



# COMINO FOUNDATION

## Newsletter - Developments in technology to address environment issues Issue 08/3 - July 2008

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The Comino Foundation is concerned to help address current issues regarding the environment. To address these issues the Foundation encourages people to modify their lifestyle but it is the Foundation's view that advances in technology will eventually provide the solutions. This newsletter seeks to highlight advances in environment technologies in the recent months that will have a part to play.

### [Moving towards central electricity generation with near zero green house gas emissions](#)

Worldwide electricity generation generates 40% of green house gas emissions with worldwide demand for electricity increasing at 3% per annum. The technology already exists to near eliminate these emissions by 2050 although it is likely that emissions from central electricity generation will increase before 2020 before progressively falling thereafter. This section of the newsletter highlights current developments in moving towards electricity generation with near zero green house gas emissions.

### [Yorkshire plan to lead the way in carbon capture and storage](#)

<http://www.forumforthefuture.org.uk/greenfutures/articles/consigningcarbontocaptivity>

[http://www.yorkshire-](http://www.yorkshire-forward.com/asset_store/document/carboncapturebros8_4_14410.pdf)

[forward.com/asset\\_store/document/carboncapturebros8\\_4\\_14410.pdf](http://www.yorkshire-forward.com/asset_store/document/carboncapturebros8_4_14410.pdf)

Yorkshire Forward, partners in the area and the Carbon Capture and Storage Association are looking to take the lead in developing the infrastructure to transport and store carbon dioxide. There are a number of coal fired power stations in Yorkshire and Powerfuel are building a carbon dioxide capture ready 900MW power station which will be on stream in 2013 and take away 15million tonnes of carbon dioxide a year.

The key to the initiative is a review of existing pipelines in the area that connect, or could connect to the depleted gas fields off the UK's East coast. It is the first initiative in the UK, and possibly the world, to consider how carbon dioxide transport and storage can be co-ordinated and developed to store industrial carbon dioxide emissions from an entire region.

### [A better way to capture carbon](#)

<http://www.technologyreview.com/Energy/20295/>

New materials provide a potentially cheaper way to reduce carbon dioxide emissions from power plants.

Researchers have developed porous materials that can soak up 80 times their volume of carbon dioxide, offering the tantalizing possibility that the greenhouse gas could be cheaply scrubbed from power-plant chimneys. After the carbon dioxide has been absorbed by the new materials, it could be released through pressure changes, compressed, and, finally, pumped underground for long-term storage. The new materials do not absorb other gases.

These materials appear to compare favorably with other experimental materials that absorb carbon dioxide that are being developed to help bring down these costs. The materials could lower costs considerably since they use less energy, although exactly how much will require testing the materials at power plants.

The new materials absorb carbon dioxide because they're extremely porous, which gives them a high surface area that can come into contact with carbon dioxide molecules. The most porous of the materials reportedly contain nearly 2,000 square meters of surface area packed into one gram of material. One litre of one of these materials could store all of the molecules of carbon dioxide that, at zero °C and at ambient pressure, would take up a volume of 82.6 liters.

The next step for the materials is commercialisation which could take two to three years. The materials should be able to be made in large quantities, since they are similar to other materials that have been developed by BASF, the chemical company.

### **Key points regarding the Severn Barrage Appraisal**

**(<http://www.reuk.co.uk/Severn-Barrage-Tidal-Power.htm>) – for general information and links to other barrages**

On the 22<sup>nd</sup> July 2008 at the Royal Academy of Engineering there was a review of the issues associated with the Government's appraisal of the Severn Barrage proposal. The following points became evident:

- ◆ the potential electricity generating capacity would be over 8GW or twice the capacity of Drax Power Station which generates 4GW. It would supply approximately 5% of the UK's electricity needs as at 2008;
- ◆ there are environmental concerns regarding loss of mudflats for wading birds but other estuaries accommodate far high bird populations;
- ◆ a barrage would reduce flood risk in the part of the estuary above the barrage;
- ◆ the construction challenge is formidable. It would be the largest construction project in the UK, would employ 45,000 people during construction, would consume huge amounts of cement and aggregate and would compete with the building of other new power plants, particularly nuclear;
- ◆ the current projected cost is c.£23billion which is 3 times the cost of coal plants with CCS. The barrage, however, would have a lifespan of over 100 years compared with 30/ 40 years for other types of power plant, e.g. nuclear;
- ◆ UK power generating companies would probably find it impossible to finance the Severn Barrage scheme, independently. Some form of Public Private Partnership is, probably, the only potential financing route;
- ◆ Greenpeace state that they are neutral about the project but consider that any Government funding could be allocated to better use on other power renewable projects;
- ◆ the Government is due to determine first stage feasibility towards the end of 2008. If this is possible detailed feasibility will take until 2010.

