



COMINO FOUNDATION

Newsletter - Developments in technology to address environment issues Issue 08/5 - November 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.

Developments in understanding climate change

The scientific principles which underpin climate change are not understood to the levels that are necessary to predict the impact of high carbon dioxide levels on the future climate, temperature and topography of the world. This section of the newsletter highlights current developments in these scientific principles.

President Obama elect promises a long list of measures to address global warming and climate change

(<http://www.thenewamerican.com/usnews/election/547>)

President Obama elect has set out a long list of measures to address carbon emissions from electricity generation and transportation. The thrust of his proposals are to create 2½ million jobs in 'green' infrastructure projects, acceleration in changing the technology of cars to plug-in hybrids and in introducing clean coal technology for electricity plants. He seeks to remove dependence on oil from the Middle East in 10 years.

Obama presidency will bring a global carbon market closer

(<http://www.businessgreen.com/business-green/news/2229805/global-carbon-market-moves>)

The US president-elect is expected to begin work on developing a cap-and-trade market modelled on the existing EU scheme that would aim to cut emissions to 1990 levels by 2020 and then deliver deep reductions of 80 per cent by 2050. The introduction of a US-wide carbon cap-and-trade scheme is likely to bring a major boost to both the size and liquidity of the global carbon market. The US scheme is likely to be linked to the EU market and similar proposed schemes in countries such as Australia and Japan. This would raise the prospect of carbon credits being traded round the clock in formal cap-and-trade schemes and laying the foundation for a genuinely global market.

2 week international conference to negotiate successor to Kyoto plan

(<http://www.google.com/hostednews/afp/article/ALeqM5h2PO2N5L8VgHmXUVq39BqC-xPhDg>)

(<http://www.reuters.com/article/vcCandidateFeed2/idUSTRE4AQ42320081127>)

The 14th Conference of the Parties to the United Nations Framework Convention on Climate Change is being held in Poznan, Poland 1st to 12th December 2008. 9,000 participants from more than 190 countries met to work out the details of a climate change accord to succeed the Kyoto Protocol that expires in 2012. Senior delegates recognised that the world financial crisis will throw a shadow over the negotiations. An emphasis on the new climate regime being self-financing is expected.

UK Climate Change Act requires 80% cut in emissions by 2050

(http://www.opsi.gov.uk/acts/acts2008/ukpga_20080027_en_1)

The 2008 Climate Change Act now sets out that the UK will achieve an 80% cut in greenhouse gas emissions from 1990 by 2050. It also sets out the terms for budget arrangements, the arrangements and responsibilities for the Climate Change Committee, acceptable arrangements for carbon trading schemes, arrangements for waste reduction programmes and regulations about company reporting requirements.

UK Climate Change Committee issues its first report

(<http://www.theccc.org.uk/reports/>)

(<http://www.guardian.co.uk/environment/2008/dec/01/climatechange-carbonemissions1>)

(<http://www.independent.co.uk/environment/climate-change/12-years-to-halve-uk-co2-1047092.html>)

The UK's Climate Change Committee's first report set carbon budgets for 2008-2012, 2013-2017 and 2018-2022. These budgets seek to reduce greenhouse gas emissions by at least 34% of 1990 levels by 2020. To build a low carbon economy the report emphasises the need to move to cleaner ways of generating electricity and heat, to use energy more efficiently, to reduce transport emissions by moving to electric cars, biofuels and the use of more public transport.

The economic recession slightly reduces investment in clean technology

(http://www.economist.com/research/articlesbysubject/displaystory.cfm?subjectid=348924&story_id=12562281)

Some large utilities are deferring their investment in alternative energy technology but in general total investment in clean energy is only expected to reduce slightly in 2008. Clean-tech firms with strong business models are still able, apparently, to still raise capital and manufacturers of wind turbines have long order books.

