind farms and wave machines could really make substantial contributions, that carbon trading could somehow make the cost of green energy disappear. We did not understand that the real cost of our affluent, energy-intensive lifestyles was being defrayed by sweated labour in a Chinese factory. While the price of clothes, fridges, TVs and toys was plummeting, we could ignore that petrol, transport and even bread and milk were in the grip of an inflationary spiral.

That is about to change because China's rate of consumption is beginning to have internal consequences for the People's Republic. Skilled labour is becoming a more scarce commodity for Chinese businesses and the cost of living is bearing down on Chinese

consumers with increases in fuel and food prices. Inexorably, Chinese inflation will feed through into the cost of goods that China sells to the world.

That means that competition for resources will ratchet up in intensity. In Europe, we have not even begun to consider the consequences for our half-hearted strategy of pursuing a low-carbon economy. In an effort to rein in the cost of electricity, British power generators have been switching from natural gas to coal, traditionally a cheaper fuel. However, it is rapidly losing its lower-cost allure, the European price having doubled to $100 per tonne. Even so, analysts at Société Générale calculate that the cost of carbon permits is still so low that, on the basis of current gas and coal prices, it remains cheaper to burn coal than to switch to cleaner natural gas.

For Mr Hu, this is a race for prosperity. Of course, he said a lot of other things about "the excessively high cost in resources and the environment" and about a restructuring of the economy away from heavy industry to services and high technology. That may be a sensible objective in Shanghai, where inflation in manufacturing wages is already causing problems, but a doubling of the incomes of peasants in western China will not be achieved by turning them into estate agents. Industrialisation will move west and that has been the Communist Party's objective for more than a decade. Mr Hu knows that disparities in wealth between east and west are a huge political risk. The party needs growth if it is to survive for another decade and that means it must build homes, factories, hospitals and sewage plants.

Removing huge disparities in wealth means a massive acceleration in the burning of hydrocarbons. The four great energy companies of the West – ExxonMobil, Shell, BP and Total – have quietly turned their backs on the low-carbon option. Alternative technologies simply do not deliver the power required to achieve the economic growth targets of China and India. These companies are investing tiny sums in alternative energy. They know full well that the nations of the West depend heavily on the profits, taxes and dividends that accrue from an efficient hydrocarbon economy. A failure to invest in oil and gas extraction will leave Europe and America poor, technologically disabled and unequipped financially to cope with climate change.

The feeble intellectual response of Europe and America to this energy challenge is becoming a matter not of concern but alarm. The use of food crops for biofuels, the hobbling of energy companies with the obligation to use unreliable and expensive alternatives and the lack of investment in nuclear power is frightening.

Those whom the gods wish to destroy, they first make mad. It is not in our power to stop the Chinese locomotive; we should leave our fantasies behind, acknowledge that carbon emissions will continue to grow and plan accordingly.

http://business.timesonline.co.uk/tol/business/columnists/article2673579.ece

Clean up at Drax Power station

18 November 2007

The power station is spewing out profits - and, as Dorothy Thompson, its CEO, tells Sylvia Pfeifer, cutting emissions too.

Bill Coley, the chief executive of British Energy, was doing his utmost to play down the problems at Britain's nuclear power group last week. "Unfortunate" is how he described new corrosion problems at two of the company's reactors, which will cut down the amount of power it can supply in the coming weeks.

Coley was doing what any boss in similar circumstances would have done, but the prospect of Britain's biggest power provider not operating at full capacity during the winter months

will have sent uncomfortable shivers down the spines of government ministers. To make matters worse, National Grid was last week forced to call on power stations to increase output for the fourth time this month, while gas spot prices have soared.

With Britain now a net importer of gas, how to keep the lights on has moved to the top of the political agenda - and the problems at British Energy have only helped underline the fragility of the country's balance between supply and demand.

