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NOVEMBER-DECEMBER 2012

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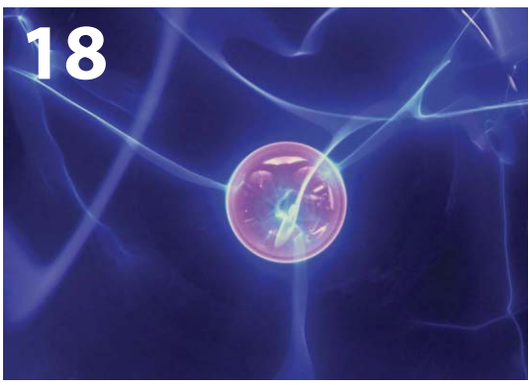

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EDUCATION, EDUCATION, EDUCATION

A good public education campaign and well chosen site cannot be underestimated in project communications

Ben Messenger Managing Editor

We've been on something of a high here at WMW for the past few weeks. Why? It's not just because the festive period of welcomed over-indulgence is of course upon us. We were recently presented with the Waste-to-Energy Research and Technology Council's (WTERT) prestigious award. The reason? For making a significant contribution to global sustainable waste management during the first decade of the 21st century. And with the November/December issue being our annual waste to energy special edition, it couldn't have been better timing.

As waste sector professionals, you have an understanding of just how tightly controlled the emissions from modern waste incineration plants are, and that those emissions have been repeatedly found to be of no harm to human health in pretty much every developed country. But unfortunately – at least in some parts of the world - the public isn't convinced.

In an age of growing cynicism and distrust in politicians and 'big business', the leaflet through the door warning of lethal dioxins and corporate cover ups can prove hard to counter.

Indeed, in some parts of the world the need to placate a sceptical public in the face of vociferous and often plain wrong anti-incineration rhetoric has led, in part at least, to a move towards 'non mass-burn' technologies. In New York the mayor has made a request for proposals for a 500 tpd facility that excludes mass-burn technologies. In the UK Air Products has begun building a 50 MW plasma gasification facility which received not a single objection to its planning application (See p18).

Sure, there are other factors at play here, such as a good public education campaign and a well chosen site, but I wouldn't mind betting that plans for an equivalently sized incineration facility would have received objections.

However, while so called 'advanced' conversion technologies look set to take their place at the waste to energy table, as detailed in Tom Freyberg's report from the WTERT's Annual Conference at Columbia University, 'traditional' thermal treatment technologies are hardly standing still (see p12). Indeed, it could be argued they have a head start of many decades.

With a growing global population, rising energy demands and diminishing natural resources, it's hard to imagine a future in which waste to energy does not play an increasingly important role - particularly where truly renewable waste feedstocks are used. The more technologies available to make best use various wastes in multiple locations is surely a good thing. After all, there is no one size fits all approach.

Enjoy the issue and have a great New Year.

Ben Messenger
Managing Editor

> **The need to placate a sceptical public in the face of vociferous anti-incineration rehetoric has led to a move towards non mass-burn technologies.**

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BIOPLASTICS READY FOR LIFTOFF

Already being put to use by the clothing and automotive industries, bioplastics look set for strong growth in the coming years

David Newman President, ISWA

The prestigious recognition of WMW by the University of Columbia WTERT in October, for its promotion of the waste industry worldwide, is an important signal of the value of our official publication and my thanks and compliments go to the staff at PennWell and in particular their editors, Tom Freyberg and Ben Messenger. I remind all ISWA members that they can send articles to be considered for publication in WMW to our GS in Vienna.

Ben and I met recently in Rimini, Italy where he was tracking the Ecomondo trade fair and I was participating in several workshops including one organised by the Italian National Member of ISWA. Over 80,000 people passed through Ecomondo this year, their best year to date.

Also in the month of November ISWA held a very successful Hazardous Waste Training Workshop in Buenos Aires, organised with UNEP and our National Member ARS. Participants were present from 12 Latin American nations, updating the guidelines of the Training Package for translation into Spanish. This followed the model of the workshop held earlier this year in Singapore and highlights the importance of Hazardous Waste Treatment in rapidly developing countries. My thanks to UNEP for supporting the workshop, to our Working Group led by Jean Paul Leglise and to ARS for their fine local organisation.