Rapid and significant warming in both Polar Regions

(<http://www.telegraph.co.uk/earth/main.jhtml?xml=/earth/2008/10/30/epolar130.xml>)

(<http://www.nature.com/news/2008/081030/full/news.2008.1195.html>)

New research findings state that rapid and significant warming in both the Antarctic and Arctic cannot be explained away by natural climate fluctuations and can only have been caused by human influence. Scientists believe that there is now conclusive proof that global warming is due to man's influence mainly through greenhouse gases and ozone depletion. Scientists looked at average temperatures recorded at 70 different stations in the Antarctic over the past 50 years and then compared them with four different climate models. In the Arctic they were able to look back over 100 years of average temperatures from 80 stations. The results, published online in Nature Geoscience, reveal human influence is the cause of significant warming over both Polar regions since 2000.

A form of rock near the Earth's surface could store carbon dioxide

(http://www.economist.com/science/displaystory.cfm?story_id=12592256)

Peridotite is one of the main rocks in the upper mantle of the Earth. It occurs some 20km or more down, although in some areas plate tectonics have forced up some of the mantle, for example peridotite reaches the surface in part of the Omani desert.

Scientists have shown that the Omani peridotite absorbs tens of thousands of tonnes of carbon dioxide a year, far more than anyone had thought. By drilling and fracturing the rock they believe they can start a process to increase the absorption rate by 100,000 times or more. These scientists estimate that the Omani outcrop, which extends down some 5km, could absorb some 4 billion tonnes of carbon dioxide a year from the atmosphere, which is a substantial proportion of the annual 30 billion or so tonnes of the gas that humans send into the atmosphere, mostly by burning fossil fuels. Peridotite is not the only rock that absorbs carbon dioxide. Scientists are currently exploring the potential of volcanic basalt.

Virgin Galactic space planes to gather data on climate change

(<http://www.guardian.co.uk/environment/2008/sep/30/climatechange.scienceofclimatechange>)

Virgin Galactic, the space tourism company, is to use its space planes to gather scientific data on climate change from the highest reaches of the atmosphere under a new collaboration with an American government laboratory. Instruments and sensors will be added to the company's high altitude plane, White Knight Two, and the smaller rocket-propelled SpaceShipTwo, as part of a climate change research project planned by the US National Oceanic and Atmospheric Administration (NOAA) in Colorado.

The researchers will use Virgin Galactic test flights, and subsequent commercial launches, to collect air samples from high up in the atmosphere, which will be analysed for greenhouse gases such as carbon dioxide, methane and other constituents.

World Wildlife '2008 Living Planet Report'

(http://www.wwf.org.uk/research_centre/index.cfm?uNewsID=2309)

The 2008 edition of the WWF Living Planet Report reveals a planet in environmental crisis. Only urgent action to curb our rampant consumption can prevent ecological recession sliding into irreversible breakdown. Demand for resources now exceeds the planet's capacity to replenish its 'natural capital' by about 30%. If global consumption continues at the same rate, by the mid-2030s we will need the equivalent of two planets to maintain our lifestyles.

In addition, the new report shows that populations of nearly 1,700 species of mammals, birds, reptiles, amphibians and fish have declined on average by nearly 30% since 1970. The situation is particularly bleak in tropical regions, where the average fall is 51%.

This report adds weight to the conclusions of the [cebr report](#), which was funded by the Comino Foundation, and which showed that switching lifestyles from purchasing goods to purchasing services would significantly reduce carbon emissions.

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.

UK wave power project goes live in Portugal

(<http://www.businessgreen.com/business-green/news/2226943/uk-tech-behind-portuguese-wave>)

Located three miles off the Portuguese coast, the Aguçadoura project has just gone live with three energy converters from Edinburgh-based Pelamis Wave Power. The backers claim this is the world's first commercial wave power project. However, this may be disputed by the developers of the Limpet 500 scheme on the island of Islay in Scotland, which went into production in November 2000.

