

Newsletter of The Energy Sector

ENERGY SECTOR UPDATE

Dear Members of the RSC Energy Sector,
Welcome to our Spring 2012 Newsletter! You will find this newsletter packed with interesting articles describing the Energy Sector's activities.

The Task Force set up to develop a strategy for the Energy Sector to plan activities has now completed their work and produced a report describing operational procedures to follow when organising events. You can find the main outcomes of the report in this Newsletter. I would like to thank David McCaffrey (Chair), Chris Satterley and Richard Wain for the excellent work they have put together to develop this strategic report for the RSC Energy Sector.

We have received a grant from the RSC to organise an activity that 'promotes the chemical sciences' as part of its International Year of Chemistry Challenge Fund. We'd like to hear from you suggestions and ideas for such an event. Please, read more in this newsletter.

We have said good bye to our Treasurer Michael Whitehouse. We are indeed indebted for his long service as Treasurer to the Energy Sector. Michael will continue as a member of the Executive Committee. We welcome David McCaffrey who has been duly elected as our Treasurer and look forward to working with David.

Sadly, our Newsletter Editor, Rachel Gomes, has recently taken another strategic role and cannot continue as Newsletter Editor for the RSC Energy Sector. We are currently searching for a new Editor. If you are interested in this role, please contact me.

As always, I welcome all the members' suggestions and your involvement in the Energy Sector's activities and would like to extend an invitation to contact me if you want to be involved in one of our existing initiatives or want to propose any event.

Finally, this is my last newsletter piece from the University of Nottingham, as I am taking the Robert Buchan Chair at Heriot Watt and my team will be relocating this summer. I will be writing my next 'wee' piece as Chair of the RSC Energy Sector from the north.

Exciting times ahead!

Prof. Mercedes Maroto-Valer, Chair.

IYC CHALLENGE GRANT

To continue the 2011 International Year of Chemistry (IYC) legacy, the Energy Sector has received £1000 from the RSC to support projects that promote the Chemical Sciences in 2012.



We are asking for your help as Energy Sector members by providing the idea for an activity that we can spend the £1000 on. So, if you have an idea for a project that promotes the Chemical Sciences with an Energy theme, the Energy Sector wants to know about it! The recipient of the winning idea, as chosen by the Energy Sector Committee, will receive a prize of £50 in retail vouchers.

Your idea can be targeted for outreach into schools, industrial visits, workshops... anything that supports the Chemical Sciences, with Energy as a theme. The best idea will then be developed by the Committee into an activity to run in 2012.

The RSC has awarded the £1000 grant to 90 separate groups and there is an added incentive to provide an interesting idea. The most worthy project from these groups as judged by the Council will be awarded an extension grant of £10,000 to develop that activity further.

Please send your idea(s) for an activity to rachel.gomes@nottingham.ac.uk by 22nd June 2012.

FUTURE STRATEGY TASK FORCE: MAIN FINDINGS

The Future Strategy Task Force has now completed its report and based on the information obtained from the Member's survey carried out between July and September last year, the Task Force recommends that the Energy Sector pursue the organisation of events and seminars in the following technical areas:

- Policy & Regulation, specifically, (i) Renewables/Sustainable Energy issues, and (ii) Nuclear Policy & Regulation.
- Nuclear, specifically, (i) Nuclear Waste Management and Reprocessing, and (ii) Materials Issues/Structural integrity, including the Effect of Chemistry on the Degradation of Materials in Reactor Systems and Reactor Coolant Chemistry.
- Renewables, specifically, (i) Fuel Cells/Energy, Storage, (ii) Solar Photovoltaics/Solar Thermal

and (iii) Solar Fuels.

Although Energy Efficiency was considered of general interest, it was considered by the Task Force that this subject could be incorporated into other meetings.

- Fossil Fuel, specifically, (i) Environmental Issues, including emissions to air, SO₂, NO_x, Trace Elements, particularly Mercury, Particulates, Polyaromatics, etc., and Environmental Mitigation and Control Systems, (ii) Future Fossil Fuel Power Generation Technologies, and (iii) Steam Cycle Chemistry/Materials Issues.

Although Carbon Capture and Storage was highlighted as an area of significant interest, it was considered by the Task Force that this area has been well covered by seminars elsewhere.

- Oil & Gas, where none of the categories identified, other than policy issues, gave a high enough level of interest from the survey to be considered for a seminar.