But every cloud has a silver lining. Bad news for British Energy is good news for Drax, Britain's largest power station. Shares in the company rose by nearly 3 per cent after British Energy first warned investors of the new problems last month. To complete the irony, while nuclear fuel is regarded as "green", coal-fired Drax in Yorkshire is Britain's largest single producer of carbon dioxide.

It may be "dirty" energy but Drax is one of the most reliable providers of electricity in the country, not least because as a coal station it is able to scale up or down production very quickly. It is also the energy sector's comeback kid. Four years ago, when power prices were low, Drax was put into administration by AES, its American owner. Nearly two years ago, buoyed by rising power prices, it bounced back, floating on the London stock market and briefly joining the FTSE100 index of Britain's leading companies. Today it has a market value of £2.3bn.

Dorothy Thompson, its chief executive, is well aware of Drax's role as the country's energy backstop. "We are the most efficient and cleanest coal plant in the system," she says proudly. "We are also one of the best in terms of being available and operating on a continuous basis. That means we are well placed at times when the market is tight."

Thompson's own tenure at the company - she was hired from InterGen, the power generation business, to lead the float in September 2005 - could have been very short indeed. About a week before she joined, Drax received a joint bid from Constellation Energy of the US and Perry Capital, an American hedge fund.

"Drax was over-leveraged and had a lot of shareholders who were looking to exit. It was a little bit uncomfortable when you join a company and the week before you join, someone makes a bid to buy it," says Thompson.

The offer sparked a full-blown auction but, perhaps more importantly, it focused the board's mind on what was the right kind of financial structure for a company such as Drax. Unlike a conventional utility, Drax has no customer base and operates much more like a metals or an oil company, buying all its raw materials - principally coal - from the commodity markets and selling its output into the market.

It was a debate that Thompson, with her financial background as a trained economist, clearly relished. "All of the bids were based on high leverage, so all of those required some level of pre-contracting to support a heavy debt package. The listing was based on low leverage and it was all about the fact that you can capture better value for a business like Drax if you can freely access the commodity markets. We demonstrated that in spades," she says.

Last year was one of the best ever for Drax; pre-tax profits more than doubled to £634m on higher power prices. But with governments around the world focused on cutting harmful emissions, Drax - which emits about 20 to 22m tonnes of carbon dioxide every year - faces a stiff challenge if it is to survive in the long term. If Thompson had any illusions about how big a challenge, she lost them when more than 600 protesters descended on Drax for a "day of action" in August last year that led to more than 40 arrests.

"We think of carbon as probably our biggest single challenge. Climate change has gone from being a relatively low-level issue to being front and centre of everyone's mind. When I joined Drax it was already an issue but not a protest issue," she says in reference to the demonstration.

Thompson, who says she doesn't offset her own carbon emissions but drives a fuel-efficient Lexus diesel, believes the way to address the carbon challenge is by "making progressive steps". "There is a lot of talk in climate change of where the solution is. People sometimes forget that you can take steps that will make near-term changes that deliver near-term benefits," she says.

The company's response has been twofold: it is investing £100m in new technology, specifically in upgrading the blades on its turbines in a bid to increase the plant's overall efficiency; and it is committing £67m to grow crops for fuel.

The latter is by far the bigger gamble. The scale of the proposal would see an Essex-sized chunk of agricultural land devoted to growing crops for use in Drax's furnaces. And Thompson has pledged that Drax will generate 10 per cent of its output from biomass such as elephant grass and rape seed by 2009, saving almost 2m tons of CO_2 - the equivalent of about 500 windmills.

She admits it isn't nearly enough in the context of the Government's ambitious targets to cut CO_2 levels but insists that, in the absence of wholesale solutions, "the question is what are the steps that you can take that get you nearer and nearer the solution".

"This is a transition technology rather than the total solution. But it's not insignificant. If all our colleagues also participate, co-firing will provide a much higher percentage of renewable energy than anyone ever envisaged and much more significant carbon savings. I think it's the forgotten technology," she says. How to achieve the biomass target is "without a doubt the largest challenge right now. The issue is the timing, not whether it's achievable," she adds. Drax will also look at any other sources of energy, including new generation of gas. Does she see a future for Drax in 20 years' time? "Absolutely."

