

## ENERGY MANAGEMENT GROUP NEWSLETTER

### Focus on Renewables

#### Forthcoming events

**24-26 September 2003: Eighth Grove Fuel Cell Symposium** – Building Fuel Cell Industries Conference & Exhibition, London, UK (annual event, see [www.grofuelcell.com](http://www.grofuelcell.com) for details)

**21-23 October 2003: Sustainable Energy 2003**, Olympia, London, UK (annual event, see [www.sustainable-expo.info](http://www.sustainable-expo.info) for details)

**28-30 October 2003: BWEA 25** ([www.bwea.com/25](http://www.bwea.com/25))

**11 November 2003 – Sustainable Energy Solutions** – This one day seminar has been organised by the Energy Management Group and attendance is free to all group members. Please see the enclosed leaflet for further details. Speakers have been chosen to reflect the interests expressed in the members survey carried out earlier this year and we hope that as many of you as possible will attend.

The Energy Management Group's AGM will be held during the lunch-break of the seminar and further details can be found in the enclosed notification.

#### Energy Management Group Website

##### A guide by Simon Roberts

The regular series of EMG newsletters is now accompanied by a fully established web site. If you haven't already visited it, please take a look at <http://groups.iop.org/EG>

In common with many of the IoP subject groups, the site opens with the group's mission statement and a list of the main sections on the left. There, you can access full details of the committee members and meetings. All issues of the newsletter are archived and web links mentioned in the newsletters are added to the growing "Web links" section.

As our list of events increases, the "Presentations" section is becoming a treasure trove of speakers' materials, useful to both those who attended and those who couldn't. These materials can sometimes be PowerPoint files of many megabytes so take note of the sizes given for downloads if you are only using a slow link.

Do please visit the site and tell us what you think. As webmaster, I am keen to develop the site in ways that you find useful. Contact me at [simon.roberts@arup.com](mailto:simon.roberts@arup.com)

## Publications

**The Solar Economy by Hermann Scheer** (Earthscan, 2002, 347pp, ISBN 1853838357, £17.99)

### A review by Simon Roberts

"Sustainable energy" is very much in vogue to cover more than just renewable energy technologies. It is about reducing CO2 emissions to mitigate the increasingly dire effects of climate change, and can include the use of resources that will be depleted but not for a very long time.

"Sustainability" in its broader application, though, has a wider meaning. In simple terms it is often thought of as the "triple bottom lines" of social and environmental alongside the traditional financial considerations. Sustainable *development* is about considering and balancing these, almost orthogonal, concepts as best as possible within current circumstances, though striving to improve for the future.

As physicists and engineers in pursuit of our interests and projects, the *financial* bottom line can be frustrating but we're always aware that this is the "real world". Also we're increasingly taking on board *environmental* consequences, never more so than in the containment of radioactive waste from nuclear power. But the *social* bit? Isn't that for the politicians and society to decide and provide the leadership? (...well grounded on sound technical information, of course.)

Hermann Scheer's book isn't about sustainability as such but I suggest it offers a very powerful argument connecting energy technologies and sustainability from a different direction.

Scheer uses "solar" to cover not only electricity from photovoltaics and heating but hydro, wind and wave. He includes materials of plant origin, produced from sunlight via photosynthesis to emphasise their solar origin. (Tidal-based power generation systems depend on the moon's motion, not the sun, but I think Scheer would include these within his solar label.)

The title of his book, "The solar economy", puts all these solar resources at the heart of thinking and ultimately action. His message is very simple in essence: *locally or regionally produced solar energy, foodstuffs and solar resources should be consumed and marketed in preference to otherwise equivalent products.* (This is the sixth of seven propositions he puts forward.)

Lets consider some of the evidence Scheer presents. By 1999, Germany had installed around 3500 MW of wind turbine capacity and Denmark 1560 MW, whereas France had installed only 19 MW and Ireland 73 MW - although the Atlantic coastline endows France and Ireland with many more suitable sites.

The difference is not down to geography but to the favourable climate for wind turbine operators in Denmark and Germany provided by the "electricity feed-in laws" that guarantee grid access and minimum prices. As a German MP, Scheer was the architect behind getting this legislation through; a doer as well as a visionary. The point here is that the difference in wind turbine capacity owes more to politics and culture.

