RUSHLIGHT AWARDS

2008 WINNERS & COMMENDED ENTRIES

Air Products plc (www.airproducts.com)**, Imperial College London** (www3.imperial.ac.uk) **and Doosan Babcock Energy Ltd** (www.doosanbabcock.com) for their process which removes mercury, sulphur dioxide and nitrogen oxides byproducts of the combustion phase during the compression phase of oxyfuel combustion and captures CO2 for coal-fired power plants. This provides a cheaper and more direct way of addressing these contaminants than the removal technologies for air-fired combustion. (Winner)

Ampair (www.ampair.com) for the Ampair 6000, a 5.5m diameter Class 1 wind turbine that is suitable for grid connection or battery charging with a rated power of 6KW. It is a horizontal axis 3-bladed wind turbine of downwind layout with passive yaw control and a direct drive permanent magnet alternator. It has cold weather protection, reduced noise output and is marine grade, allowing installation anywhere in the world. (Winner)

AM Technology (www.amtechuk.com) High value chemicals have traditionally been manufactured in batch reactors. AM Technology have developed a new chemical reactor which allows manufacturers to evaluate large scale processes at low throughputs and make process development simpler and cheaper. The agitated cell reactor has 10 stirred stages within a single module, obviating the need for inter stage pipes, uses loose agitator inserts, vibrates as whole and can be upturned to empty. The process cuts out significant waste coming from the chemical development phase for manufacturers. (Winner)

Artemis Intelligent Power (www.artemisip.com) for their new hybrid vehicle technology, the Digital Displacement Hydraulic Hybrid. A retrofit of the system on a manual gearbox saloon produces a 50% reduction in fuel consumption on an urban cycle and is much cheaper than electric solutions. The combination of an ultra-efficient radial piston design, electronically controlled poppet valves and synchronized computer control avoids the typical high frequency whine of traditional hydraulics. The Judges said: "This entry incorporates fundamental advances in hydraulics with an innovative application in hybrid transmission. The potential of fuel savings of up to 50% in urban driving conditions means there is great scope for widespread applications." (Winner)

Atmos Technologies (www. atmos-technologies.com) for their completely new method of producing photovoltaic power generating devices which can produce electricity at less than one tenth of the cost of existing silicon-based solar cells but at the same efficiency, without requiring a clean room or toxic ingredients. It is based on flame spraying or thermal deposition of semi-conductive transition metal oxides. Devices as large as 2 metres square can be made with this process. (Commended)

Connaught Engineering (www.connaughtengineering.com) for their HYBRID+ system, comprising an electric motor which is retrofitted to the vehicle drive line via a constantly variable transmission. During deceleration or braking, this motor performs like a dynamo and generates electricity which is then stored in supercapacitors which in turn can assist the vehicle engine when required, creating a fuel/ electric hybrid vehicle. The judges said: "Connaught Engineering has developed a means of hybridising existing vehicles, thereby achieving up to 25% improvements in fuel economy without the need for a heavy battery. Their hybridisation system is easily retrofitted to most existing vehicles and it therefore offers most car owners a relatively inexpensive way to reduce CO2 emissions." (Winner)

Disenco plc (www.disenco.com) for their HomePowerPlant, a small and highly efficient micro combined heat and power appliance for domestic and small commercial use. It is based on a kinematic Stirling engine design using helium as its working gas. It reduces energy costs and CO2 emissions and is expected to be available to the market from the end of 2009. (Winner)

Envar Limited (www.envar.co.uk) The GICOM composting tunnel can accurately control and maintain even composting temperatures throughout all of the feedstock. It can therefore guarantee that all of the composting material reaches the pasteurization stage required by EU regulations, even when meat-based catering is included, in one pass through. The tunnels have heated walls and floors from hot water pipes ensuring that there are no cold spots. (Winner)

G&P Batteries Ltd (www.g-pbatt.co.uk) G&P Batteries have developed and run a waste battery collection and recycling system ahead of the forthcoming EU Batteries Directive. In the UK, 90% of waste lead acid batteries are recycled, but only 3% of portable batteries are recycled. In order to divert batteries away from landfill, G&P batteries developed the BattBox, a compact and fully recyclable container designed to encourage battery recycling in the workplace which is collected from each location by G&P Batteries' own fleet of vehicles. The judges said: "We consider that their entry shows a whole systems approach to a practical issue. It is timely given the forthcoming Batteries Directive targets and as well as supplying a solution to a growing problem they have taken innovative approaches both operationally and in providing advice across handling, storage, transportation and recycling of batteries." (Winner)