In addition, the Task Force considered a further topic not included in the survey:

- Analytical Chemistry issues in the Energy Industry, (possibly jointly with the Analytical Chemistry Division of the RSC).

The Task Force also recommended that the Executive Committee should define the role and scope of the Energy Sector, and that the Energy Sector mission statement should be reviewed and updated periodically. The full report from the Future Strategy Task Force is now available on the MyRSC Energy Sector group website.

Dr. David McCaffrey, Task Force Chair

ENERGY SECTOR NEWSLETTER EDITOR

WANTED!

The Energy Sector Newsletter is distributed on a bi-annual basis, reaching over 720 members.

Through the Newsletter, Energy Sector members are updated on the activities undertaken by the Committee as well as reports from meetings attended by our members, upcoming meetings and conferences, and Energy-related articles that members feel may be of interest to the Energy Sector community.

This will be my last Newsletter for the Energy Sector as I leave to take up another strategic role. Thank you to everyone who has contributed to the past Newsletter issues.

The role of Newsletter Editor represents an excellent opportunity to become more involved with the activities and dissemination of the Energy Sector and members are now invited to apply for this position by emailing the Chair.

Rachel Gomes, Newsletter Editor



NEW TREASURER

Dr. David J. A. McCaffrey *CChem FRSC*

I am pleased to take up the position of Treasurer of the RSC Energy Sector. My beginnings in Chemistry started, of course, at school and developed with my first degree and my PhD in transition metal organo-metallic chemistry from the University of Kent. My background in energy matters comes from my works in the coal industry, working at the British Coal Corporation's Coal Research Establishment and latterly for one of the privatised companies, CRE Group Ltd. at the Stoke Orchard site, near Cheltenham. I worked for these two organisations for over 20 years, where my final position was Head of the Research and the Analysis business areas. In this position, I was responsible for many coal combustion, emissions, gasification, coal handling, coal characterisation and liquefaction projects and was the co-ordinator of several large multi million European Commission projects. I was also responsible for all of the chemical analytical services and requirements at the Stoke Orchard site. I was one (of the 2) UK Representatives on the European Coal and Steel Community (ECSC) Experts Committee on "Coal Conversion". I was the British Coal Utilisation Research Association's, (a registered charity, which gave grants to UK Universities to carry out energy research), Technical Officer for 18 years and on retirement from this post became a Member of the board of directors and have recently been elected Vice-President of this charity. I have been the Secretary of the Coal Research Forum since its formation in 1988. I am also invited to attend meetings of the Advanced Power Generation Technologies Forum in an advisory capacity. I have been running my own business, McEnergy Consultancy, since I left CRE Group Ltd. at the end of 1998.

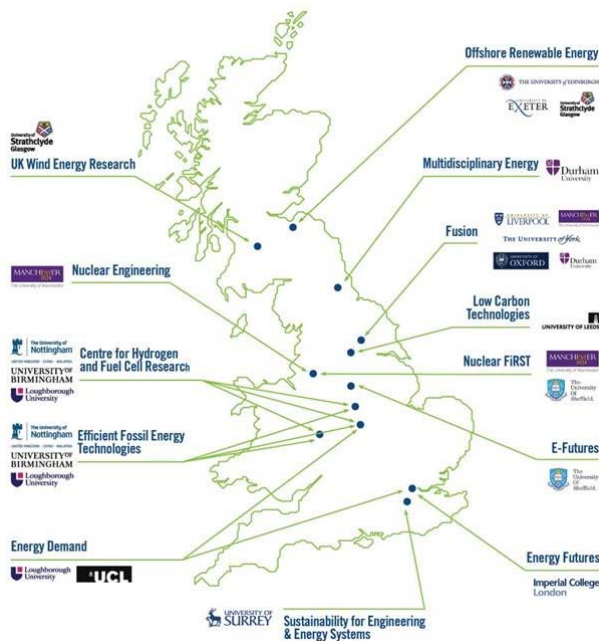


I have been a Member of the RSC since 1971 and a Fellow and CChem for nearly 20 years. Since joining the Energy Sector Executive Committee in 2009, I have taken an active role in the Energy Sector activities and have been one of the leading organisers, together with many others, of several of the Energy Sector seminars during this period. Under the guidance of the Executive Committee Chair, I have formed and chaired the Future Strategy Task Force, which determined the subject matter of future RSC Energy Sector seminars and events and developed a policy for the Energy Sector to ensure that future seminars are properly organised, budgeted and managed. I have considerable financial experience in handling accounts, and have been the Treasurer of other clubs, societies and conferences. I will endeavour to provide accurate and up-to-date financial information to the Executive Committee and seek ways of getting tasks done.