He critically examines the evolution and impact of our current energy companies. "Like a spider, the fossil resource industry has been spinning its web over more and more sectors of the economy. Each strand of this web is a supply chain, with crosslinks composed of other directly

connected industries." Out of the 50 largest European companies, 17 are in part or wholly conventional suppliers of energy and raw materials, or part of the chemicals industry.

Scheer develops his argument around the number of steps in the supply chains of various energy technologies, highlighting many hidden costs. "An examination of the entire supply chain for fossil fuel energy demonstrates that its claim to be more economical is a myth. In theory, renewable energy sources have an economic advantage because of their much shorter supply chains. This can be exploited if the atomic and fossil fuel energy suppliers are divested of their numerous state privileges."

The most sensitive question humanity faces is whether the global economy produces enough to go around. If our economy continues to be based on limited, polluting resources and ever more concentrated global business structures, then there will not be enough for all. Resource reserves are in truth the flashpoints for ever more conflicts. Scheer's seventh proposition is that, "Only a solar global economy can satisfy the material needs of all mankind and grant us the freedom to re-establish our social and democratic ideals."

Scheer enables us to think big and "sustainable", not in a fluffy way but one that will appeal to many physicist's: systemic thinking based on some fundamental physical concepts argued with a wealth of statistics.

Here are a couple of links on the web to give a taste.

- Effective use of renewable resources requires a radical rethink of the supply and distribution network - simply copying the established structure will not work. Many think that the "hydrogen economy" is what we need but Scheer argues against Jeremy Rifkin who supports this single-minded commitment; full transcript at [www.daimlerchrysler.com/environ/report2003/2\\_magazine\\_2\\_e.htm](http://www.daimlerchrysler.com/environ/report2003/2_magazine_2_e.htm)
- A short article by Scheer on "Moving From A Fossilized Economy To A Solar Economy" can be found at [dwij.org/forum/future\\_link/future3scheer](http://dwij.org/forum/future_link/future3scheer).

If you find these links interesting, maybe you'll be tempted to read "The solar economy" for the full story.

## **Renewables News Update**

### **North Hoyle Wind Farm**

The first of 30 wind turbines have been installed at the North Hoyle offshore wind farm, off the coast of Prestatyn in North Wales. The website can be accessed via <http://www.sparkdata.co.uk/refocus/frames.asp?docid=28396243&accnum=1> or the BWEA's website ([www.bwea.com](http://www.bwea.com)) and has further information and an excellent "Construction Diary", which shows photographs of the different stages of the construction programme.

### **Ireland's First Offshore Wind Farm**

Meanwhile construction work has started on Ireland's first offshore wind farm. More details can be found at <http://www.sparkdata.co.uk/refocus/frames.asp?docid=65159243&accnum=1>.

### **Wind Overseas**

And for those interested in wind energy or anyone who wants to find out more about what is going on internationally the following web sites may be useful:

Australian Wind Energy Association: [www.auswea.com.au](http://www.auswea.com.au)

Danish Wind Power Industry: [www.windpower.dk](http://www.windpower.dk)

American Wind Energy Association: [www.awea.org](http://www.awea.org)

**Biofuels**

Targets for the progressive introduction of biofuels - including fuels derived from waste products - have been agreed. The UK will have to announce the 2005 biofuel target by July 2004. Further details are available at:

[http://europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action.gettxt=gt](http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt)

<[http://europa.eu.int/rapid/start/cgi/guesten.ksh?p\\_action.gettxt=gt&doc=IP/03/665%7C0%7CRAPID&lg=EN](http://europa.eu.int/rapid/start/cgi/guesten.ksh?p_action.gettxt=gt&doc=IP/03/665%7C0%7CRAPID&lg=EN)> &doc=IP/03/665|0|RAPID&lg=EN; [check link]

**Power from wood**

Another topic that is being covered in the 11 November seminar is the potential for power generation in the UK from biomass. One novel process for utilisation of biomass with small industrial gas turbines has recently been reported in the technical press and is summarised below:

