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Promoting sustainable waste management worldwide

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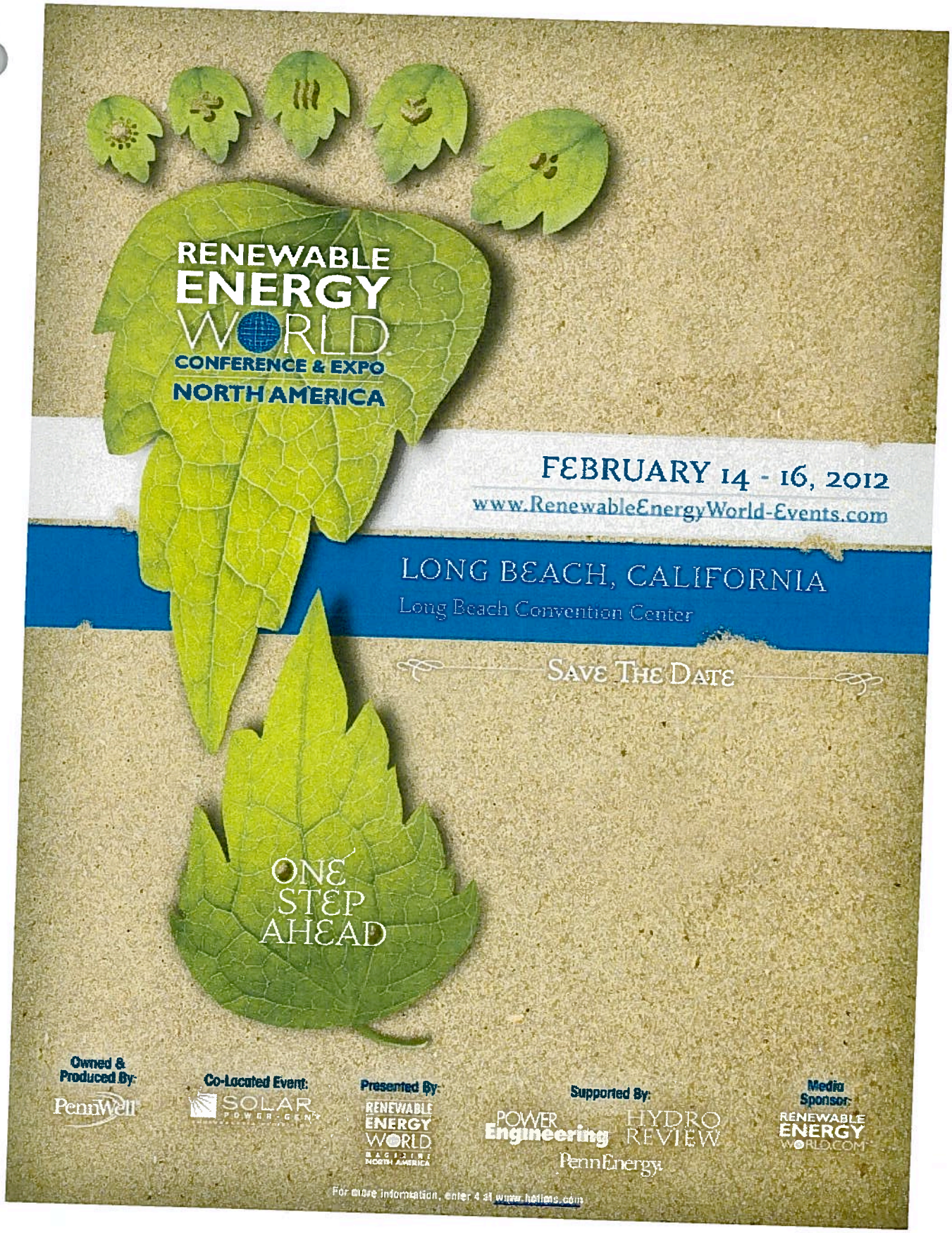
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Uncovering Waste's Dirty Secret: Global E-Waste Trafficking

Illegal e-waste passes through numerous hands (Image credit - Margaret Bates)

With over one million tonnes of e-waste produced every year in the UK it is the country's fastest growing waste stream.

With such a large volume of waste to treat, and strong regulations in place governing its proper disposal, it is no surprise that as in many developed nations, the illegal export of e-waste is a growing problem in the UK. However, over the past three years the Environment Agency (EA) has turned to intelligence led enforcement, involving collaboration with the Police and Customs, as well as increased international co-operation.

As part of this approach, the Environmental Investigation Agency (EIA) has recently embarked on its most thorough investigation to date into illegal e-waste smuggling. As a result of the 18 month undercover operation, the agency has published a report - System Failure: The UK's harmful trade in electronic waste - that sheds light on the lucrative international black market for e-waste.

Undercover

Following the successful prosecutions of several councils for selling potentially harmful e-waste to unauthorised traders, the EIA decided to launch an investigation into how such waste, collected at civic amenity sites ends up smuggled to developing countries. From mid 2009 until early this year, undercover EIA investigators held a series of meetings with recycling companies and waste brokers to scrutinise the handling of e-waste at several civic disposal sites.

In spring 2010, EIA investigators posing as students visited six civic amenity sites throughout Greater London. At one site in Merton, discussions with a site worker revealed that TVs and other electrical goods were being taken away separately by an outside company to be packed into containers and shipped to Nigeria. At least seven tonnes of TVs were being sold to the company each week. Similar occurrences were happening across many of the council sites visited.

However, it is not against the law in the UK to export electronic equipment, as long as it is tested and working. To find out if such checks were being made, two deliberately disabled television sets equipped with sophisticated tracking devices were dropped off at two of the offending sites. After touring the UK, the signal from the sets was lost. When transmissions resumed, one of the TVs was located in an notorious e-waste trade centre, Alaba Market in Lagos, Nigeria, and the other in Tema Port, Ghana.