WHAT'S 'HOT' IN THE ENERGY SECTOR

NETWORK OF ENERGY CENTRES FOR DOCTORAL TRAINING

Delivering world class research skill and knowledge to transform the future of energy



The Network of Energy Centres for Doctoral Training (CDTs) is comprised of 13 centres across 16 UK Universities, and represents over £60 million of investment and over 600 early career researchers. Each centre is funded by the EPSRC and has leading expertise in energy related research and training to develop postgraduate students over a four-year programme. There is a large and varied research portfolio within the Network; covering all areas of energy technology from wind power to nuclear energy, carbon capture to demand reduction and marine energy to alternative fuels. The training of these future leaders will help the UK to meet its CO₂ emissions targets and fulfil its commitment to creating a low carbon economy.

Background: CDTs are exciting, prestigious environments offering postgraduate study to safeguard the flow of highly qualified people into careers in research or industry. Through a combination of taught modules, professional development and research, students not only develop a breadth of knowledge in their chosen field but also an understanding of

where their research sits within the energy landscape and how it relates to other areas. CDT students receive professional skills training in areas such as project management and enterprise. They also have the opportunity to spend time working in industry; this can be for up to 75% of their time if they are enrolled at one of the Industrial Doctorate Centres. Furthermore, students undertake public engagement activities as part of their training. This not only strengthens their communication skills but also helps to develop the teamwork, creativity and leadership skills needed to take up senior roles in academia or industry.

About the Network: The Network of Energy CDTs draws the 13 centres together with a mission to provide an environment for leaders in UK energy research and training to share expertise, stimulate collaboration and develop the personnel who will transform the future of energy. The Network was launched at Durham University on the 31st October 2011 and is led by Professors Colin Snape (University of Nottingham) and Paul Williams (University of Leeds). Network activities are managed by two personnel; Dr Donna Palmer, Network Manager (based in Nottingham) and Nicola Smith, Public Engagement Manager (based in Leeds).

Involving Industry: In February 2012, the Network conducted an online survey to ascertain levels of understanding for CDTs in general and the Energy related CDTs in particular, from members of academia and industry. The survey was circulated through Twitter, LinkedIn groups, The Energy Generation & Supply KTN, RSC Energy Sector forum, IOP forums and the NERN newsletter. Qualitative data suggests that there is a wide range of understanding across academia and industry, however several respondents seemed to see the CDT's purely as a channel for meeting industry demand for personnel. There is however, strong evidence that some respondents are aware of the enhanced training that CDT students receive.

Respondents were aware of several member centres of the Network of Energy Centres for Doctoral Training and there were also mentions of 'energy' centres. It is clear from these results that work needs to be done by CDTs with industry and academia to ensure that there is a wider understanding of the benefits that CDTs confer on their graduates and their overall aims. An explanation of the different CDT models can be found on the Network website below, which is hosted by UKERC (The UK Energy Research Centre).

There are many and wide ranging opportunities for industry to contribute to the development of the future energy leaders, these include but are not restricted to: Providing industrially relevant input into the training programme through guest lectures or offering site visits; and Inviting a student to carry out research relevant to your organisation through offering Industrial sponsorship or internships.

Interaction with the Network offers industry the chance to meet and interact with their employees of the future. If you are interested in finding out how you can get involved with the Network contact Dr Donna Palmer (donna.palmer@nottingham.ac.uk), Network Manager or visit Energy CDT Network (<http://www.ukerc.ac.uk/support/cdt+overview>).