The Pelamis wave converters consist of a series of semi-submerged hinged cylindrical sections. A further 25 devices are planned for the second phase of the project, which should bring the installed capacity to around 21MW.

Tidal electricity trial projects moving forward

(<http://www.environmental-expert.com/resultEachPressRelease.aspx?cid=31183&codi=37782&idproducttype=8&level=0>)

(http://newenergyfocus.com/do/ecco.py/view_item?listid=1&listcatid=32&istitemid=1729§ion=Hydro%20%26%20Marine)

ScottishPower Renewables is evaluating three separate coastal sites for the development of the world's largest tidal stream projects. Two of the sites are being planned in Scotland, in the Pentland Firth and the Sound of Islay, with the third off the North Antrim coast in Northern Ireland. This has been made possible by the successful trial of the world's most advanced tidal turbine – Lånstrøm which has been developed by Hammerfest Strøm AS, a company jointly owned by ScottishPower Renewables, StatoilHydro and Hammerfest Energi.

Each site is being evaluated with a view of installing between 5 and 20 tidal turbines. With each turbine having an installed capacity of 1MW, this could lead to a combined output of 60MW – enough energy for over 40,000 homes. Following planning approval, the projects could be operational by 2011. In addition the hydrofoil device from tidal power technology developer, Pulse Tidal of Sheffield, will be operational in the Humber Estuary during November. Piles are already installed for the main structure of the system which put in place early October in water depths of about five metres. The Pulse Tidal system is designed to generate power from tidal currents in shallower waters than tidal systems that use rotors to drive turbines. It uses two 12 metre long hydrofoils - which are like large underwater aeroplane wings that rise and fall in a tidal current to generate power

China launches the world's first magnetic levitation wind turbine

(http://www.treehugger.com/files/2006/07/china_unveils_w.php)

Chinese developers unveiled the world's first permanent magnetic levitation wind power generator at the Wind Power Asia Exhibition 2006 in Beijing. The device is called a MagLev generator, and is being regarded as a new dimension in the evolution of global wind power technology. The generator was jointly developed by Guangzhou Energy Research Institute under China's Academy of Sciences.

The MagLev generator is expected to boost wind energy generating capacity by as much as 20 percent over traditional wind turbines and lowers operational expenses of wind farms by as much as 50 per cent. The MagLev is able to utilize winds with starting speeds as low as 1.5 meters per second (m/s), and cut-in speeds of 3 m/s which means that the technology could potentially fill the power void in locations with no connection to the grid by harnessing low-speed wind resources that were previously untappable. In addition, the Maglev generator will be able to provide roadside lighting along highways by utilizing the airflow generated from vehicles passing by.

New turbine design could improve wind power efficiency and lower cost

(<http://www.technologyreview.com/energy/21737/?a=f>)

FloDesign Wind Turbine, a spin-off from the aerospace company FloDesign based in Wilbraham, Massachusetts, has developed a wind turbine that could generate electricity at half the cost of conventional turbines. The company recently raised \$6 million in its first round of venture financing and has announced partnerships with wind-farm developers.

The company's design, which draws on technology developed for jet engines, circumvents a fundamental limit to conventional wind turbines. Typically, as wind approaches a turbine, almost half of the air is forced around the blades rather than through them, and the energy in that deflected wind is lost. At best, traditional wind turbines capture only 59.3 percent of the energy in wind.

Increased UK Government support for Anaerobic Digestion

(<http://www.businessgreen.com/business-green/news/2221876/ministers-signal-support>)

The UK Government plans to increase the UK's use of anaerobic digestion (AD) technologies which is capable of generating energy, biogas and fertilizer from organic waste streams such as food and agricultural manure.

The technology is relatively widely used in the water treatment industry where it is used to treat sewage, but experts insist that it could also have numerous applications across the agricultural and food waste sectors. A recent study from property consultants Bidwells on renewable energy in the farming industry found that there was a strong case for installing anaerobic digestors at packing houses, where they could be fuelled by either waste food or slurry from local farms.