Middlemen

Based on the results of the market investigation, the EIA was able to conclude that illegal e-waste exports were passing through a number of hands before arriving in the developing world. To dig deeper the agency set up a front company looking to source non-functional CRTs for shipment to China.

From a list of target companies drawn up using research on internet trading platforms, the EIA began meeting face-to-face with a number of suppliers. The investigations revealed that while some firm were directly exporting CRTs, many others simply sold them to the exporters.

At a meeting with one EA licensed carrier, investigators were told that the company, which at the time was bidding to secure 10,000 CRTs from the Ministry of Defence - does not test individual units. Instead they are visually inspected, with obviously defective sets, such as those with broken screens, sent for recycling. The company itself does not export CRTs. However the managing director did admit to having customers in a number of countries in Africa and Asia.

At another company also marketing untested CRTs, investigators were offered regular shipments to China of 1000 CRTs per month for £3 each. The company claimed that the units would be coming from a "very large" UK recycling company that sourced the sets from the UK and abroad. Investigators were told that the large recycling company was not allowed to sell untested CRTs to China, but that by acting as middlemen the traders could circumvent this issue. This was repeated by numerous other traders on the EIA's target list.

Recommendations

According to the EIA, until local councils and their contractors take responsibility for ensuring e-waste in their care does not leak onto the black market, the problem will persist. Recommendations made by the EIA said that all WEEE left at designated collection facilities should be quantified before leaving the site, and audit records kept. In spite of the inroads it has made into exposing those responsible for the illegal export of e-waste, funding for EIA's specialist e-waste intelligence unit ended in March, and it is uncertain whether progress in curbing e-waste smuggling will be maintained.

Perspective

Dr Margaret Bates, manager of the Centre for Sustainable Wastes Management at Northampton University has travelled to Nigeria several times in the course of her research, and has talked to the people who deal with the electronics once they arrive. Commenting on the EIA report, Bates stressed the need to be very careful to differentiate between legal and illegal trade.

"In Alaba market, Lagos, the dealers and traders are very keen to have any equipment from the UK as even the broken/illegal can be harvested for components. The tested/untested theme is consistent throughout the supply chain and if you ask in the market for the price of a TV or computer you will be asked if you want tested or untested. Therefore it seems odd to the importers that we worry so much about the difference," she said.

Bates also explained that Nigeria is developing its own guidelines to ensure environmentally sound management of e-waste, and is in discussions with a UK based WEEE recycler to establish a facility in Lagos.

The development of a recycling solution, rather than banning legal export, will provide a sustainable solution not only for EEE that was imported second hand, but also for that which was brand new or manufactured in the developing world.

"In general I agree with the recommendations of the EIA report and feel the need for effective regulation and accurate data and records is key to stopping the illegal activities. I am wary of suggesting that export activities should be stopped whilst investigations are ongoing as this could put legitimate exporters out of business," Bates concluded.

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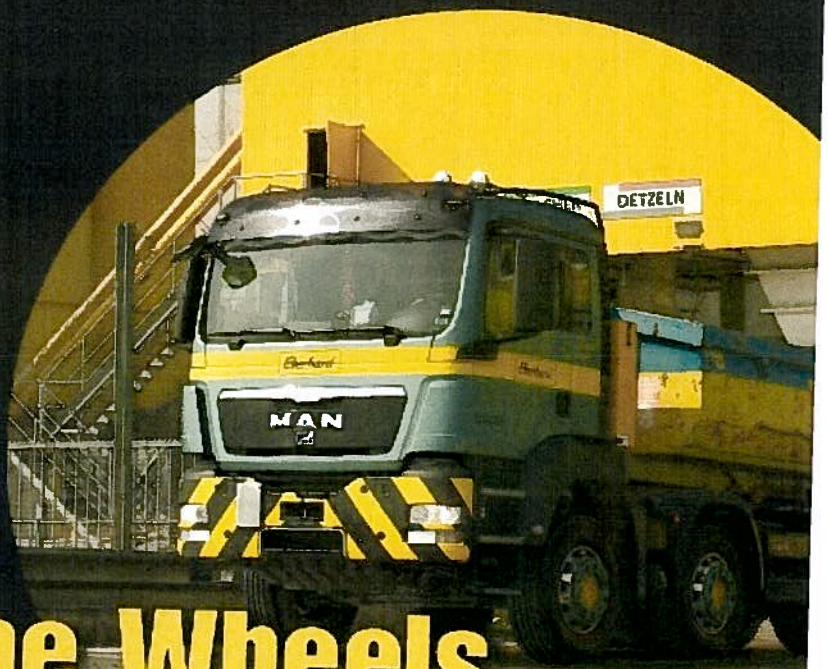
WASTE management world

SPECIAL

Collection & Transport Focus



Oiling the Wheels of the Waste Sector

- Container Handling by Hydraulic Crane - A Growing Trend?
- Switching to Alternative Fuel? LPG and all-electric Vans
- Show Review: Season opener Samotor for Italian Companies

Malcolm Bates has been waiting for a chance to test a new Lithium-Ion battery electric Refuse Collection Vehicle (RCV) for several months. But while he's been waiting, he's found another new electric vehicle to test drive. It's smaller, but in many ways could have a larger impact on our industry...

The standard diesel-fuelled Nemo is already an environmentally friendly option for retrofit applications as it features the lowest emissions in class

Plug in, Turn On

The Nicholson McLaren Citroen Nemo

There are a couple of points to note before we explore the value of lithium-Ion battery powered light vans and trucks in a waste and recycling industry operating environment. Firstly, while Lithium-Ion battery packs have largely replaced the old style lead/acid traction battery, they do so at a cost. A pretty high cost.