REPORTS FROM RECENT MEETINGS

ROYAL SOCIETY OF CHEMISTRY ROADMAP SERIES 2012: FUTURE CITIES POLICY EVENT Burlington House, London, 16th March 2012

The RSC Future Cities policy event was held on the 16th March at Burlington House and was chaired by the Energy Sector Executive Committee member, Dr Anna Weston. At the event Dr Richard Miller (Head of Sustainability at the Technology Strategy Board) and Professor AbuBakr Bahaj (Head of the Energy and Climate Change Division at the University of Southampton) discussed the impact of an increasing population on cities' growth and infrastructure requirements. Energy was key to the discussions which focussed around the following topics:

- How to build new low carbon cities and how to lower the carbon footprint of existing cities;
- How to develop more intelligent methods to utilise our waste such as catalytic conversion to fuels;
- More efficient heating/cooling of buildings;
- How to meet our increasing energy demand, especially as more people adopt a western lifestyle, with damaging the environment;
- Developing joined up solutions which take energy, water, transport and waste into account;
- Localised renewable energy solutions and grey water recycling.

A video of the Future Cities Policy event can be viewed online at The Reaction website:

<http://www.thereaction.net/explore/future-cities/>

Anna Weston

SEMI[®] INTERNATIONAL STANDARDS MEETINGS PHOTOVOLTAIC PLANT MANAGERS FORUM (PVPMF) Hotel Kempinski Bristol, Berlin, 25 - 27th March 2012

This is an annual event organised by *PV Group* (<http://www.pvgroup.org/>) that represents SEMI member companies involved in the solar energy manufacturing supply chain. It focuses on specific hot-topics in the PV manufacturing industry with all presentations by invited speakers. Topics included forecast supply/demand issues, new techniques for silicon crystal growth and reduced wafer thickness, high efficiency cell architectures and cost-of-ownership in manufacturing operations. Whilst manufacturing cost has reduced in most areas, current high silver metal prices have raised the cost of printed metal contacts to 10% of the total module cost. Base metal solutions such as copper plating were shown to be a technology ready for adoption and supporting the industry cost reduction roadmap (issue 3) presented by PV Group at the meeting.

Nigel Mason

SOLAR ENERGY SOCIETY & PVNET-UK PHOTOVOLTAIC SCIENCE APPLICATIONS AND TECHNOLOGY CONFERENCE (PVSAT-8) Northumbria University, Newcastle, 2 - 4th April 2012

This was the 8th in what has become an annual solar energy conference organised by the Solar Energy Society and is the main scientific event for Solar PV in the UK. Approximately 100 delegates attended the conference (30% reduction on 2011) to hear some 33 oral presentations, review 26 poster presentations and participate in a panel discussion on the Future of Photovoltaic Research in the UK. Thin film PV had the largest number of papers (20), reflecting the predominance of UK PV research in this area. Organic cells (OPV) and dye-sensitised cells (DSC) also have strong research funding in the UK but disappointingly only two papers (both on DSC) were presented. The conference learnt that despite significant reductions in the price of PV systems, a 40% annual growth in global installed PV (2011), a 10-fold increase in PV installed in the UK and the expectation that the cost of electricity from Solar PV would be competitive (without subsidy) with retail electricity prices in UK by 2020, the Department of Energy and Climate Change (DECC) does not include Solar PV as one of the 8 key renewable energy technologies for the UK.

Nigel Mason

REPORTS FROM RECENT MEETINGS

RESEARCH COUNCILS UK (RCUK) ENERGY PROGRAMME TORREFACTION OF BIOMASS WORKSHOP

University of Leeds, Leeds, 28th March 2012

This was the first of two workshops planned as part of the dissemination activities of the project: "Premium Upgraded Biomass Solid Fuels - Fundamentals of torrefaction and performance of torrefied fuels", which is financed by the Energy Programme (Grant EP/H048839/1). The workshop aimed to bring together academic and industrial researchers, and other stakeholders interested in biomass utilisation for energy production.

The torrefaction process involves heating biomass to a moderate temperature (~280 °C) in the absence of air. This results in a material containing typically 80% of the heating value of the original biomass, and is transformed into a harder, darker fuel, which is much easier to crush (Figure 1). This process is attractive to all sectors involved in the bioenergy chain:

- Growers see this is a way of adding value to the biomass they grow and reducing transportation costs (since the fuel is dry and has a greater energy per unit volume);
- Power-generators see this as a simpler fuel to handle in the power stations;

There is also interest in using torrefied biomass as a fuel in other conversion processes, such as biomass gasification to liquid (transport) fuels (BTL). Furthermore, unlike raw biomass, torrefied biomass may not degrade upon storage and so it becomes attractive for extending the supply window for using biomass. In order for torrefaction of biomass to happen on a large scale much information is needed including: optimisation of the process; combustion behaviour; handling behaviour; safety issues; and economics.