In mid October I spoke at the Biopolymers Symposium in San Antonio, Texas. The introduction of bioplastics into packaging, but also for uses such as the interiors of automobiles (Ford) and components of shoes (Nike), is growing exponentially. American analysts reckon on a 500% growth in bio-based plastics production from now until 2015 with new technological advances being announced almost every day. For waste managers bioplastics present new opportunities and challenges, both in collection systems and treatment. This is a debate we have not really had within our industry but now is the time to start it. I look forward to WMW affronting the question in a future issue and to all your contributions.

> **American analysts reckon on a 500% growth in biobased plastics production from now until 2015 with new technological advances being announced almost every day**

ISWA's Climate Change team is working hard to prepare for the Doha UNFCCC COP 18 Summit which ISWA will attend from November 29th to December 6th and which I will report back on in some detail in the next issue. ISWA will hold a press conference on December 4th as well as participating in events held by other stakeholders over the week, with the aim of ensuring that waste is firmly on the agenda of negotiators when discussing mitigation instruments and sectorial agreements.

Further, I met Juan Jose Mussi, Argentine Minister of Environment in Buenos Aires November 16th and Maria Benitez, Chilean Minister of Environment in Santiago, November 15th, to enlist their support for our climate change platform. Both were sympathetic to our proposals and we will be meeting again with them in Doha. I also took the opportunity of meeting with the new Chile National Member for ISWA, AEPA, who kindly illustrated the situation regarding waste management in this beautiful country. We welcome them to the ISWA family.

I recall that the ISWA European Group has a good agenda for the meetings in Brussels on December 5th and 6th. I hope many of our European readers and members will attend to ensure a broad and engaging debate.

Let me take the opportunity of wishing all readers the very best for the season's festivities and a prosperous New Year.

David Newman
President, ISWA

NEWS

NEWS

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LANDFILL: TO BAN OR NOT TO BAN

A ban on sending unsorted waste to landfill could save the UK around £2.1 billion by 2024, according to the Waste and Resources Action Programme's (WRAP) latest report into the impact of introducing landfill bans.

Written by environmental consultants, Eunomia Research & Consulting, the report - 'Landfill Bans: Feasibility Research' – is an update to an earlier 2010 publication and has been compiled using a revised model of landfilling.

According to WRAP the study aimed to discover whether the costs and benefits of specific landfill bans and restrictions justify their use. Further goals were to understand how landfill bans or restrictions could help meet the EU Landfill Directive for biodegradable municipal waste and increase business opportunities.

Restrictions Vs Bans

Following an initial consideration of available options, the report's authors said that two types of material-based policy were taken forward for the cost benefit analysis:

- A 'restriction' whereby any form of 'sorting' of the effected materials would be considered sufficient for those types of materials to be restricted from landfill as far as is able to be known and with carriers required to testify to such processing.
- A 'ban on unsorted waste' whereby different types of waste are totally diverted from landfill. This measure would be supported by a defined 'requirement to sort', setting out minimum requirements to apply irrespective of the destination of residual waste.

Savings by material

The report found that the depending on how the biogas produced by the processing of food waste is used, a landfill restriction could offer savings of up to £92 million between 2009 and 2024 – but could cost an additional £290 million. However, under a ban the equivalent range is between £340 million and £1.3 billion in savings.

For paper and card the study found that the potential savings from restrictions could result in a net benefit to society of some £130 million, while a total ban could bring that to £720 million. Likewise, for metals the figure rises from £75 million for a restriction to a possible £800 million for a ban and for textiles the figures suggest a £110 million saving to society for a restriction and £250 million for a ban.

Interestingly, for wood waste the report said that a landfill restriction for could result in net benefits to society of £48 million, reducing to £21 million under a ban, while a restriction on the landfilling of green waste offers zero potential savings and a ban a net cost to society of up to £84 million.