"Why? One, I think we are, of the existing coal fleet, the most efficient. We will sustain generation, one would expect, beyond all other coal stations in the UK. In addition, technology moves on and we will continue to enhance the equipment." What of her own plans? Many Drax staff have been there for more than 20 years but fans of Thompson believe her talents are wasted at the group. She insists her focus is very much on the present but whatever happens is keen to stay in the utilities sector.

"It's quite complex, between being a vital good, driven by complex commodities and yet also complex regulation," she says. "It's a very challenging puzzle."
http://www.telegraph.co.uk/money/main.jhtml?xml=/money/2007/11/18/ccdrax118.xml

Worldwide power plant carbon dioxide emissions database

15 November 2007
Now for the first time, the CO_2 emissions of 50,000 power plants worldwide, the globe's most concentrated source of greenhouse gases, have been compiled into a massive new data base, called CARMA--Carbon Monitoring for Action.

The on-line database, compiled by the Center for Global Development (CGD), an independent policy and research organisation that focuses on how the actions of the rich world shape the lives of poor people in developing countries, lays out exactly where the CO_2 emitters are and how much of the greenhouse gas they are casting into the atmosphere. It also shows which companies own the plants.

A research team, led by David Wheeler, a senior fellow at CGD, constructed the enormous database to help speed the shift to less carbon-intensive power generation -- with the objective of minimising global warming which is and will hurt poor people in developing countries first and worst.

The database and its website rank individual power plants, plotting their location by latitude and longitude. The data for total power-related emissions can be displayed by cities, states or provinces, and countries. For the U.S., emissions data are also available for Congressional districts, counties and metro areas, making it possible for the first time to compare total power-related emissions by locality.

Rankings of the 4,000 electric power companies in the world show which are the biggest carbon polluters, globally, nationally, and at sub-national levels. Company-level data include emissions and power generation for 2000 and 2007, as well as estimates of future emissions and power generation from planned expansions. Data will be updated regularly as facility ownership changes and new plants come online.

Power generation accounts for about one-quarter of total emissions of CO_2, the main culprit in global warming. But, until now, people concerned about climate change lacked information about the emissions of particular power plants and the identities of the companies that own them.

"CARMA makes information about power-related CO_2 emissions transparent to people throughout the world," says Dr. Wheeler, an expert in the use of public information disclosure to reduce pollution. "Information leads to action. We know that this works for other forms of pollution and we believe it can work for greenhouse gas emissions, too."

"We expect that institutional and private investors, insurers, lenders, environmental and consumer groups and individual activists will use the CARMA data to encourage power companies to burn less coal and oil and to shift to renewable power sources, such as wind and solar," Dr. Wheeler says. Earlier research by Wheeler and his co-authors showed that highly-polluting plants in China and Indonesia responded to pressure from neighbouring communities and lenders by reducing pollution significantly after public disclosure of their emissions.

On a per capita basis, Australians are some of the largest CO_2 emitters in the world, producing more than 11 tons of power sector CO_2 emissions per person every year. Americans aren't far behind at more than 9 tons per person. Populous developing nations have far lower per capita emissions. For example, the average Chinese citizen produces 2 tons of CO_2 emissions from power generation annually, and Indians emit about half of one ton per person.

A recent study by William Cline, a joint senior fellow at CGD and the Peterson Institute for International Economics, predicts that agricultural productivity in developing countries will decline sharply by 2080, as crops in areas closer to the equator suffer from the effects of increased heat and drought. Averting such a disaster would require rapid emission reductions in the first half of this century. CARMA is intended to help speed the necessary emission reductions.

CARMA data come from government reports and often from the plants themselves. Where directly reported emissions data are lacking, the CARMA team has estimated emissions, with 90% or greater confidence, using a statistical model based on the type and age of plant, the type of fuel, and the amount of power generated.