### **World's first commercial scale tidal generator goes live**

**([http://www.marineturbines.com/3/news/article/9/seagen\\_completed\\_worlds\\_first\\_megawatt\\_scale\\_tidal\\_turbine\\_installed/](http://www.marineturbines.com/3/news/article/9/seagen_completed_worlds_first_megawatt_scale_tidal_turbine_installed/))**

Bristol based company Marine Current Turbines has completed the first installation phase of the 1.2MW SeaGen Tidal System at Northern Ireland's Strangford Lough - a site chosen for its combination of fast tidal current and ability to provide shelter from bad weather which may hinder the construction process. It is expected that the power plant will be operational around mid 2008 with its massive 16m diameter twin rotors harnessing the tides to produce the equivalent amount of energy it takes to power 1000 homes.

SeaGen will enter commercial operation after a commissioning phase of around 12 weeks and supply electricity to the local grid. The company sees enormous potential in the technology and hope it will eventually make a significant contribution to the future energy needs of the British Isles, Ireland and beyond.

### **Rapid expansion of US solar power**

**([http://www.forumforthefuture.org.uk/greenfutures/articles/sun\\_rises\\_on\\_US\\_energy\\_scene](http://www.forumforthefuture.org.uk/greenfutures/articles/sun_rises_on_US_energy_scene))**

After a record year of growth in 2007, putting over \$2 billion into the economy, the solar manufacturing sector – manufacturers and distributors of photovoltaic cells, concentrated solar power and solar heating technology - is projecting that revenues will again more than double in 2008.

The Solar Energy Industries Association advises that Wall Street is investing billions of dollars in solar energy companies. An SEIA survey of its members reveals that there are 80 major projects in the planning stages that, if built, would represent about 56,000MW of renewable power and 20,000 permanent jobs.

There is one major caveat to this rosy outlook. A federal subsidy, which covers 30% of the cost to solar manufacturers of building plants, expires at the end of 2008 and has not yet been renewed by Congress. If the solar investment tax credit is allowed to lapse, after only three years in existence, companies may see a substantial loss of jobs and reduced revenue growth.

### **Developing microgeneration at the local level**

There is 10,000 times more sunlight than we need to meet the world's energy requirements. The technology to collect and deploy solar energy it is about to advance exponentially in a similar way to the development of silicon chips for computers. It is possible that 50% of domestic and commercial buildings, worldwide, could be generating their own energy from solar panels by 2050.

There is already an exponential progression in the use of solar energy. Installations are doubling every two years. This section of the newsletter highlights current technology developments in microgeneration and, in particular, solar panel manufacture and deployment which is an important aspect of moving towards electricity generation with zero green house gas emissions.

### **Microgeneration reaches remote areas of the world**

**(<http://www.forumforthefuture.org.uk/greenfutures/articles/energyforchange>)**

High in an upland pasture, 14,000 feet above sea level in China's Qinghai province, a Tibetan herdsman lashes a small solar panel to his tent. For the first time, he and his family have electricity. Its clean, clear light outshines their dim, smoky butter lamps. There's power for a radio-cassette too, and a charger for a mobile phone. Their solar system is one of 360,000 installed as a result of the work of the Renewable Energy Development Project, which has helped Chinese companies sell a whole range of systems at prices which are affordable for local people in remote areas. Many of these are members of China's minorities, mostly Tibetans and Mongolians.