True, the cost of the actual 'energy' used, in terms of the electricity required to charge the packs is, compared to the cost of diesel, practically nothing. But the precious metal mining operations required for the manufacture of Lithium-Ion batteries have a negative impact on our environment and, in the same way that the nuclear lobby conveniently seeks to 'bury' the argument regarding safe disposal of spent nuclear materials, the disposal of Lithium-Ion batteries would rapidly become a major global issue if we all used them to power cars and light vans. It makes the point, nothing is 'for nothing'.

Yes, in addition to the diesel/electric hybrid solutions, prototypes of 'full-sized' - by which I mean 20-tonne plus gross weight - all-electric refuse collection vehicles using Lithium-Ion battery packs have been built, but it's a fact that wherever you

Driver experience, safety and comfort standards on the Nemo are already high - underlining the advantages of starting with a mass-produced design

options have a considerably-reduced range when compared to diesel-fuelled vehicles too. For example, a diesel-fuelled Nemo has a range of 500 miles (800 km) on one tankfull. But the 80 mile (130 km) range quoted for the all-electric Nicholson McLaren-converted Nemo could still be enough for operations in an urban area. Especially as a plug-in charger can give quick 'top-up' charges when the vehicle is parked up during the shift.

While we wait for hydrogen fuel cell technology to be productionised - which may, or may not happen any year soon - Nicholson McLaren designers have been looking for ways to ensure a battery electric vehicle doesn't just grind to a halt when the driver gets caught away from base with a spent battery pack. "We're looking at the provision of an auxiliary plug-in pack like the engine start packs sold by automotive parts retailers," John Waghorn explained, "but we're also looking at a small IC auxiliary engine which could provide a 'get-you-home' facility at reduced speed.

"Our research suggests it need only be the size of a 5hp lawnmower engine in order to generate enough current and of course it could be used to charge the battery packs when moving on the highway, returning to battery-only mode in heavily trafficked urban areas," he adds. And guess what, the small auxiliary engine could be fuelled by LPG!

It might sound bizarre, but it does make operational sense. The principal of a small engine powering a generator is at the heart of most 'hybrid' solutions, after all.

The future? Nicholson McLaren is now looking for global partners with a view to productionising its alternative fuel conversion packages for wider global markets.

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email: malcolm@automotivespecialists.co.uk

This article is on-line. **Please visit www.waste-management-world.com**

Not only are trucks and wheeled loaders operated within waste transfer and recycling site applications, the company also operates - and constructs - landfill sites, where the conditions can be really challenging. Here a 120 tonne CAT excavator is loading rock spoil onto a fleet of ADTs to enlarge a landfill site

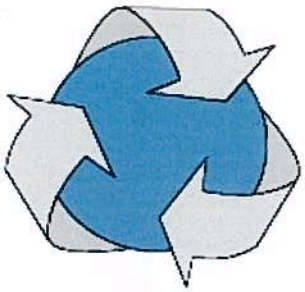
become advantageous after an accidental spill, or failure takes place - making use hard to justify in cost/benefit terms - the scientists at Panolin also formulated Green Machine products to significantly reduce CO_2 levels as well. And that has financial and environmental benefits from day one - and every day from there on. My point is? We could be talking about a carbon reduction of 50% here. I'll say that again: 50%! Across an entire city council (commune) fleet? That could be a saving of thousands of tonnes of CO_2 per annum. This really should be headline news.

So, there's more to the Green Machine Concept than a few cans of lube, then? There certainly is. Using computer modelling, the whole life operational costs of say, a refuse collection vehicle (RCV) - or it could equally be a wheeled loader, or a precinct sweeper - are taken into account. Then, the optimum combination of lubricants to reduce consumption, while enhancing reliability is planned. Regular oil sampling and analysis is at the heart of this programme. It covers hydraulic oil, engine and transmission oil and grease. The end result is designed to reduce fuel consumption, reduce emissions and extend oil changes and service periods - in some cases by a factor of six. In recent 'real life' case studies I've witnessed, an operator of a Liebherr machine reported a four-fold extension to oil change intervals - from 500 hours up to over 2000 hours. As the same machine had already reached over 26,000 operating hours, clearly, any feared reduction in service life is unfounded!

So how's it done? The central theme of the entire Green Machine Concept marketing philosophy is a holistic view aimed at helping the end user save money and increase the reliability of vehicles, equipment and machinery working in the toughest operating environments, while helping to protect the natural environment. If there is any 'bad news', it's that initially, Panolin products will cost more to purchase than the products sold by the other major brands. But the key word here is 'initially'. And in answer to your question, "Why should I be spending more than I do already?" in addition to extended service intervals, the key words to take into consideration are 'biodegradability', 'low toxicity' and increasingly important - 'CO_2 reduction'.

A powerful argument

"There is a very powerful public relations argument that vehicles and equipment that are employed by either the city council (commune), or a commercial waste contractor to help keep our environment clean, should, in themselves, be as environmentally-friendly as possible," suggests Panolin executive director Patrick Lacmanle. He's absolutely right. That such a philosophy should go beyond 'the easy stuff' - like reduced exhaust and noise emissions - to embrace toxic 'consumables', that can help reduce heat build-up and vibration issues, not to mention a reduction in



Having built a reputation for high quality hydraulic timber loading cranes, Austrian manufacturer Penz is now looking to sell more vehicle-mounted and fixed cranes for waste container loading and recycled materials handling applications. And, as Malcolm Bates reports, the company is looking to do that globally...