The resulting information is displayed using a five-colour rating system and differently sized circles based on the amount of power produced. CARMA highlights low-carbon power

producers and flags dangerous emitters. Rankings range from nearly zero emissions, Green, to extremely dirty, Red.

"CARMA is unique, one of a kind--a world standard," says CGD president Nancy Birdsall. "Never before has this kind of detailed information been made available on a global scale. Not only is it likely to catalyze action to cut emissions now, it also strengthens the knowledge base for monitoring any future international market-based agreement, whether a carbon tax or cap-and-trade. Let us hope it speeds the way to an agreement -- which matters immensely for the well-being of hundreds of millions of people in developing countries."

http://www.sciencedaily.com/releases/2007/11/071114163448.htm

See link below to access the CARMA database

http://carma.org/?hpid=topnews

Student Bursaries for 2008

The Coal Research Forum in conjunction with the Coal Utilisation Subject Group of the IChemE is offering up to 6 travel and subsistence bursaries for up to £300 each to bona-fide full-time students wishing to attend appropriate coal-related conferences, (please see the Calendar of Coal Research Events for details), such as the "Seventh European Conference on Coal Research and its Applications", (7th ECCRIA), to be held at Cardiff University in September 2008.

The Coal Research Forum is also pleased to announce that International Power plc. has offered to provide the funding for the conference fees for two final year, (2007/08), first degree engineering students from any UK University to attend the 7th ECCRIA to be held at Cardiff University in September 2008.

To apply for either of the above awards, please send your application to :-

Prof. J.W. Patrick
School of Chemical & Environmental Engineering
The University of Nottingham
Nottingham
NG7 2RD

where for the former award, you should include the abstract submitted to the conference with a brief supporting letter from your supervisor. These bursaries and awards 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 next edition.

Update on current EPSRC Energy Projects

(as of January 2008)

Grant Title	Investigator	Value (£)
Wind Energy Technologies	Professor PJ Tavner	2,552,788
United Kingdom Sustainable Hydrogen Energy Consortium (UK-SHEC) CORE PROGRAMME	Dr TJ Mays	5,965,477
UK-Japan Hydrogen Storage Research Network	Dr D Book	143,919
The Supergen5 Biological Fuel Cells Consortium	Professor FA Armstrong	2,022,490
SUPERGEN Photovoltaic Materials for the 21st Century	Professor K Durose	6,270,876
Supergen Marine - Core	Professor R Wallace	5,539,980
SUPERGEN BIOMASS BIOFUELS AND ENERGY CROPS II CORE	Dr JM Jones	6,387,325
SUPERGEN 2 - Conventional Power Plant Lifetime Extension Consortium - CORE	Professor RC Thomson	4295007
SUPERGEN 1 Renewal Core - FlexNet: Renewal of the Supergen consortium on Future Network Technologies	Professor J McDonald	6,974,971
SUPERGEN - The Energy Storage Consortium	Professor MS Islam	2,156,535
SUPERGEN - PV Materials for the 21st Century	Professor K Durose	4,199,407
Solid state NMR for dynamics and kinetics of hydrogen uptake and transport in novel bionanomaterials for energy applications ('Nano-NMR')	Professor L.E. Macaskie	119,972
Solid state NMR for dynamics and kinetics of hydrogen uptake and transport in novel bionanomaterials for energy applications ('Nano-NMR')	Professor ME Smith	58,003
SI/SIGE NANOWIRE ARRAYS FOR THERMOELECTRICITY	Dr K Fobelets	123,625
Short Term Deterministic Wave Prediction as a Tool for Enhanced Performance with Survivability for Wave Energy Converters.	Dr MR Belmont	166,264
Seminar for the Next Generation of Researchers in Power Systems - 2007	Professor D Kirschen	10,785
Semi-Biological Photovoltaic Cells	Dr A Fisher	155,256
SCORE - (S)tove for (CO)oking, (R)efrigeration and (E)lectricity supply: an affordable appliance for remote and rural communities	Professor C Lawn	302,238
SCORE - (S)tove for (CO)oking, (R)efrigeration and (E)lectricity supply: an affordable appliance for remote and rural communities	Dr K Pullen	251,605
SCORE - (S)tove for (CO)oking, (R)efrigeration and (E)lectricity supply:	Dr AJ Jaworski	407,068