In a narrow, wooded valley in Brazil's deep south, an engineer opens a valve and sets free a cascade of water. It surges into the blades of a turbine and sends them spinning, generating electricity which is fed into local farms and villages. It's unobtrusive, 'run-of-the-river' hydro power – far preferable to the huge dams which have blighted Brazil

**IBM links with Japanese firm to improve thin film PV efficiency**  
**(<http://business.smh.com.au/ibm-in-solar-power-venture-20080616-2rd0.html>)**

IBM has joined forces with semiconductor process company Tokyo Ohka Kogyo to develop more efficient solar power technologies to improve efficiency and cut the cost of electricity for thin film PV solar panels. The partnership is seeking to create techniques that double the efficiency of thin-film solar modules. The companies do not plan to enter the solar module production business, but hope to licence their technology to producers in the next two to three years

The focus will be on developing new methods for printing copper-indium-gallium-selenide (CIGS) cells that can turn more than 15% of sunlight into power - a significant improvement on the 6%-12% efficiency that current solar CIGS makers have achieved. Currently, an estimated 90% of photovoltaic solar equipment uses silicon to turn sunlight into electricity. That technology is more efficient than CIGS, often converting more than 20% of sunlight into power, but with far more material is costly. The ultimate goal is to create a process for making the cells that achieve "grid parity" the level at which solar power is competitive with electricity from the grid.

**Abu Dhabi firm makes £2bn investment in thin film PV manufacturing**  
**(<http://www.businessgreen.com/business-green/news/2217858/abu-dhabi-pumps-2bn-thin-film>)**

Masdar PV, the solar photovoltaic arm of the Abu Dhabi government-backed Masdar clean tech initiative, has announced it is to invest \$2bn in building up manufacturing capacity for thin film photovoltaic modules.

Under the programme, the company will initially invest \$600m in building two manufacturing facilities, one in Germany and a second in Abu Dhabi, designed to deliver a combined annual production capacity of 210MW of solar panels. It will then aim to scale up capacity and open additional plants, with a view to reaching one gigawatt of annual production by 2014.

The company said that the new thin film manufacturing plants would play a major role in bringing down the cost of solar energy to a level where it is competitive with grid power. The panels manufactured would only use 1% of the materials used in conventional crystalline PV cells.

**Sharp pledges massive increase in thin film solar cell production**  
**(<http://www.businessgreen.com/business-green/news/2204867/sharp-pledges-massive-increase>)**

Japanese electronics company Sharp has underlined its commitment to the solar panel market by announcing increased production at its main thin-film solar cell plant by more than 10-fold and unveiling plans for a new solar panel manufacturing facility by increasing capacity at its existing thin film solar cell manufacturing plant in Katsuragi from its current level of 15MW to 160MW per year by October 2008.

The announcement came as Sharp commenced building its new "manufacturing complex for the 21st Century" in Sakai City, which will include a new solar cell plant that the company claims will be capable of producing 1,000MW of thin-film solar cell capacity a year when it opens in 2010.

The company said its investment in new solar cell capacity was in response to growing demand from Europe. Sharp has invested heavily in thin-film solar cells, which are fabricated by depositing thin layers of silicon on a glass substrate, and is confident the technology has many advantages over conventional crystalline solar cells.

## **Reducing green house gas emissions from transport**

25% of green house gas emissions come from transport and it is important that the internal combustion engine is replaced with a form of energy that is free of emissions. This section of the newsletter highlights current developments in moving towards transport that is powered with zero, or near zero, green house gas emissions.

### **US car manufacturers change course**

**([http://www.forumforthefuture.org.uk/greenfutures/articles/american\\_eye\\_69](http://www.forumforthefuture.org.uk/greenfutures/articles/american_eye_69))**

US auto manufacturers are now moving away from climate-killing gas guzzlers and towards fuel efficient vehicles. For the past two years, US consumers have been progressively abandoning people carriers, leading the media to dub the SUV an "endangered species". There are plummeting sales of both sport utility vehicles (down by 38%) and small pick up trucks (down 20%). Ford, General Motors and Chrysler all apparently acknowledge that the writing is on the wall.

Ford's chief executive Alan Mulally announced that Ford was cutting overall production by 15% for the rest of this year; the company will manufacture fewer SUVs and more compact vehicles such as the Focus, Fusion and Edge. GM is also cutting production and jobs.

Ford, GM and Chrysler are now openly engaged in a race to produce the most customer-friendly range of fuel efficient vehicles. All are designing a variety of hybrid-engine cars, SUVs and light trucks, as well as plug-in electric vehicles and models equipped with advanced gasoline and diesel engines. GM, for example, is developing a method of applying the compression-ignition efficiency of diesel engineering to petrol engines, which will cut their fuel consumption by 15%.