One Hundred Percent Penzl Austrian-based scrap and recycling contractor, Kutin, is one of a growing number of operators in the waste and recycling industry to move over to Penz Crane

Penz Meanz Cranes

Perhaps we should start by comparing the timber (logging) extraction market and the scrap, waste and recycling sectors. There are some striking contrasts that's for sure - not least of which is the fact that timber is normally loaded onto trucks off-highway, in remote wooded areas far from human habitation - just about the last place you'd want to fix a broken crane. In contrast, hydraulic loading cranes used in scrap, waste and recycling tend to work in urban areas, where lots of people will be able to see the brand logo of any broken-down crane.

It goes without saying that compared to the transport and logistics sectors - where the loader crane might not be required 100% of the time because a forklift truck is available - a unit used in timber handling or scrap, recycling and waste handling applications has to be designed to stand constant use, all shift long. The difference in 'duty' is really the start of our story because as Rochus Penz senior discovered in rural Austria, what is referred to as a basic 'pallet crane' in the Penz factory today, just wasn't up to the job of constant, fully loaded work cycles out in the woods. So being a practical man, rather than risk unplanned downtime, Penz decided the solution was to design and build a crane specifically for the job. And in 1966 he did just that.

That he got things pretty much right first time, isn't really open to argument. Today, Penz Crane, the company he founded 40 years ago, not only holds the number two slot among the ranks

The 4X crane operator's cabin is as good as any found on excavators or telehandlers

In Penz 'Hydrolink' cranes, main column bearing is packed with grease and all hydraulic service pipes are routed internally to allow for full 360degree rotation – a major operational advantage


To ensure quality, Penz manufactures a high percentage of components in-house

> A good timber crane doesn't automatically translate into a good recycling crane

The best policy

Bortolussi is keen to point out that a good timber crane doesn't automatically translate into a good recycling crane. During my factory tour, I'm shown the differences between the two - Penz Crane is indeed already manufacturing a considerable number of truck-mounted hydraulic cranes for customers in the scrap metals and recycling sectors and the number of options - particularly in the design and positioning of the controls and operator's station - are considerable. And this is clearly only possible with a built-to-customer-order policy.

In line with that philosophy, a large percentage of the basic components continue to be designed and built in-house, while the larger fabrications are manufactured at a sister company located in the Czech Republic. At the present time, each pre-painted loader crane is assembled by specialist teams at operation-specific work stations. But one of the purposes of my visit was to discuss the potential for new waste and recycling industry products.

And once that project has been completed, there are plans for a new production system to optimise production output, but without losing the 'custom' build facility. So what might the new marketing opportunities in waste and recycling be? Penz Crane already has two full product ranges in timber cranes - 'L' and 'Z' - those units designed for scrap, waste and recycling carry the additional 'R' designation. But there is another product line that has a growing potential in our industry - and that's the fixed 'podium' crane range.

The case for fixed 'podium' cranes

There are already a number of well-known existing manufacturers that produce fixed cranes - some of which are handling bulk materials such as scrap and waste. But the designers at Penz Crane think there are still a number of significant gaps in the market. "It is important to stress that our fixed cranes are not built to the same design as the lorry loader cranes," Bortolussi explains.

And just to make sure I'd got the message, he took me through the design of both types. He's right - although significantly the same high quality precision engineering applies to both product lines.

Other sound, common-sense ideas such as a grease-packed rotating column bearing with internal hoses (to allow for a full 360 degree rotation) are shared. But these are positive factors. Even though we already have numerous ways of handling waste materials, it's not too late to ask if we're sure we've got things

Volvo's active-type DPF temporarily holds the particulate matter and then incinerates it, further reducing emissions. This process is conducted, it is claimed, without any loss of performance or operation. The service interval for the Volvo DPF is 4500 hours and the company has organised a Reman service exchange programme for the item.

The first three Volvo wheel loaders to ascend from F- to G-series include the models L150G, L180G and L220G with bucket capacity ranges of 4.0m³ to 6.8m3, 4.4m³ to 7.8m³ and 4.9m³ to 8.2m³, respectively. As well as being fitted with the latest Volvo Tier 4i/Stage IIIB compliant engines, these three loaders also have stronger hydraulics. They are claimed to provide a 20% increase in lifting force, a 10% improvement in breakout force and better fuel efficiency.

Designed to enhance Volvo's position in the world articulated hauler market, the company's new F-Series machines feature not only Tier 4i/Stage IIIB emissions legislation, but also a package of improvements in functionality, design, and maintenance.

The Case stand at Samoter saw the introduction of new wheel loaders and excavators with Stage IIIB complaint engines. The new excavator series, which are produced for Case by Sumitomo in Japan, includes the 24.7 tonne CX250C, the 29.5 tonne CX300C, the 34.7 tonne CX350C and 36.8 tonne CX370C. They have turbocharged Isuzu engines that feature EGR and a diesel particulate diffuser. The first of the new F-series Case wheel loaders are the models 721F, 821F and 921E.

A new five-speed automatic transmission with torque lock-up ensures faster acceleration and higher travel speeds compared to the E-Series, reducing fuel consumption and increasing

Case showed this new 821F wheel loader complete with selective catalytic reduction (SCR) technology and an AdBlue tank

productivity. The middle-sized 821F is powered by a Stage IIIB compliant 6.7 litre Case Family IV engine, producing 168kW (227hp) of power. This engine uses selective catalytic reduction (SCR) technology which involves the addition of a Diesel Exhaust Fluid - a urea solution known in Europe as AdBlue.