Figure 1 The change in colour of the biomass, from untreated (or raw) to biomass torrefied at increasingly higher temperatures and or residence times.

After a welcome and a brief introduction to the torrefaction process by the Energy Sector Executive Committee member, Prof. Jenny Jones, ECN (Fred Verhoeff) presented their latest observations on the possible exothermicity of the fixed bed process. Rotawave (Garth Way) briefly explained their novel torrefaction process, and SSE, Ferrybridge Power Station (Mobeen Aslam) discussed the potential of torrefied material for large-scale electricity generation at existing coal stations.

This session was followed by presentations on the current research activities in the area by the University of Leeds (Raimie Ibrahim, Andrew Ross), University of Sheffield (Jim Swithenbank), Sintef (Roger Khalil), and AFR Inc. (Marek Wójtowicz). An assessment of the impact of torrefaction on lowering the greenhouse gas emissions of bioenergy systems was presented by Coventry University (William Hall), followed by a discussion of the supply chain economics of biomass torrefaction by 365 Strategy Ltd (Richard Lee).

The current work on determining the explosive limits of torrefied material was presented by the University of Leeds (Hamed Sattar and Clara Huéscar), whilst the final session consisted of two talks from Leeds University: the first one considered options for combining washing pre-treatment with torrefaction to obtain a fuel with improved ash properties (Abby Saddawi), whilst the second one was an overview of storage issues (Jenny Jones). Summaries of several of the presentations are available from:

<http://www.engineering.leeds.ac.uk/short-courses/Torrefaction.shtml>

The second and final workshop on torrefaction of biomass is planned for March 2014.

Leilani Darvell

CALENDAR OF UPCOMING EVENTS

OPPORTUNITIES FOR ALGAL COMMERCIALISATION

Cranfield University, Bedfordshire 20th June 2012

This free workshop is organised by the Algal Bioenergy Special Interest Group at Cranfield University, the Environmental Sustainability Knowledge Transfer Network (KTN), and the Biosciences KTN. The aims of the workshop are to:

- Highlight the opportunities for algae commercialisation & current UK R&D strengths in algal biotechnology;
- Identify UK industry needs to take forward the cultivation and use of algal feedstocks for applications across a range of market sectors;
- Identify strategic research priorities in algal R&D to support UK industry working in this sector.

The workshop will be of interest to academia and industry in the areas of algae cultivation, wastewater remediation, bioenergy and biofuel generation and supply, and non-energy value added products from algal biomass.

Outputs from the workshop will provide a platform for an industry road mapping event, planned for Autumn 2012. The road mapping event aims to define the timeframe and actions required to establish a competitive algal industry sector within the UK.

Confirmed speakers include: Steve Skill (PML), Paul Mcartain (CREDIT), Feargal Brennan (Cranfield University), Peter Williams (AB Agri), Joe Macdonald (Varicon Aqua Solutions), Bruce Jefferson (Cranfield University), Martin Tangney (Napier University).

For further information and to register for the event, go to <http://algalcommercialisation.eventbrite.co.uk/>

WASTE TO ENERGY CITY SUMMIT 2012

London Chamber of Commerce, London, 21st June 2012

With a focus on new opportunities in advanced conversion technologies for municipal and industrial waste, this one day networking event will bring together key stakeholders (including policy makers, city officials, technology developers, waste companies, utilities and landowners) to debate issues in the advanced waste to energy market. Attendance will enable the opportunity to:

- Network with leading infrastructure and private equity investors;
- Debate the political and financial challenges facing the waste to energy market today;
- Analyse and compare the market potential of advanced gasification and pyrolysis technologies;
- Question utilities and industrial consumers on their waste to energy strategies;
- Assess where the biggest growth markets will be and how you can access them;
- Meet potential clients, suppliers and joint venture partners.

Outcomes from this event will generate a roadmap for how and where the industry will grow over the next 5 years. Further details can be found at <http://wastetoenergy.rethinkevents.com/>

THE EUROPEAN BIOENERGY EXPO & CONFERENCE (EBEC 2012)

Stoneleigh Park, Warwickshire, 10th - 11th October 2012

EBEC is now in its 7th year and considered the UK's largest bioenergy expo and conference. The event is a leading annual event for the UK Bioenergy sector dedicated to biogas, biomass, biodiesel and energy from waste sectors. Attendees will have the opportunity to discuss and debate the business issues, legislative challenges and opportunities which really matter, now and into the future.