### **Developing cars that recycle carbon dioxide**

**(<http://www.grouplotus.com/mediacentre/index.html>) - see the item dated 1-3-08 titled Lotus researches cars running on carbon dioxide**

Lotus Engineering announced its latest development towards carbon neutral road transport at the 78th Geneva International Motor Show. The Lotus Exige 270E Tri-fuel is the most powerful road version yet of the Exige (0-60 mph in 3.88 seconds, a top speed of 158 mph and 270 hp at 8000 rpm). It runs on any mixture of gasoline, bioethanol and methanol. Emerging technologies will allow alcohol fuels such as methanol, already a proven internal combustion fuel, to be made synthetically from carbon dioxide.

An alcohol-based fuel derived from atmospheric carbon dioxide would allow society to transfer relatively easily to sustainable, carbon-neutral internal combustion, which would allow a progressive change from the internal combustion engine to other forms of power for cars. Lotus Engineering is researching the use of sustainable synthetic alcohols as potential future fuels, with technology available from Lotus for introduction in four to five years. However, the supply infrastructure investment from governments and fuel companies could take 15 to 20 years.

Methanol can be produced synthetically from carbon dioxide and hydrogen. The carbon dioxide could be produced from the atmosphere or from extraction from coal. Whilst cars running on synthetic methanol would still produce carbon dioxide on combustion they would be environmentally neutral since the carbon dioxide is essentially recycled. As well as being green, the great benefit of synthetic methanol is that it would use similar engines and fuel systems to those in current cars; and synthetic methanol can be stored, transported and retailed in much the same way as today's liquid fuels such as gasoline and diesel.

### **The electric car may come of age in 2008**

**(<http://www.petrolprices.com/blog/-the-year-of-the-electric-car-90.html>)**

Advances in battery technology and the need for car manufacturers to develop technology to replace the internal combustion engine are bringing a number of new electric vehicles to market. 2008 could well be the year when the electric car starts to become a real alternative and one that starts to address climate change issues associated with transport.

### **The first high performance, practical electric car**

**([http://www.autoindustry.co.uk/news/31-07-06\\_9](http://www.autoindustry.co.uk/news/31-07-06_9))**

Tesla Motors opened its first dealership in Santa Monica, California, in May 2008. The next dealership will open in San Carlos within a couple months to appeal to the Silicon Valley tech elite. The company is impressed with demand as it has taken 600 orders for the initial sports car and has a waiting list of another 400. The 650 being produced in 2008 are all sold even though the current price is around \$100,000. This new high performance electric-hybrid car, which uses the new generation lithium-ion batteries, has a range of 220 miles and can go from 0 to 60 mph in less than 4 seconds. Lotus Cars in the UK make the body and may assemble in the UK.

The company plans to make a luxury saloon car next year called the Whitestar which will come in two versions: an all-electric model that will run entirely on its lithium-ion battery pack, and a range-extended vehicle that will also use liquid fuel to extend its range. This car will have a range of 220 miles per charge and the mileage equivalent of 135 miles per gallon.

Tesla lays claim to putting all-electric cars back on the map, with its high performance sports car. But it certainly won't be alone for long. General Motors, Renault, Nissan and Audi are all at advanced stages of development plus some new start-up companies.

### **Converting conventional cars to hydrogen**

**(<http://www.hydrogencarsnow.com/blog2/index.php/hydrogen-production/itm-power-and-roush-put-uk-on-fast-track-to-hydrogen/>)**

British firms, ITM Power and Roush Technologies have signed an agreement to develop a market in converting traditional cars to hydrogen power. Roush, an automotive technology, engineering and development firm will be responsible for adapting current internal combustion engines to run on hydrogen. ITM Power is in the process of using breakthrough technology to build home hydrogen fueling stations so that consumers can refuel their cars in the comfort of their own garages. ITM Power is building a special facility for the production of these home refueling stations in Sheffield for marketing in 2008.

The ITM Power fueling station uses an electrolyzer to convert water to hydrogen. The electrolysis unit uses power from the grid or electricity supplied by renewable sources such as wind, solar, ocean power, or geothermal to create hydrogen. If the grid is used, then hydrogen can be created during off-peak hours to minimize costs.

While Honda, GM, General Electric and a few other companies have been in development of home hydrogen fueling stations, it looks like ITM Power will be the first in the world to offer a commercial unit to consumers.

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