New Holland Construction was also introducing new Stage IIIB compliant excavators and wheel loaders. Visitors to Samoter were able to check out the new 31.7 tonne E305C crawler excavator (which incorporates Kobelco technology) and the two wheel loader models - the 345 kW (195hp) W170C and the 172 kW (230hp) W190C. All utilise New Holland's Selective

Product news

Electric Performance

The Terberg OmniDEL-E is proving successful in a number of global markets. The zero emissions electric hinlifter which doesn't require the engine of the RCV to be running while lifting containers, uses a safe, low voltage (24vDC) power system which could save up to 1900 litres of diesel fuel when compared to an otherwise identical RCV using a conventional hydraulic lifter. Terberg said the OmniDEL-E should return that level of saving on a typical collection round of 1200 container lifts per shift. The OmniDEL-E is also much quieter.

While it is expected the electric lifter technology will spread to other products in the Terberg range, there are other 'eco' selections in the product catalogue too - such as plastics-bodied utility vehicle suitable for the collection of food waste.

www.terbergmatec.com

Axors join Eco-Equipe's fleet

In an effort to reduce operating costs and downtime as a result of breakdowns, Eco-Equipe the commune-owned municipal company based in Terrassa, Spain purchased a single Mercedes Benz 'Atego 1628' fitted with Allison 3000 series automatic transmission back in 2006. Even though some of the company drivers were sceptical of the advantages, extensive trials showed an estimated £30,000 saving in replacement clutches and drivetrain wear. And as a result, four new Mercedes 'Axors' have recently joined the 25-unit strong Eco-Equipe fleet of refuse trucks.

As well as collecting household waste and recycling, Eco-Equipe is also responsible for industrial and trade waste, maintaining the sewerage system and picking up litter, and in total has a fleet comprising 73 vehicles. Such has been the success of the automatic gearbox trials that the policy has been adopted to specify automatics wherever possible in future.

According to fleet engineer, Josep Ma Moreno: "The drivers now fight to take out an auto box RCV."

www.allisontransmission.com

Big Cats Dig Big Hole

One of the largest construction projects currently being undertaken in Europe is quietly and efficiently taking place just a few kilometres from Zurich Switzerland - and yet it's highly unlikely that anyone living locally to it, even knows it's taking place. Over one million tonnes of solid rock is being excavated out of the middle of a hillside in Eufingen, to make a brand new, state-of-the-art landfill. While Switzerland may not be short of mountains - and rock - it is most definitely short of landfill capacity. This explains why over 30 personnel and a wide range of heavy construction machinery is engaged on this arduous project, which is due to open - on schedule - late this year.

The work is being undertaken by waste and recycling specialists Eberhard using a wide range of Caterpillar machines, including articulated dump trucks and three of the largest 360 excavators currently in the Cat range - the 100 tonne 385C's. Cat 365s, 345s, 740 dumpers and D5G dozers make up a large part of the remaining fleet of machines on site, which will absorb over 1600 cubic metres of concrete before it is completed.

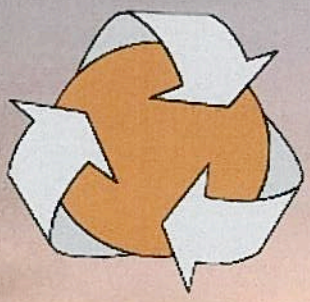
Working throughout the highly changeable seasons in Switzerland, all machines on-site have to battle against both the weather and a combination of dust and mud as the 'hole' is excavated down below the surface of the hillside. Some machines are working within the close confines of 82 metres of tunnel - and then for the ADTs, there's the shock loadings and strain of hauling a full load back up the haul road to the surface.

To ensure maximum reliability while keeping the carbon footprint of this project to a minimum, Eberhard is running all the machines on-site to the Panolin 'Green Machine Concept'.

www.cat.com
www.panolin.com

***Waste Management World has been invited back for the official commissioning of this site later in the year.**

Eberhard uses a range of Cat machines including three of the largest 360 excavators



In 2014 Brazil will host the FIFA World Cup followed by the Summer Olympic Games in 2016. As a result a huge amount of investment is being spent, yet waste management improvements still lack funds. Sergio Guerreiro Ribeiro explores the potential for waste to energy technologies to flourish in such a situation.

WtE: the Redeemer of Brazil's waste legacy?

or allows the use of bad solutions due to inadequate technical background by the bank officials.

Feasibility studies

To import a good solution that is working abroad may not be a straightforward task. Indeed, quick calculations show that a conventional WtE mass-burning facility (40 bar/400°C steam conditions), the most common worldwide, is not feasible in Brazil. Some companies with strong influence in government are trying to obtain incentives to make the spreadsheets look good. This may work in some places but will not prevail as a sustainable way to reduce landfills on a major basis. Also to consider unrealistic Operations and Maintenance (O&M) costs will lower the quality of flue gas, and other effluents, treatment which will bring a negative image to WtE.

Several feasibility studies in Brazil start with cost estimates based on a mass throughput (tonnes/day) but the key parameter for the investment and operating costs is the thermal output. With respect to energy recovery MSW is a mixture of dry combustible (Carbon and Hydrogen), water and inerts (ashes). The thermal output is directly proportional to the dry fuel amount (C and H), and which determines the size of the boiler, the flue-gas volume and therefore the size of the flue-gas cleaning devices.

Many people in Brazil advocate Mechanical Biological Treatment (MBT) to produce Refuse Derived Fuel (RDF) because of the high moisture waste. If the grate is well designed and able to burn all of the carbon and hydrogen in a mass-burning facility, and the moisture can be evaporated in the pre-combustion zone using adequate combustion air preheating, there is no need to pre-process waste (RDF) under the argument that more energy will be available.