With a free conference, the 2012 event will also incorporate nextgen and be co-located with microgen. This results in a broad based renewable energy event ideal for assessing technology options, suppliers, learning and networking. Registration will open in July and further information about the event including nextgen and microgen is available at <http://ebec.nextgenexpo.co.uk/>

CALENDAR OF UPCOMING EVENTS

A further selection of forthcoming events relevant to the Energy Sector is given below. Please contact the Newsletter Editor if you would like to write a brief article about any meetings you attend.

12 - 14 June 2012. **Energy Storage Forum**, Hotel Quirinale, Rome, Italy. Topics on Energy Storage with Smart Grid, Government and Policy, Area Regulation, and the role of wind, solar and power electronics will be explored. Further details are available from <http://www.energystorageforum.com/>

4 - 5 July 2012. **UK AD & Biogas 2012 - AD: Your missing link**, NEC, Birmingham, UK. The Anaerobic Digestion and Biogas Association's (ADBA) third annual trade show and conference will demonstrate where anaerobic digestion can offer the best benefits to the farming sector. Website: www.adbiogas.co.uk

2 - 5 September 2012. **11th International Conference on Sustainable Energy Technologies (SET 2012)**, Delta Vancouver Airport Hotel, Vancouver, Canada. An international multi-disciplinary conference focusing on sustainable energy sources and technologies. Further details are at <http://www.setconference.org/>

10 - 12 September 2012. **9th European conference on Coal Research and its applications (ECCRIA 9)**, University of Nottingham, Nottingham, UK. Aimed at academia and industry who are carrying out research or are interested in the application of the research in industry Further details are at <http://9.eccria.org/ibis/eccria9/home>

17 - 18 September 2012. **SMi Group's 5th Annual Energy from Waste Conference**, Copthorne Tara Hotel, London, UK. This conference will focus on commercial opportunities and regulatory frameworks which govern and shape the development of this sector of industry. Website: <http://www.smi-online.co.uk/events/overview.asp?is=5&ref=4003>

24 - 28 September 2012. **27th European PV Solar Energy Conference & Exhibition (EU PVSEC)**, The International Fair, Frankfurt, Germany. Meeting of the European and world photovoltaic community to discuss and debate the 'hot' subjects around photovoltaic technology. Further details are available from <http://www.photovoltic-conference.com/>

24 - 28 September 2012. **Nuclear Plant Chemistry Conference (NPC 2012)**, Paris Tour Eiffel Novotel Convention Centre, Paris, France. There is a call for papers for this four day international conference in water chemistry of nuclear reactor systems. Website: <https://www.sfen.fr/NPC-2012>

FUNDING OPPORTUNITIES

SCOPING WORKSHOP: ENGINEERING AND PHYSICAL SCIENCES RESEARCH CHALLENGES IN GEOLOGICAL STORAGE FOR CCS

Crowne Plaza Hotel, NEC, Birmingham, UK, 10th July 2012

Expressions of interest are invited from eligible individuals to attend an EPSRC workshop that will focus on the research challenges around geological storage for carbon capture and storage. This one day workshop will bring academic, industrial and other stakeholder carbon capture and storage communities together to scope a call on tackling the challenges around geological storage and contribute to accelerating the deployment of CCS.

The outcomes from this workshop will lead to an open call with funding by EPSRC of up to £5M as part of the RCUK Energy Programme. Documents to support this scoping workshop and the Expression of Interest Form are available at <http://www.epsrc.ac.uk/funding/calls/open/Pages/geologicalstorageforccs.aspx> with a closing date of 7th June 2012.

FUTURE CONVENTIONAL POWER CONSORTIUM

Funding of £2M is available to support one multi-disciplinary research consortia in conventional power with the aim of reducing carbon emissions and increasing the flexibility, efficiency and sustainability of electricity generation from fossil fuels. Proposals are therefore invited, which must include matched funding from industry (both cash and in-kind).

The full call documents are available at <http://www.epsrc.ac.uk/funding/calls/open/Pages/fcprc.aspx>. For those interested in submitting a proposal for this call must register their interest by the 16th July 2012, with a closing date of 16th August 2012.

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If you would like to continue receiving a hard copy of the Energy Sector Newsletter, please contact the Newsletter Editor confirming your postal address.