For plastics the cost benefit analysis as modeled by the research suggests that a landfill restriction could result in net costs to society of £170 million, and a ban on unsorted waste could increase that to £480 million over the same period. When looking at the impact for Waste Electrical and Electronic Equipment (WEEE) the report claimed that a restriction could result in a net cost to society of £20 million and a ban could increase this to £200 million.

Recommendations

The report concluded that the climate change benefits and resource efficiency gains are likely to be greatest where a ban on landfilling unsorted waste is implemented.

According to the authors, if all materials considered in the report are within the scope of a ban on unsorted waste, the median value of the net benefit to society is estimated at £910 million between 2009 and 2024 and the median value of greenhouse gas savings over the same period is estimated at 120 million tonnes of CO_2 equivalent.

The report concluded that if only those materials for which there are net social benefits are considered, the median value of GHG savings achieved over the period is estimated at around 73 million tonnes CO_2 equivalent. The median value of the net benefit to society from a ban on unsorted waste covering these materials is estimated at £2.1 billion.

However, the authors also concluded that few of the material based measures could be implemented in such a way that their enforcement was intended to be meaningful in a period of any less than five to seven years and that this could be even longer for some materials, such as biodegradable wastes which account for 10 times as much material as any other measure.

The report also cautioned that any ban on unsorted waste to landfill should be accompanied by an equivalent measure covering all residual waste treatments so that the requirement is not 'sidestepped'.

SMART MATERIAL MANAGEMENT ABOUT MORE THAN JUST WASTE

Worldwide 62 billion tonnes of natural resources including minerals, wood, metals, fossil and biomass fuels, and construction material are extracted each year with around 20% of that ending up as waste, according to a new report by the Organisation for Economic Co-operation and Development (OECD).

Historically, the report said that governments have focused on managing waste as a means of managing the impact of materials on the environment. However, it argues that while much success has been achieved, research has shown that waste management is not the key to controlling material flows.

The OECD said that a more complete approach to materials management, known as Sustainable Materials Management (SMM), is increasingly recognised as a policy approach that can contribute to green growth.

The report explained that the policy principles of SMM are the preservation of natural capital, the life-cycle perspective, the use of the full range of policy instruments and a multi-stakeholder approach.

The organisation said that one of the main challenges of the SMM approach is to effectively address the environmental impacts that can occur along the life-cycle of materials, which frequently extends across political and geographic borders and involves a multitude of different economic actors.

A key lesson for policy makers highlighted in the report is that SMM will require greater coherence of policies which requires co-operation across different parts of government, which is not current practice. SMM also requires enhanced partnerships between economic actors as well as an international perspective and further efforts for capacity development.

US DEMAND FOR RECYCLED PLASTICS TO RISE 5.9% PA TO 2016

Demand in the U.S. for post-consumer recycled plastics is forecast to rise 5.9% per year to 1.54 million tones in 2016, according to a report by market analysts, Freedonia.

The report found that gains will be driven by a number of factors, including a growing emphasis on sustainability, advancements in processing and sorting technologies, and an improved collection infrastructure and continued support by federal, state, and local governments for recycling efforts.

However, the authors cautioned that the overall rate of plastic recycling in the U.S. will remain relatively low at around 6.5% of total plastic demand in 2016, and that the industry faces a number of challenges.

Due to a lack of collection and economically viable processing capability, the report said that recycling in several major plastic markets, including construction products, motor vehicles and packaging film remains minimal.

According to the analysts exports, particularly to China, siphon off a large portion of plastic scrap and much of what is processed domestically has high levels of contamination. As a result, only 53% of the plastic collected for recycling makes its way into manufactured products in the U.S. market.

IN BRIEF

Bridge Made from Recycled Plastics in California

A bridge in Santa Rosa Valley, California has become the first on the West Coast of the U.S. to have both its superstructure and fencing made of recycled plastic.

The 25 foot (7.5 metre) bridge, designed for both pedestrians and horses has been made from STRUXURE™, a recycled plastic material developed by New Providence, New Jersey based AXION International Holdings.