Organic issues

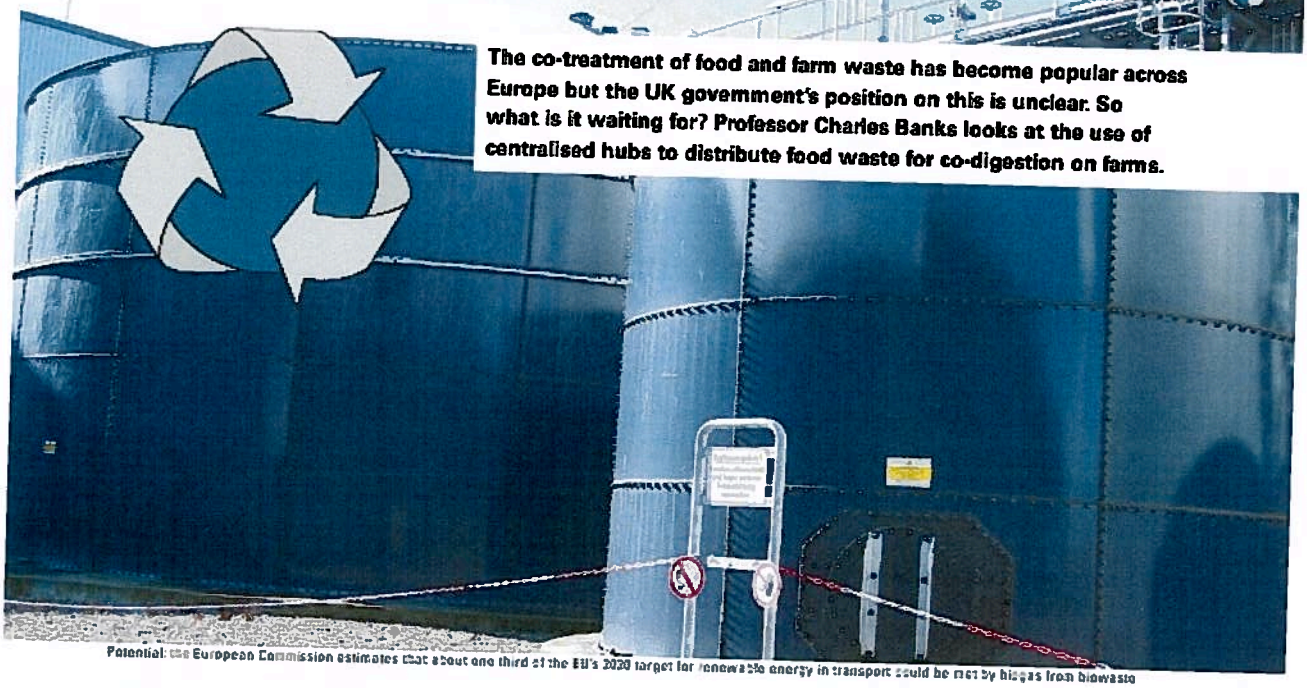
One fundamental question that is causing controversy in Brazil is should the organics be removed from mixed waste? Singapore has many similarities with Brazil such as climate, waste characteristic with high moisture and reduced LHV. They recycle 57%, mass-burn 41% and send only 2% of inerts to Semakau landfill.

Despite the fact Singapore has one of the best source separation systems in the world, organics and non recyclables are incinerated together. On the other hand the per capita income in Brazil is much lower than in Singapore and some changes are needed to adopt WtE after recycling.

All of the above present positive and negative points since it is well known that corrosion with steam temperatures above 400°C limits the efficiency of WtE plants. Therefore, higher steam temperatures using only MSW will decrease the availability and/or increase capital and O&M costs due to corrosion related problems. Combined cycles (Zabalgarbi) will have high efficiency and high availability but the NG consumption is enormous (80% of the total energy produced comes from the NG) and it is hard to justify the environmental gains of WtE with such a high amount of a fossil fuel needed. Also the uncertainty in the NG supply and price will increase the risk of the enterprise in Brazil.

Using a standalone external superheater (Heritgen) burns natural gas with 30% efficiency (limited by steam cycle) and the economic feasibility does not improve much over conventional WtE plants (40 bar/400°C).

The co-treatment of food and farm waste has become popular across Europe but the UK government's position on this is unclear. So what is it waiting for? Professor Charles Banks looks at the use of centralised hubs to distribute food waste for co-digestion on farms.



Potential: the European Commission estimates that about one third of the EU's 2020 target for renewable energy in transport could be met by biogas from biowaste

Two Peas in a PoD? Food and Farm Co-Digestion

Sustainable management of biowastes is currently a major issue in the UK and across Europe. One of the main drivers for this is the requirement under the EU Landfill directive (99/31/EC) for diversion of biodegradable wastes, due to their potential for greenhouse gas emissions. There is also growing awareness of the resource recovery potential of these materials, and of the economic benefits in managing them through the anaerobic digestion route. The European Commission estimates that about one third of the EU's 2020 target for renewable energy in transport could be met using biogas produced from biowaste. While around 2% of the overall EU renewable energy target could be met if all biowaste was converted to energy, with further economic gains from the associated recycling and waste prevention policies.

Of the biowastes available for anaerobic digestion (AD), food waste is currently attracting most attention in the UK. A number of digesters are already being built specifically for the treatment of this material. The concept of a centralised anaerobic digester receiving and treating biowastes from different sources is now becoming familiar. At present the financial returns of this approach may be increased by operating at a larger scale. In a centralised system, income both from the gate fees for accepting the food waste and from the sale of energy, including any renewable energy premium, goes to the plant owner or operator. At present farmers are usually asked to accept digestates without any fee, although spreading of the material may be carried out at no cost.