Industrial Noise & Vibration Centre (INVC) (www.invc.co.uk) Quiet Fan Technology is an innovative centrifugal fan noise control technology which reduces tonal noise at source at a fraction of the cost of traditional techniques such as silencers and enclosures. It also requires no maintenance, lasts the lifetime of the fan and can be retrofitted with little downtime. The technology involves fan specific aerodynamic inserts that fit inside the original fan casing and which modify the flow inside the fan by up to 99%. (Winner)

Intelligent Energy (www.intelligent-energy.com) Intelligent Energy developed a 20KW hydrogen fuel cell power system and helped to integrate it into a light aircraft with Boeing to create the world's first manned fuel cell aircraft which enjoyed its maiden flight in February 2008. The power system fitted into the same envelope as the original engine and met all the performance standards of Boeing and the Spanish Civil Aviation Authority. (Winner)

Mitsubishi Electric (www. meuk.mee.com) for Ecodan, an air source heat pump which runs on a single-phase electrical circuit and which can regulate the energy consumption to ensure that it only consumes the exact energy needed to give a constant supply of hot water and heating. The result is a reduction in CO2 emissions of up to 50% and 30% on costs. The judges commented on "the ease with which it can be installed, the diversity of residential dwellings it can be fitted to, cost recovery and the opportunity for reaching the mass market". (Winner)

Mitsubishi Electric (www. meuk.mee.com) for their Green Gateway Initiative which is a comprehensive 10-point plan to reduce CO2 emissions, especially in connection with the commercial use of their heating and cooling equipment. (Commended)

Modec (www.modeczev.com) for their 98% recyclable, zero emission vehicle which can achieve a 100 mile range carrying up to 2 tonnes at up to 50mph on a single night's charge using their zebra or lithium ion batteries, a 400% performance improvement on conventional batteries. (Commended)

Aymeric Girard at Napier University, Edinburgh (www.morganps.com) for a software tool that optimizes clean energy technologies for the benefit of building designers. (Commended)

Novacem Ltd (www.novacem.com) for their new cement system which not only produces a significant reduction in CO2 emissions in production when compared with traditional cements, but also absorbs CO2 when hardening and so can lock CO2 into construction materials. The production of ~2 billion tonnes of cement every year is responsible for ~5% of global CO_2 emissions. Novacem is developing the next generation of cement systems based on magnesium oxide. In contrast to standard cement, its production process causes minimal CO_2 emissions. It hardens by absorbing CO_2 and therefore offers the unique potential to lock atmospheric CO_2 into construction materials. This means that for every tonne of standard cement replaced by Novacem cement, ~1 tonne of CO_2 is captured and stored indefinitely, thus transforming the cement industry from a significant emitter to a significant absorber of CO_2. The judges commented: "The potential impact of the Novacem technology is huge - providing an exciting opportunity to move an industry from being a significant climate change problem to being part of the solution." (Winner)

OpenHydro (www.openhydro.com) for their Open-Centre Turbine has a single moving part installed directly on the seabed using a base design without the need for

pinning, piling or drilling and deep enough to avoid any shipping hazard. The device then captures energy from tidal streams. Deployment can be completed within a single tidal cycle using their own specifically-designed Installer. The turbine features a horizontal axis rotor, with the rotor blades within an outer housing and having a large open centre, thereby minimizing both marine life risk and maintenance between overhauls. The Judges said: "An innovative approach to marine current turbine design that enhances performance, reduces maintenance, and results in lower adverse environmental impact. It can also be very rapidly deployed due to a novel installation arrangement which eliminates the need for sea-bed construction. The design has been successfully demonstrated at production scale and is on the point of being available for commercial use." (Winner)

Orchid Environmental Ltd (www.orchid-environmental.co.uk). Orchid Environmental are behind the £13m demonstration centre at Huyton in Merseyside which was commissioned in April 2008. The facility diverts up to 80,000 tonnes of municipal solid waste per annum away from landfill and creates a high quality refined biofuel and a range of recyclates. The light industrial style building is kept at negative pressure to manage odours which are then addressed by passing the vapours through a biofilter. (Winner)