Sims Offloads Arizona Scrap Assets

Sims Metal Management has sold its Arizona scrap metal recycling assets to SA Recycling - a joint venture owned equally by Sims and Adams Steel.

The company said that the sale was settled for a cash price of $35 million and principally involves the real property related assets of the two scrap metal recycling facilities located in Phoenix and Tucson.

Sims will retain the working capital assets of the Arizona business which it will monetise for around a further $15 million.

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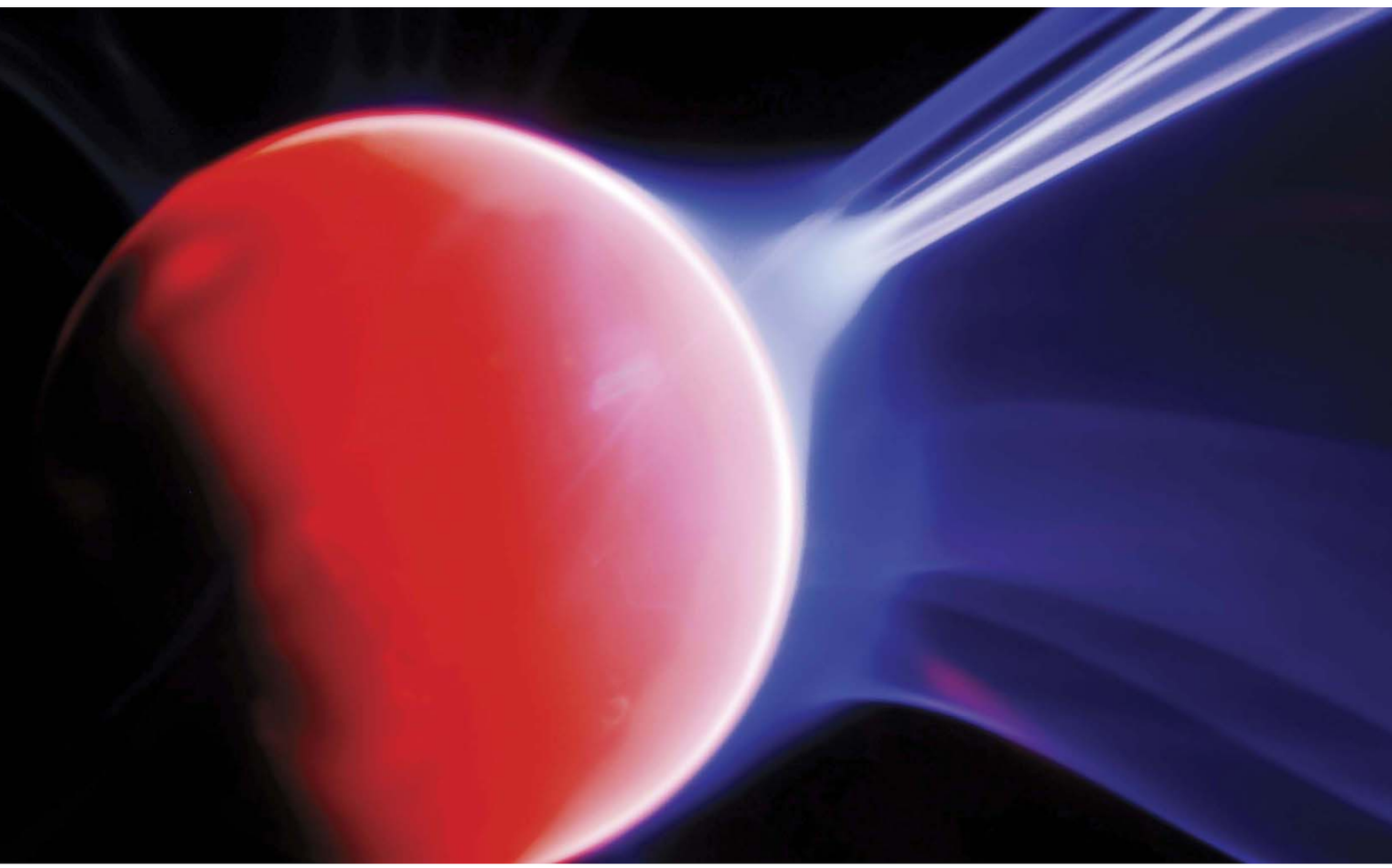

WASTE GASIFICATION: COMING OF AGE?