an affordable appliance for remote and rural communities		
SCORE - (S)tove for (CO)oking, (R)efrigeration and (E)lectricity supply: an affordable appliance for remote and rural communities	Professor CM Johnson	617,864
Photophysical Strategies and Novel NIR Dyes for Optimisation of Luminescent Solar Concentrators	Dr BS Richards	160,093
Photophysical Strategies and Novel NIR Dyes for Optimisation of Luminescent Solar Concentrators	Dr N Robertson	147,591
Novel Multi-functional Membrane Reactors for Energy Conversion and CO2 Capture via Pre-combustion Decarbonisation Route	Professor K Li	170,073
Novel Ammonia-Based Energy Storage Technology	Professor SG Davies	267,602
Nanofuels as Future Energy Vectors	Dr D Wen	179,443
Measurement, Modelling, Mapping and Managenmment (4M): An Evidence-Based Methodology for Understanding and Shrinking the Urban Carbon Footprint	Professor K Lomas	2,726,669
Laboratory Experiment of Physical Power Systems for SUPERGEN Projects through International Collaboration	Professor H Wang	60,727
Keeping the Nuclear Option Open	Professor RW Grimes	6,114,715
Innovative Accelerator Technology for Accelerator Driven Subcritical Reactors	Professor RJ Barlow	142,341
Hydrogen generation from biomass derived glycerol using sorption enhanced reaction processes	Dr V Dupont	270,319
High Throughput Synthesis and Screening of Novel Hydrogen Storage Materials	Professor WIF David	243,193
High Throughput Synthesis and Screening of Novel Hydrogen Storage Materials	Professor P Edwards	485,413
FEASIBILITY STUDY OF UREA FUEL CELL	DR S Tao	87,874
Feasibility Study of Optimisation of Scroll Air Motors and Energy Recovery from Exhaust Compressed Air	Dr J Wang	108,825
Feasibility Study of Optimisation of Scroll Air Motors and Energy Recovery from Exhaust Compressed Air	Professor ASI Zinober	80,737
Exploration of the hydrogen storage capacity of pillared nanographite intercalates	Professor N Skipper	204,744
Exploration of the hydrogen storage capacity of pillared nanographite intercalates	Professor SM Bennington	92,301
EPSRC Star Academic Proposal	Professor J McDonald	709,745
EPSRC Energy Project Manager	Professor RK Aggarwal	94,425
Enhancement of Electrochemical Energy Efficiency via Process Intensification	Dr H Yeung	220,349
Enhanced Management and Performance for a Sustainable UK Energy Infrastructure	Professor S Swingler	2,848,941

Enhanced biomass production and energy conversion for use in water-scarce areas of India	Professor RE Critoph	294,073
Enhanced biomass production and energy conversion for use in water-scarce areas of India	Dr PA Davies	716,657
Enhanced biomass production and energy conversion for use in water-scarce areas of India	Dr MJ Tierney	74,531
Engineering the soil carbon sink: a novel approach to carbon emission abatement	Professor DAC Manning	239,700
Energy research development manager at Imperial College London (Linked to EP/E011705)	Professor NP Brandon	193,377
Energy project officer	Professor G Tomlinson	80,191
Energy management decisions under real-time uncertainty in both price and load	Professor P Duck	144,789
Electrolytic Silicon and Iron Powders as Alternatives to Hydrogen as Energy Carrier and Store	Dr GZ Chen	151,939
Distributed Hydrogen Production with Carbon Capture: A Novel Process for the Production of Hydrogen from Biomass	Dr J Dennis	175,850
Chair in Radiation Chemistry	Professor SM Pimblott	270,054
Chair in Power System Engineering	Professor D Kirschen	818,336
Chair in Decommissioning Engineering	Professor TB Kelly	275,577
Biological and Engineering Impacts of Climate Change on Slopes: Learning from full scale	Dr D Hughes	22,321
Biological and Engineering Impacts of Climate Change on Slopes: Learning from full scale	Professor N Dixon	30,855
Biological and Engineering Impacts of Climate Change on Slopes: Learning from full scale	Professor W Powrie	30,652
Biological and Engineering Impacts of Climate Change on Slopes: Learning from full scale	DR S Glendinning	95,973
Advanced Spectroscopic Techniques for the Optimisation of Photo-electrochemical Hydrogen Production	Dr AG Dutton	138,585
A feasibility study to assess the potential of organic crystals as hydrogen storage materials.	Professor N McKeown	193,830
A feasibility study for a new approach to designing non-tracking solar concentrators	Dr M McCulloch	107,190
Total number of projects:		**61**
Total value of support:		**67,828,055**