It is not difficult to imagine that this situation could change, with increases in the number of operational digesters leading to a reduction in gate fees and an increase in material for disposal. There is also competition for the available land area due to the need to dispose of biosolids from wastewater treatment, and from the growing number of composting plants. Other models for food waste management could potentially offer a more robust and sustainable approach, by taking into account benefits from improved nutrient management and reduced greenhouse gas (GHG) emissions, and also offering the opportunity to recover energy from a greater proportion of the total biomass resource available.

According to a survey carried out by WRAP, about 8.3 million tonnes of household food waste is generated in the UK each year.

requirements for crop production, giving farmers enough nitrogen, phosphate and potash to replace the amounts exported in their produce. This would close the nutrient cycle between towns and countryside.

A dairy farm of about 300 cows would need about two tanker loads of pasteurised food waste per week, with no significant effect on traffic movements to and from the farm. Production of biogas from the food waste provides a renewable energy source, and more importantly allows effective recovery of the energy in the manure, in both cases replacing an equivalent amount of fossil fuel and helping to reduce our reliance on centralised energy production. Digestion of slurry also leads to a reduction in direct GHG emissions from manure management on the farm.

As well as eliminating the 350 tonnes of CO_2 produced by this and other activities on the dairy farm, a further 200 tonnes of CO_2 are saved in avoided emissions from fossil fuel usage through exporting renewable energy, making the farm into a carbon sink rather than a source of carbon emissions.

Combining five million tonnes of the UK's food waste with 40 million tonnes of manures would allow the generation of 3,541 GWh of electricity - enough to supply 913,000 households and to save 1.8 million tonnes of CO_2 equivalent GHG from grid-based electricity production.

In economic terms, making on-farm digestion feasible and efficient allows the farmer to make the necessary capital investment in infrastructure, and reduces the capital costs to local government and ratepayers as large centralised plants are not required. In their place is a more cost-effective array of Hubs which only carry out pre-treatment to ensure biosecurity and nutrient balance. A Hub and PoD system could be managed as a separate entity so that waste disposal authorities working in conjunction with large waste management contractors can secure long-term and sustainable routes for recovery of food wastes with a single point of contact, rather than having to deal with large numbers of individual farmers.

This could reduce management costs and ensure security of the disposal route, while potentially leading to reduced gate fees.

Conclusions

Farm-based digestion boosts the local economy, increasing farm income by as much as 50% for an average dairy farm and creating local employment opportunities in service industries associated with operating the PoDs. As noted in the recent EC communication on Biowaste management (COM(2010)235) as well as producing renewable energy AD offers a means of realising a wide range of environmental benefits in a cost-effective manner: on-farm co-digestion of animal slurries and food wastes is a prime example of maximising these benefits by exploiting the synergies between these two materials.

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This article is on-line. **Please visit www.waste-management-world.com**

93.8 million tonnes by 2009. With the Chinese economy looking set to continue its astonishing upward trajectory, growing at a better than forecast 9.7% in the first quarter of the year, it seems reasonable to assume that its domestic appetite for paper products will continue to rise. According to analysts, China's paper making industries, particularly the larger enterprises are continuing to vigorously ramp up capacity to meet this increased demand.

In its recent publication, Research Report on China's Papermaking Industry 2011-2012, market analysts, China Research and Intelligence, claim that due to a lack of fibre resources China's supply capacity can no longer meet the demand for expansion, while fibre material has become a bottleneck constraining the development of the country's papermaking industry. According to the report, in 2009 wood pulp accounted for 23% of the raw materials consumed by the industry, non-wood pulp accounted for 15%, and waste paper pulp made up the bulk with 62%. Over recent years, the proportion of waste paper pulp has been on the rise, while that of non-wood pulp has been in decline.

Recovering markets

Waste paper recycling, then, is playing an increasingly pivotal role in supporting the development of China's papermaking industry. China's waste paper imports grew from 2.52 million tonnes in 1999 to 27.5 million tonnes in 2009, with annual growth rate of over 30%. With such a rapid growth in demand, prices for imported waste paper have increased substantially. In 1999 imported waste paper cost the Chinese $97 per tonne, by 2008 that figure had skyrocketed to an average price of $230 per tonne, peaking briefly at $300 per tonne. This was before the world fell into the grip of economic turmoil: by 2009 the figure stood at $138. According to Export to China, at the time of writing the price had recovered almost to its pre-credit crunch highs and stood at $247 per tonne.

The high prices paid by the Chinese for imported recovered paper fibres has helped pay for the West's sophisticated collection schemes - Image Credit: WRAP

In its report, The Chinese markets for recovered paper and plastics - an update, WRAP assesses that the Chinese markets were particularly affected by the market disruption in late 2008, as the effects coincided with the end of the momentum provided by the Olympic Games. In the space of one month, UK exports of recovered paper and plastics to China fell by 40% - 45%, and prices fell even more dramatically, by up to 66% in some cases.

Challenges such as long lasting gas and leachate emissions and costly aftercare procedures persist for landfill owners and operators. However contradictory it may sound, could "Sustainable landfilling" be the answer? Marion Huber-Humer explains a new approach to evaluate the sustainability of landfills.

Sustainability in the context of landfills includes pre-treatment of waste before disposal

A New Approach

to Evaluate the Sustainability of Landfills

Sustainable landfilling is a key-issue in modern waste management concepts. However, no internationally accepted definition has been identified to date. The concept can, however, be understood as a landfill where the waste mass is already in a stable state, meaning the remaining turnover processes are low and emission release is below the local environmentally acceptable level. Or that it can be controlled by simple and natural measures, such as methane oxidation in landfill covers. Most of the remaining carbon and nitrogen is bonded in stable substances and the landfill can be regarded as a long-term carbon storage pool. In order to evaluate, assess and quantify these processes and pools, new methodologies and analytical tools are needed.