Futureproof? Hitachi Zosen Inova says the Renergia facility in Switzerland will include several advancements in combustion

OUT WITH THE OLD IN WITH THE NEW?

Gasification and The Evolution of Traditional Combustion

How can traditional moving grate combustion be improved? Is gasification now being taken seriously? How did Canada double its awarded projects in five years? Will Brazil and India's first projects be successful? WMW reports from the Waste to Energy Research and Technology Council (WTERT) Annual Conference at Columbia University in New York to find the answers.

by Tom Freyberg

Image: BIG-Bjarke Ingels Group/Glessner (architects) and Amager Resource Centre (client)

> **A crucial feature of gasification is that cleaning and recovering thermal energy from syngas is difficult and costly. As a result the scale is small**

The million dollar question continually being asked within the waste to energy sector is why is there such an interest in gasification technology when, compared to traditional combustion, it's still unproven on a wide, commercial scale?

"There have been increased interests in greener technologies. The word gasification has the perception of being cleaner, greener and sexier than combustion," says Steve Goff, vice president of research and development at Covanta Energy.

"Gasification is a well established process for fossil fuel and biomass feedstocks but economics are still challenging. The heterogeneous nature of MSW [municipal solid waste] complicates equipment design, process design and process control."

Discussing pre-treatment concerns, Goff says that the cost of pre-sorting waste - handling, shredding, processing and storing - is very high and a lot corporations turning their hand to gasification expect other companies to do this. They simply underestimate the cost.

"The gasification processes developed for coal or biomass would require significant pre-processing of MSW," he adds.

GASIFICATION DEMONSTRATION AND COMPARISON

Covanta might have been flying the combustion flag since it started operations back in 1986, boasting 40 facilities worldwide, yet it is also actively looking into new gasification technologies.

In Tulsa, Oklahoma in the U.S. the company has been operating a commercial gasification demonstration, called the Tulsa Unit 3. The process is MSW gasification with syngas combustion.

Sharing results from the trial with delegates, Goff says the unit has been "operating reliably since July 2011 with 94% availability". Quoting "excellent emissions performance", he says that NOx levels average 40 – 60 parts per million (ppm) with short-term NOx tests being measured less than 30 ppm.

Using the experience from its Tulsa installation, the company plans on launching a 300 tonne per day modular gasification plant, called the Covanta Low Emissions Energy Recovery Gasification, or CLEERGAS for short.

According to the VP of research and development, this system has been selected by St, Lucie County in Florida for two 300 tpd facilities, providing combined heat and power. Discussing advantages compared with traditional WtE, he says: "There is a better control of syngas combustion with lower NOx and CO generation. Furthermore, there is a lower air requirement – lower flue gas flow, higher boiler efficiency, lower particulate and smaller equipment."

Providing another perspective, Professor Stefano Consonni from Politecnico di Milano in Italy presents a comparative analysis of two waste gasification technologies.

"Gasification is not a new technology – it was introduced as far back as the 1800s," he says. "Yet waste gasification has never really taken off. Nearly all waste gasification technologies proposed are two-step oxidation processes."

Also quoting pre-treatment of MSW as a requirement for the technology, the professor highlights challenges with the produced syngas compared to combustion.

He says: "A crucial feature of waste gasification is the cleaning and recovering of thermal energy from the syngas is so difficult and costly. As a result, the scale is typically so small.

"Rather than producing power by high-efficiency systems like Combined Cycles or combustion engines, waste gasification plants typically adopt the same power system of conventional combustion plants: steam cycle."

On a positive note, Consonni adds that "at most, waste gasification plants can reach energy performances close to those of combustion plants".