CALENDAR OF COAL RESEARCH MEETINGS AND EVENTS

Date	Title	Location	Contact
5-6 February 2008	3rd international conference on underground coal gasification	London, UK,	The UCG Partnership, Network House, Bradfield Close, Woking, Surrey GU22 7RE, UK Tel: +44 870 803 0665 Fax: +44 870 803 2065 Email: rohan.courtney@ucgp.com Internet: www.ucgp.com/conferences/next-conference
27 February 2008	8th UK Advanced Power Generation Technology Forum (APGTF) workshop: carbon capture and storage	London, UK	Judy Henson, Alstom Power, Newbold Road, Rugby, CV21 2NH, UK Tel: +44 1788 531478 e-mail: judy.henson@power.alstom.com Internet: : www.apgtf-uk.com/index.php?option=com_content&task=view&id=25&Itemid=1
10 April 2008 (Provisional)	**The CRF/CUSG Annual Meetings together with a joint Combustion/Coal Characterisation/Coal Conversion Divisional Meeting**	**To be confirmed**	**Dr David McCaffrey** **E-mail: mail@coalresearchforum.org**
15-17 April 2008	EuroCoke Summit 2008	Prague, Czech Republic	IntertechPira, Cleeve Road, Leatherhead, Surrey KT22 7RU, UK Tel: +44 1372 802 051 Fax: +44 1372 802 243 Email: paul.squires@pira-international.com Internet: www.intertechpira.com/mineralsandmetals
1-5 June 2008	The Clearwater coal conference: 33rd annual international technical conference on coal utilization & fuel systems	Clearwater, FL, USA.	Barbara A. Sakkestad, The Clearwater Coal Conference, 601 Suffield Drive, Gaithersburg, MD 20878, USA Tel: +1 301 294 6080 Fax: +1 301 294 7480 Email: barbarasak@aol.com Internet:

			www.coaltechnologies.com
Wednesday 4 June 2008	**BCURA/CRF Research Event** **Coal Research Forum with BCURA**	**Imperial College London**	**Dr David McCaffrey** **E-mail:** **mail@coalresearchforum.org**
Tuesday 2 September 2008	IEA Coal Science Workshop (topic to be advised)	University of Cardiff	Robert Davidson. IEA Clean Coal Centre Gemini House, 10-18, Putney Hill, London, SW15 6AA. Tel : 0208-7890-2111. robert@iea-coal.org.uk
Wednesday 3-Friday 5 September 2008	**7th European Conference on Coal Research and its Applications**	**University of Cardiff**	**Dr A W Thompson** **Tel : 0115-936-2351** **or 01332 514768** **E-mail :** **awt_crf@btinternet.com**
October 16 or 23 (Provisional)	**"The Environmental Impact of CO2 Storage", joint seminar between the CRF, the Royal Society of Chemistry, (ES), the Geological Society and the IChemE**	**The Geological Society, Burlington House, Piccadilly, Central London**	**Dr M Whitehouse** **Tel : 01793-894118** **E-mail :** **michael.whitehouse@RWEnpower.com**