Polypipe Civils (www.polypipe.com) The Polystorm range of modular cells provide an effective method for storm water to be channeled to end up either permeating naturally into the surrounding soil as a soakaway solution or being attenuated and discharged into the existing drainage system in a controlled manner. With a 40 tonne compression strength, it has a number of uses and at the end of its 50 year life, it can be 100% recycled. It provides an attractive alternative to the above-ground solutions to storm water being driven by the Future Water Strategy. The judges said: "This stormwater management innovation can be a major contribution to allowing existing urban drainage networks to cope with extreme precipitation events, which are predicted to become more frequent as a result of climate change. It has been developed in a very nice modular design which can be easily adjusted for use in a range of scales and applications." (Winner)

Polypipe Civils (www.polypipe.com) Storm-X4 utilises a four-stage, upward flow technology to remove common pollutants such as silt, debris, detergents, hydrocarbons and heavy metals from storm rainwater washing over heavily-trafficked areas. Once the storm water enters the inlet, it is forced into a vortex which removes particulates. As the chamber fills up, the water is forced up through the filter which removes further solids and the filter substrate removes any heavy metals and hydrocarbons by chemical separation. Then there is the oil retention stage before the water is allowed to be discharged to a soakaway, attenuation structure or drain run. (Winner)

Pulse Tidal Ltd (www.pulsetidal.com) for their tidal power technology based on twin oscillating hydrofoils which, unlike many technologies addressing this source of energy, can be scaled up even in shallow water. By using two horizontal hydrofoils and controlling the angle of the foils, a single Pulse Stream Generator can interact with more

than 5 times as much flow as a single rotary turbine, leading to a four-fold increase in unit capacity. The Judges said: "A highly innovative concept that could significantly extend the application of marine turbines by permitting their use in comparatively shallow waters but at large power levels. Initial laboratory tests have proven the viability of the approach which is now being extended to prototype stage." (Commended)

PuriTech Ltd (www.puritech.co.uk) **and ACWA Services Ltd** (www.acwa.co.uk) for their NITREAT process which is a continuous ion exchange system for the removal of nitrates from drinking water. It replaces the fixed bed ion exchange process and enhances performance, reduces costs and minimizes waste. (Commended)

Pursuit Dynamics plc (www.pursuitdynamics.com) for their PDX Ethanol Reactor Tower which increases yield and reduces the cost of processing ethanol through instant low temperature starch activation, minimizing enzyme use and accelerating fermentation times. The tower uses a powerful pressure shock wave induced by injecting supersonic steam to activate all the starch at a lower temperature than conventional cooking. It can be retrofitted onto existing facilities on a small footprint. The judges said: "It enables a fixed volume of bioethanol to be produced from a significantly reduced amount of land or feedstock. This is particularly important at a time when the world is looking for creative solutions that allow us to produce both food AND fuel. The technology can be retro-fitted to existing bioethanol plants - which is important when you note the huge number of such plants already operating in the US and Brazil and Europe rapidly following suit." (Winner)

Pursuit Dynamics plc (www.pursuitdynamics.com) The PDX Wort Heater enables brewers to save up to 50% of their energy consumption during the wort boiling process, which itself accounts for about 60% of a brewer's total energy costs. It produces shorter cycle times, increased control over the stripping of wort volatiles and better mixing of adjuncts, lower steam consumption to remove volatiles, increased hydration and activation improving hop utilization and removes the need for dedicated external wort heater cleaning. (Winner)

REFLATED Consortium (www.ctechinnovation.com). The REFLATED process treats the waste liquid crystal display screens and recovers the maximum value from the panels, including the liquid crystal, indium metal and glass. The process can be integrated into existing waste processing facilities. As well as being a first as a whole, some of the individual processes are particularly novel, such as the removal of polymer films from the screens and the recovery and fraction of the liquid crystal. The judges said: "The REFLATED consortium have identified a process which forms a novel approach to the entire treatment of waste LCD screens. This is a clear technological advance allowing the treatment of a relatively new waste stream. It combines potentially significant environmental and economic benefits and we look forward to it making an impact soon." (Winner)

Rural Generation Ltd (www.ruralgeneration.com) Rural generation provided a solution to a milk processing and bakery operation which produced 500 m3 of wastewater weekly from their equipment cleaning. Rather than transfer the waste water by road tanker to local waste water treatment works, it is treated in a surface aerated tank, settled to allow the effluent to be drawn off the top and the rest used to irrigate a plantation of short rotation coppice using a little-and-often methodology through pipes which is automatically controlled. (Winner)