R&D DIRECTOR'S DREAM

New technologies to one side, Peter Chromec, CEO of Hitachi Zosen believes there is still huge room for innovation and improvement when it comes to grate combustion technology.

He starts by identifying areas that are challenging for facility managers: "There are two opposite conditions for low steam production – firstly not enough fuel on the grate or secondly, sufficient fuel but too much moisture content. These drops mean you end up losing steam and power production. We face the challenges of changing feedstock, such as a lorry full of waste after a heavy rainfall."

The CEO says that calculations reveal this lost production could be up to half a million dollars per year for plant operators.

New measures touted to resolve these challenges include the early detection of fuel property changes as well as the ability to closely control the position of the fire on the grate.

Stack losses were also highlighted as one significant area for improvement on existing facilities. "Stack losses are significant and equate to roughly 10-15% of energy (lower heating value)," he says. "Efficiency improvements can be made by lowering exhaust gas temperature or lowering exhaust gas flow rate."

The Renergia facility in Perlen, near Lucerne in Switzerland is where Hitachi Zosen Inova will be including many of the new developments mentioned above. Chromec refers to the facility as an "R&D Director's Dream Came True".

Set for start-up in January 2015, the 200,000 tonne per year facility will eventually process

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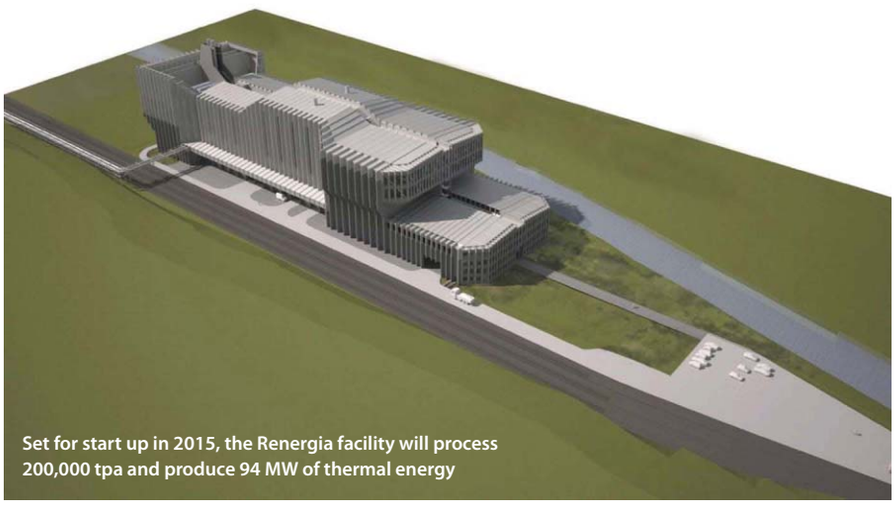
PARADIGM SHIFT

Looking at the industry more broadly, Paul Hauck, consulting engineer for CDM Smith believes that the traditional waste hierarchy triangle should be turned upside down. More attention should be paid to source reduction at the top of the triangle and less landfill at the bottom. He references a U.S. patent granted in 1995 for a "dome" style waste to energy plant. Ten years later and Veolia Environmental Services' Marchwood facility in England came online with the very same design.

Asked to predict the future of waste management, Hauck believes that there will be a "marriage of public works as they start working together" and we could see "construction waste sorting facilities, MRFs, wastewater treatment works and WtE plants all on one campus". These will be called "eco campuses", he predicts. The consulting engineer refers to the Hillsborough County Resource Recovery Facility in the U.S. as one site where such relationships are already taking place. The WtE plant was originally constructed in 1987 with a 1200 tpd capacity and expanded in 2009 with a further 600 tonne capacity.

Here a wastewater treatment plant is co-located. Treated sewage effluent is used for cooling of the power plant and 2 MW of power is provided back to the water plant. The consulting engineer says this enables the water plant to operate separately from the grid.

"Using electricity internally in public works could save tens of millions of dollars each year across the US," he says.