Steps towards a sustainable landfill

Sustainability in the context of landfilling often means a multi-barrier concept that includes the appropriate geological background, technical landfill equipment and pre-treatment technologies of waste prior to landfilling. When physical barriers fail due to aging, emission release should be below the environmentally acceptable level. This is particularly crucial when considering the standard use in Europe of insulating landfills by means of impermeable liners. Insulation interrupts all landfill processes, but liners will only hold over a limited period, and will inevitably fail at some (unknown) point in future.

The way to put the principle of sustainable landfilling into practice represents one of the main research issues for the scientific community. Several promising pre-treatment, in-situ treatment, and post-treatment measures and technologies are currently undergoing development to achieve a sustainable landfill concept with acceptable aftercare phases of about one generation. The latter aim is most likely to be achieved by modern landfills receiving pre-treated and separated waste streams. Moreover, promising technologies, such as in-situ aeration or flushing technologies, to enhance landfill processes and shorten aftercare periods of old, closed MSW landfills are available.

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ISWA 2011

World Congress of International Solid Waste Association

October 17 - 20, 2011 | EXCO, Daegu, Korea

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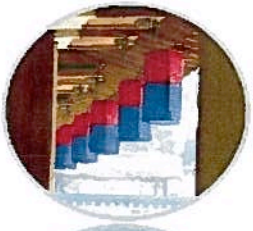

√ Early Registration Deadline

> August 15, 2011

√ TOPICS

[SPECIAL TOPICS]

- Practices and Challenges of 3Rs in Metropolis (Asian and European)
- ODA(Official Development Assistance) Experiences in Municipal Solid Waste Management (for both of developing and developed country sides)
- Trans-boundary Flow and Recycling of E-waste
- Roles of Landfill for Sustainable Solid Waste Management
- Controversial Issues in Energies from Wastes
- Emerging Technologies and Businesses in Solid Waste Sector

[GENERAL TOPICS]

- Advanced Thermal Treatment and Energy Recovery
- Advanced Treatment for Hazardous Waste
- Climate Change and Waste Prevention
- Communication and Social Issues
- Construction and Demolition Waste
- Disaster Waste Management
- E-Waste
- Eco-Materials and Green Products
- EPR Experiences in Developed & Developing Countries
- Innovative Ideas for Recycling
- Landfilling & Landfills
- Material (Carbon) Flow Analysis
- Present and Future State of Waste Management in Developing Countries
- Ocean Pollution & Marine Waste
- Role of NGOs, CBOs and the Private Sector
- Sustainability in Modern Societies
- Urban Mining
- Waste Policies for Green Growth
- Converting Waste to Energy
- Other Topics Related to Waste Management

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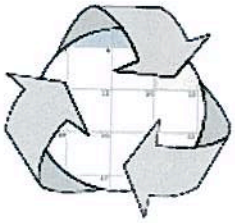

Diary of events

2011

2011 World Recycling Convention & Exhibition
Singapore
22–25 May 2011
Tel: +32 2 627 57 70
e-mail: bir@bir.org
web: www.bir.org

2nd Beacon Conference on Waste Prevention & Recycling
Vienna, Austria
23–24 May 2011
Tel: +43 1 253 6001
e-mail: iswa@iswa.org
web: www.iswa.org

Waste-to-Resources - 4th International Symposium MBT & MRF 2011
Hanover, Germany
24–26 May 2011
Tel: +49 511 235 9383
e-mail: info@wasteconsult.de
web: www.wasteconsult.de

SustainabilityLive 2011
Birmingham, UK
24–26 May 2011
Tel: +44 20 8651 7106
e-mail: sandra.bilz@fav-house.com
web: www.sustainabilitylive.com

WasteTech 2011
Moscow, Russian Federation
31 May – 3 June 2011
Tel: +7 495225 5986
e-mail: info@sibico.com
web: www.waste-tech.ru

POWER-GEN Europe
Milan, Italy
7–9 June 2011
Tel: +44 1992 656 646
Fax: +44 1992 656 700
e-mail: csispringpennmail.com
web: www.powergeneurope.com

The Plant & Waste Recycling Show
Torbay, UK
7–9 June 2011
T. +44 1962 870355
e. admin@pawrs.co.uk
w: www.pawrs.com

WASTECON 2011
Nashville, Tennessee, USA
23–25 August 2011
20910, USA
Tel: +1 800 467 9262
e-mail: info@WASTECON.org
web: www.swana.org

RWM
Birmingham, UK
13 –15 September 2011
Tel: +44 20 7728 4687
e-mail: dan.stone@emap.com
web: www.futuresourceuk.com

ISWA Annual Congress 2011
South Korea
17–20 October 2011
Tel: +43 1 253 6001
e-mail: iswa@iswa.org
web: www.iswa.org

2011 Autumn Round Table Sessions
Munich, Germany
23–25 October 2011
Tel: +32 2 627 57 70
e-mail: bir@bir.org
web: www.bir.org

2012

IFAT ENTSORGA 2012
Munich, Germany
7–11 May 2012
Tel: +49 89 9 49 113 58
e: info@ifat.de
w: www.ifat.de

World Bioenergy 2012
Jönköping, Sweden
29–31 May 2012
Tel: +46 36 15 2214
e. jakob.hirsmark@elmia.se
w: www.worldbioenergy.com

World Recycling Convention & Exhibition 2012
Rome, Italy
29 May– 1 June 2012
T. +32 2 627 57 70
e. bir@bir.org
w: www.bir.org

WASTECON 2012
Washington D.C., USA
15–17 August 2012
T. +1 800 467 9262
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