Bioturbines Ltd. are a company in the south of England who are working on the development of a system that allows the direct combustion of wood in a gas turbine to produce electricity and heat. The process potentially allows efficiency to be maximised because the wood combustion exhaust gases pass directly through the highly efficient gas turbine as the cycle working fluid. At the same time capital cost is minimised as the need for separate gasification and cleaning steps are removed, compared to, say, competing integrated gasification combined cycles. The difficulty, of course, is that gas produced from wood firing is notorious for causing fouling and erosion of gas turbine blades, due to the presence of components including vaporised alkali metals and ash particles. Bioturbines claim to avoid these problems by incorporating a very rapid heating stage, under which conditions the actual wood cell basically disintegrates, rupturing and scattering the cellulose fibres that compose the cell membrane. The result of this is that the fibres react very rapidly with the combustion air, so that the residence times normally required to obtain complete burnout of the char are not required. The combustion process is effectively more akin to that for a liquid fuel than solid material. In addition the ash particles (key to fouling and erosion) are scattered to smaller than usual particle sizes, which allows them to remain entrained in the gas flow and pass between the turbine blades without contacting the surface of the blades. The company has spent the last few years proving the principle of the technique at a 50 kWe scale and are now intending to scale up to 250 kWe. Eventually it is anticipated that plants up to 15 Mwe could be feasible by including multiple combustors within a single pod.

For a full report on the process see the July/August 2003 edition of ReFocus Magazine ([www.refocus.net](http://www.refocus.net)), which gives contacts for Dr David James and Dr Kenneth Hay at [Bioturbines@aol.com](mailto:Bioturbines@aol.com)

**Hydrogen**

Hydrogen is often cited as being the fuel of the future, without adequate thought being given to the fact that it is a fuel intermediary and the source of hydrogen is a vitally important consideration. This, of course, means that it is a complementary not competing solution to the exploitation of renewable energy sources and, indeed, there are mutual benefits in so far as the production of hydrogen can assist in alleviating some of the issues related to the unpredictability and need for storage of renewable based generation. The EMG seminar on 11 November hopes to give insights into this, with a presentation from one of the UK experts on hydrogen. But in the meantime anyone interested might want to investigate the following website:

[www.re-hydrogen.com](http://www.re-hydrogen.com)

**Renewables Obligation Buyout Fund Shortfall**

And finally there is concern over a potential shortfall of around £20M in the RO buyout fund. Energy giant, TXU, collapsed earlier this year, owing some £20M in RO buyout charges. While the company remains in administration it is not clear if or when this amount will be paid. If it remains unpaid by 1 October 2003 it could seriously impact on the value of ROC's, as this is the date when the buyout fund is recycled to green generators. It is estimated that concern over the

potential shortfall is depressing the average value of ROC's by about £4/MWh to about £47/MWh at present.

## **Energy Policy Update**

Energy policy is an area of interest identified by many people in our members' survey earlier this year. In light of this we are starting our November seminar with a presentation from Rob Wright, who is Director of the Department of Trade and Industry's Energy Strategy Unit, on current UK energy policy.

Also, the IoP produces regular policy updates on Physics, which generally have a substantial energy and climate change content. These can be viewed on the Institute's website at <http://policy.iop.org/Policy/HE/index.html>.

### **Renewables Obligation Consultation**

The government has launched a consultation on the Renewables Obligation, with responses due in by November 2003. A summary of the key changes being considered is given below:

One of the key changes is in relation to biomass cofiring. Essentially the period for which co-firing of biomass in existing fossil fuel fired stations would be eligible for ROC's is extended and the requirements for a fixed percentage of the biomass to originate from energy crops is delayed and introduced in a phased manner. To counter any effect that such changes might have on the tradeable value of ROC's in the system the percentage of a supplier's obligation that can be met by co-firing is reduced.

In order to attempt to stimulate the development of new projects, it is proposed that an unconnected third party may develop a project and qualify for ROC's at sites which previously held NFFO awards, but had never implemented the project.

It is desired to open up the ROC's market to smaller generators, who currently do not qualify because they fail to meet the minimum generating threshold. Methods of doing this are being considered and comments are invited. This is particularly significant for small renewable CHP schemes and photovoltaic systems.

Fossil fuel based stations that wish to convert completely (i.e. not cofiring) to biomass stations will no longer be required to refurbish.

Changes are being made to the qualifying criteria in the definition of advanced technologies (pyrolysis and gasification) for waste.

Other minor changes include clarification of the definition and use of calorific values for biomass plants and clarification of the status of electricity imported by a plant during periods when it is not generating.

### **Emissions trading**

The UK Government has issued a consultation on the new European Union Emissions Trading Scheme (ETS), which will come into effect in January 2005.

### **Practicalities of developing renewable energy**

This consultation is being undertaken by the House of Lords Science & Technology Committee, closing date 13 October 2003.