Set for start up in 2015, the Renergia facility will process 200,000 tpa and produce 94 MW of thermal energy

THE CANADIAN APPROACH

John Foden, president of the Canadian Energy From Waste Coalition, doesn't pull any punches when it comes to the state of waste in Canada. "We're not a few percentage points from Zero Waste, we're a million miles away."

However, the Coalition has a very positive and enviable record when it comes to waste to energy. The country has seen a 100% increase in WtE facilities over the last five years – from seven to 14 projects being awarded. The seven new facilities in the works in 2012 include four in Ontario, two in Alberta and one in British Columbia. Public

perception of WtE and getting communities onboard is an ongoing communication challenge for the sector. Yet Canada also seems to be overcoming this as well, according to Foden. Research shows that 83% of Canadians now support WtE solutions.

This is up from 67% only four years ago. And among those who support the facilities, almost 60% would support construction of a facility in their immediate community.

GREEN LIGHT FOR WTE IN BRAZIL/INDIA

Challenges to WtE uptake in Brazil are well known: landfill has been deemed environmentally adequate for years and the fairly recent piece of regulation – the Brazilian Policy on Solid Waste Management – took 20 years to establish. Add low tipping fees and high taxes on energy into the mix and you have a difficult environment for WtE to flourish.

Yet there is a glimmer of hope, according to Sergio Guerriro Ribeiro, president of WTERT Brazil. He reveals to delegates that the first Brazilian WtE plant is being built in Sao Paulo. Keppel Seghers will provide the grate technology to new waste management company Foxx.

Plans will include an 825 tpd capacity, eventually generating 64 MW of energy. Riberio adds that if successful, this facility could lead to 16 WtE plants being built in the country.

Nor is it just Brazil from the BRIC (Brazil, Russia, India and China) cluster where waste to energy momentum could build quickly once the first major projects get off the ground. India, too, will be another market to watch, according to Ranjith Annepu from WTERT India and graduate from Columbia University.

While small scale biogas has been successful in India, he says, the country is expecting 10 plants to be awarded over the next three years. "Each city will have two to three plants as awareness increases," Annepu predicts. "Municipalities are now seeing waste as wealth."

HEATED DEBATE

Despite progression from major players such as Covanta with its CLEERGAS system, there remains much scepticism over what are considered "new" waste to energy technologies.

For countries such as Brazil and India, a basic infrastructure of proven technology will need to be installed so confidence can be built in WtE as a concept. Only then will there be room for more advanced treatment processes.

Elsewhere, all eyes and ears of the industry will be watching new developments, such as Air Products' gasification facility in Tees Valley, UK and Covanta's roll out of its system in Florida.

> **Each city in India will have two to three plants as awareness increases. Municipalities are now seeing waste as wealth.**

Caution will inevitably remain over new projects but then caution most likely remained when the first large scale combustion plants came online decades ago.

The WTERT bi-annual conference proves one thing: innovation and heated debate will continue to go hand-in-hand in the WtE business.

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Please visit www.waste-management-world.com

Is Waste Gasification FINALLY COMING OF AGE?

Spurred by government incentives and a stable regulatory environment, Air Products has begun construction of a 50 MW plasma gasification facility in Teesside. With the company already planning a second such plant at the site - as well as others around the country - is the waste industry entering the age of gasification?

by Ben Messenger

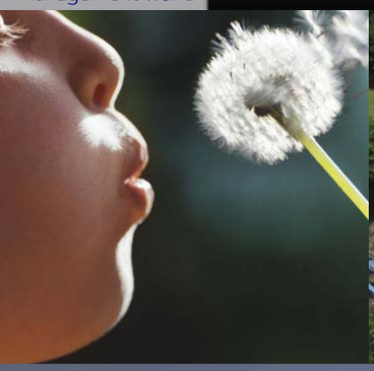
Over recent years there has been growing interest in the use of gasification technologies to treat solid waste. The concept is not a new one. Indeed gasification itself has been used for over 180 years, and was once in common use to provide gas for heating and lighting. However, these systems typically gasified coal or peat. Early attempts to use municipal waste as a feedstock ran into problems when scaled up unless the input was suitably homogenous. But with its lure of low emissions and a greatly reduced, environmentally sound residue, the story was never going to end there.