There are, however, technical and commercial barriers, currently, in adopting the technology. The best way to manage mixed waste streams to secure a consistent gas yield has yet to be developed and access to funding for large scale AD systems, which cost upwards of £1.5m, could be an issue for some firms interested in the technology.

The UK Government has stated that it is committed to tackling these barriers and intends to invest £10m in supporting a number of demonstration projects.

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.

A silicon coating could boost the efficiency of solar cells

(<http://www.technologyreview.com/energy/21655/?a=f>)

Silicon solar cells reflect about a third of the light that they could potentially convert into electricity. A new nanostructured coating developed by researchers at Rensselaer Polytechnic Institute, in Troy, New York, cuts these reflections to only 4 percent. Applied-physics professor Shawn-Yu Lin and his colleagues calculate that the coating could boost a silicon solar cell's efficiency to convert light into electricity by nearly 43 percent.

The new coating provides antireflection for sunlight coming in at nearly all angles and all sunlight wavelengths, Lin says. It's a 700-nanometer-thick structure of different material layers that the researchers grow on a silicon wafer. The multilayered coating reduces the reflection of visible and near-infrared wavelengths that silicon can convert into electricity.

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.

Can the world cope with 3 billion cars?

(http://www.economist.com/specialreports/displaystory.cfm?story_id=12544947)

A reasonable forecast for the number of cars in the world by 2050 is 3 billion. This likely expansion of the world car fleet will bring major problems of infrastructure such as roads in India, air pollution in large cities and increased greenhouse gas emissions. Both developed and developing countries are beginning to address these issues but politics is not always helping their resolution.

Britain's cars may go electric by 2025

(<http://www.timesonline.co.uk/tol/news/uk/science/article5258472.ece>)

The UK government's Committee on Climate Change tomorrow were realised has warned that motorists must get rid of their dependence on the internal combustion engine and switch in large numbers to vehicles powered by electricity, hydrogen and other low or zero-emission fuels if the UK is to meet its targets for emissions.

UK Government supports research into algae based biofuels

(<http://www.businessgreen.com/business-green/news/2228981/government-fund-world-largest>)

The UK Government will make more than £6m available to companies seeking to bring second generation algae based biofuels to market. Algae is developed in ponds and lagoons as against land where biofuel production competes with food production. Algae biofuel production is ten times more productive per hectare than land based biofuel production. The UK Government estimates that algae based biofuels could replace 70 billion litres of fossil derived fuels used worldwide in road transport and aviation by 2030.

The initial phase will fund research into selection of suitable algae strains, maximising oil content and biomass yield, maximising solar conversion efficiency, sustained algae cultivation and design and engineering of mass culture systems. The second phase will fund the construction of an open pond test and demonstration plant for five years, most likely overseas as sub-tropical climates are more conducive to growth.

In partnership with HRBiopetroleum, Shell are developing an algae demonstration project in Hawaii (see <http://www.telegraph.co.uk/finance/markets/2821085/Shell-plans-to-produce-fuel-from-algae.html>)

D1 Oils expects to increase yields from jatropha by 60%

(<http://www.businessgreen.com/business-green/news/2227365/selective-breeding-promises>)

D1 Oils, the UK based company, producing jatropha oil for biodiesel expects to increase yields from jatropha plants by 60% in the near future and possibly 250% within five years.

In partnership with BP the company is expanding the marginal land used in developing countries to 300,000 hectares before the end of 2008 and is delivering jatropha oil at a price of \$900 per tonne compared with \$1,200 per tonne for oil from soya or rape seed. With this price advantage D1 Oils is looking to expand supply aggressively over the next few years.

Other issues in reducing green house gas emissions

In addition to reducing greenhouse gas emissions by switching to energy sources that have no emissions there are other sources of greenhouse gases that mankind needs to address. De-forestation, melting permafrost and emissions from agriculture and livestock being the main issues which are addressed in this section.