## Other Energy News

### Status of UK Generating Market

Around 7000MW of generating capacity(11%) has been taken out of service over the past two years as a result of a 40% drop in whole sale prices under the NETA pricing system.(Daily Telegraph and others). The security margin before privatisation was 25% it is now down to 16%! One consequence of NETA has been to force base load generators out of the market. This has led directly to the virtual collapse of British Energy with an effective take over of the nuclear stations by the government, and also it has led to the shut down of much coal fired plant. Overseas predators are now hovering over Drax with the possibility that its debts will be taken over by a foreign coal producer and brought into operation to serve as a captive market for imported coal! (N Issues)

### Economics

The Association of Swedish Engineering Industries' have launched a new web site that provides a range of useful information and tools related to the calculation of life cycle costs relevant to procurement work in the engineering industry. These are aimed at industrial management, purchasers, consultants, contractors and manufacturers and include sections detailing how to calculate the total life cycle cost, even providing a form that identifies each item to be considered and provides a space for the appropriate cost value.

Going a step beyond conventional life cycle analysis could involve assessing the value of cost of the external impacts of activities or projects. Extensive work was done on this during the 1990's, as part of an EC funded project and this is now being followed up with a programme financed under the Fifth Framework Programme called NewExt (New Elements for the Assessment of external Costs from Energy Technologies). It aims to refine the methodology used, provide more reliable information and add more components to the external cost evaluation procedure. The results will be available during 2004 and more information can be found on the web site [www.externe.info/](http://www.externe.info/).

### Russian influence in Europe's Power Generation Sector

Quotation from ASPO (Association for Peak Oil) in N Issues Aug 2003

"for the present she [Russia] seems ready to export her surplus to earn foreign exchange, but as she becomes more aware that she has her hand on Europe's light switch, given the increasing amount of electricity generated from natural gas, she may come to recognise that starving her industrial competitors of energy will give her domestic manufacturing base a decided advantage!"

### Hatfield Power Station

Plans have been approved for Britain's biggest coal producer to build a £350 million clean coal fired power station. Coal Power will build the 430 MW plant close to the Hatfield colliery in Yorkshire.

(Financial Times, 6 August 2003, page 3)

Clean coal technologies will be featured in the forthcoming EMG seminar in November.

**COMPANY SNAP SHOT: ARUP**

(contributed by Simon Roberts)

In 1946 - at the age of 51 - Ove Arup made a new beginning: he left the construction company he and his cousin had founded eight years previously and 'went it alone as a consulting engineer'. The firm he created pioneered many advanced and economical solutions for buildings as well as beginning the process of multi-disciplinary working by taking in specialist engineers with skills such as acoustics, manufacturing, transportation, and fire prevention.

With these roots as consulting engineers, Arup has now become a firm of designers in the broadest sense. From automobiles to infrastructure, structural engineering to communications consultancy, financial, and socially led engineering; its constantly evolving skill base reflects the diversity and dynamism of both clients and staff. Arup currently operates out of more than 70 offices in 32 countries and employs over 7,000 members of staff throughout the world.

Arup has a distinct culture and an enduring set of values that binds the firm together and is central to its vision.

As a part of Arup, Arup Energy provides multidisciplinary strategic consultancy to energy supplier and consumer clients across the fields of power generation, process industry, commercial and public sectors, including technical strategic advice to local and national Governments. The firm has gained a reputation for innovative design with a focus on energy and environmental conservation.

The main web site is [www.arup.com](http://www.arup.com) with the energy business handled by [www.arup.com/energy/](http://www.arup.com/energy/)

## Contacts

This newsletter is produced by the Energy Management Group of the Institute of Physics, a professional group comprising members with interests in all aspects of energy use, energy policy, power generation and energy technologies. Further information can be obtained from the following:

Group chair: Terri Jackson ([jackson@utvinternet.com](mailto:jackson@utvinternet.com))

Group honorary secretary: Patricia Thornley ([patricia.thornley@physics.org](mailto:patricia.thornley@physics.org))

Contributions to the newsletter from group members are always welcome. In particular if you would like your company or research institute to feature in the snapshot section, please draft a short description and send it by e-mail for inclusion. The deadline for contributions to the December newsletter will be end of November 2003 and all contributions should be sent to the Group Honorary Secretary at the e-mail address above.