Semplice Energy Ltd (www.semplice.co.uk) for their EcoSolutions which combine clean energy technologies in an optimal way for different types of business customers with vastly varying needs. (Commended)

Shaw Water Engineering Ltd (www.shawwater.com) Shaw Water Engineering have developed a fully-automated system for the real-time detection of cryptosporidium in drinking water to replace the comparatively slow and manual laboratory-based approach used until now. The Crypto Tect platform includes a sub-micron filtration system, auto-focusing microscope system, use of on-line spore-specific dyes and image interpretation software. The judges said: "the integration of several technologies to reduce the lead time and improve the accuracy of detection of cryptosporidium in drinking water supplies is a significant advance, to assure water quality and allow for a more rapid response in the event of a cryptosporidium outbreak." (Winner)

Structure Vision Ltd (www.structurevision.com) for their Nuplant, a software product that serves to optimize the way in which intermediate- level nuclear waste is removed, packed and stored. It is a 3D modeling software that allows the user to view a 3D image of the plant for waste handling or complete decommissioning purposes. Through a powerful packing/ optimization algorithm which assesses the size and shape of intermediate-level waste, "what if" scenarios are run on various packing methodologies which enable the engineer to choose the optimal decommissioning process. (Winner)

Supacycle UK Ltd (www.supacycle.co.uk) for their innovative new wheeled bin and collection vehicle system, designed for the sole purpose of collecting household recycling materials. The method enables the recyclates to remain segregated throughout the collection process, eradicating the costly co-mingled MRF sorting process. (Commended)

TRAMPower (www.trampower.co.uk) for their CityClass Tram which is half the weight of traditional tram cars, uses off the shelf components and includes an innovative powered bogie where the 3 phase AC motor is body mounted and the power is transferred to the bogie by a modified HGV prop shaft and axle combination. (Commended)

University of Edinburgh undergraduates: Jeffrey Steynor, Nicola Petrie, John Morrissey, David Connolly, Douglas Craig, Cheuk (Henry) Lo, Richard Crosfield Sagivela, Edward Bolam and Jose Garcia. As part of a Royal Academy of Engineering-sponsored interdisciplinary project, this team of undergraduate engineering students

developed the Estimator, a unique software tool for rapid appraisal of small hydro developments. It enables the complex range of possible combinations of components that make up small hydro schemes to be optimized on the basis of cost and productive capability, thereby facilitating the selection of promising schemes for further, more detailed design. (Winner)

Watermark Global plc (www.watermarkglobalplc.com) for their acid main drainage waste water treatment. Acid Main Drainage is the toxic water left in the voids after underground gold mining which is rich in sulphuric acid and metals. The process treats the water so that it reaches potable standards in an area where drinking water is scarce. (Commended)

Willis Renewable Energy Systems (www.willis-renewables.com) for their Solasyphon which is used to retrofit a solar thermal system into an existing hot water cylinder. The device uses a thermo-symphonic effect to provide hot water at usable temperatures within a short period of the sun striking the solar panels. This system avoids the installation of a twin coil cylinder which is normal in new solar thermal systems, thereby reducing the cost of installations by up to 50%. The Judges said: "A simple but elegant means of connecting domestic solar thermal heating devices into existing hot water systems without needing expensive storage tank replacement. It has large potential in the dominant retro-fit market and could potentially reduce system installation costs by up to 50% and so extend the penetration of renewable heat into the domestic market." (Winner)

Wind Technologies Ltd (www.windtechs.co.uk) for their electrical generator system which can be used with all types of wind turbines. Their technology is based around their patented brushless doubly-fed induction generator, which replaces the more common slip-ring induction generator used in over 90% of wind power applications currently but which also are the source of a significant proportion of turbine down time. (Commended)

WISER Recycling Ltd (www.wiserwaste.co.uk) for their closed loop lamp recycling process. By using an onsite crusher, the TubeEater, to reduce volume, transport costs and emissions are minimized. The resulting cullet then is sold on for further lamp manufacture, rather than downgraded to aggregate usage which has been the norm. (Commended)

Zander Corporation (www.zandercorporation.com). Zander is an axonic lake sediment which has a high cation exchange capacity. It can therefore capture permanently heavy metals such as lead and cadmium and PCBs and PAHs from liquids such as hydrocarbons and aqueous salt solutions . After 2 years of use, the Zander can be dried to one-tenth of its volume and incinerated to reclaim the metals. (Winner)