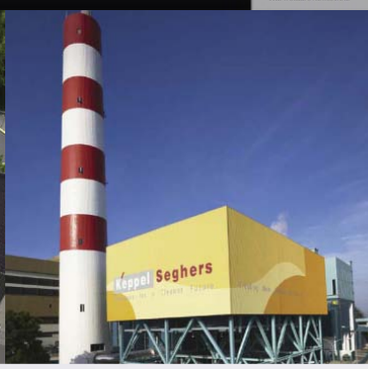
Today a number of companies offer technologies which are claimed to solve many of the problems and make the large-scale gasification of mixed solid wastes an environmentally sound reality. Nor is it just the potential environmental benefits which are pushing gasification up the waste treatment agenda. While public opinion in some countries, such as Denmark, is very favourable to traditional thermal treatment facilities for waste, in others, such as the U.S. and UK, incinerator plans often face fierce opposition.

For governments and politicians then, the ability to 'sell' a project to the public as being 'not incineration' can be appealing. A perfect example of this can be seen in the request for proposals made earlier this year by New York City's mayor, Michael Bloomberg, which specifically excludes traditional mass burn technologies. While many highly regarded figures in the industry have questioned this approach, it certainly provides a foot in the door for the gasification industry.

In the UK too, gasification is being given a leg up by government, with such facilities eligible for double support following the latest Renewables Obligation (RO) banding review (See Dr. Matthew Aylott's article on page 24 for a full explanation). Combined with the European Landfill Directive, the UK has become an attractive place to build

The 50 MW Teesside plant will be the first of its kind in the UK and the largest in the world





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This was the perfect storm that brought us to the UK. In terms of the need for additional capacity in the electricity market, the targets around renewable energy production and the financial incentives which exist

a waste gasification facility. So much so that Allentown, Pennsylvania based gas processing technology developer, Air Products has chosen to build a 50 MW plasma gasification facility in Teesside in the North East of the country.

THINKING BIG

According to Air Products, the facility - currently under construction at the New Energy and Technology Business Park, near Billingham - will be the first of its kind in the UK, and the largest of its kind anywhere in the world. As well as generating enough electricity for 50,000 homes, the plant is expected to divert up to 350,000 tonnes of non-recyclable waste from landfill per year - helping to meet the UK's waste diversion targets.

The company claims that the Westinghouse advanced gasification technology provided by AlterNRG offers a more efficient, cleaner conversion of waste into power than traditional waste to energy technologies and has the potential to generate a wider range of useful products, including heat, hydrogen, chemicals and fuels.

The facility will process residual commercial, industrial and municipal waste, which will be continuously fed into a gasifier that is also supplied with oxygen and nitrogen via an air separation unit. The waste is pre-shredded to avoid blockages. Once in the gasifier the waste is thermally treated by the system's plasma torches to generate a synthetic gas (syngas) which is then put through a gas cleanup stage. The end product is a clean syngas consisting of carbon monoxide and hydrogen which is used to fuel a Solar Turbines gas turbine driven generator.

Longer term, the company says that the facility has the potential to generate renewable hydrogen which could be deployed for commercial use, such as fuelling public transport.

"One of the nice things about these advanced gasification technologies is that they provide a really neat link back into the industrial gases sector that you could potentially use as a resource for renewable hydrogen in the future," explains Lisa Jordan, bio-energy Europe business manager at Air Products.

"Having that clean syngas is the key to unlocking all those future end products, and that's where for us this is exciting, because it ties back into our hydrogen business in the future if we need a source of renewable hydrogen, whether that's for industrial or for vehicle fuelling applications. But right now the way these things get built is through power generation because that's where the need is," she adds.

The Teesside facility will utilise Alter NRG plasma gasification technology
Credit: Alter NRG

PUBLIC OPINION AND PLANNING

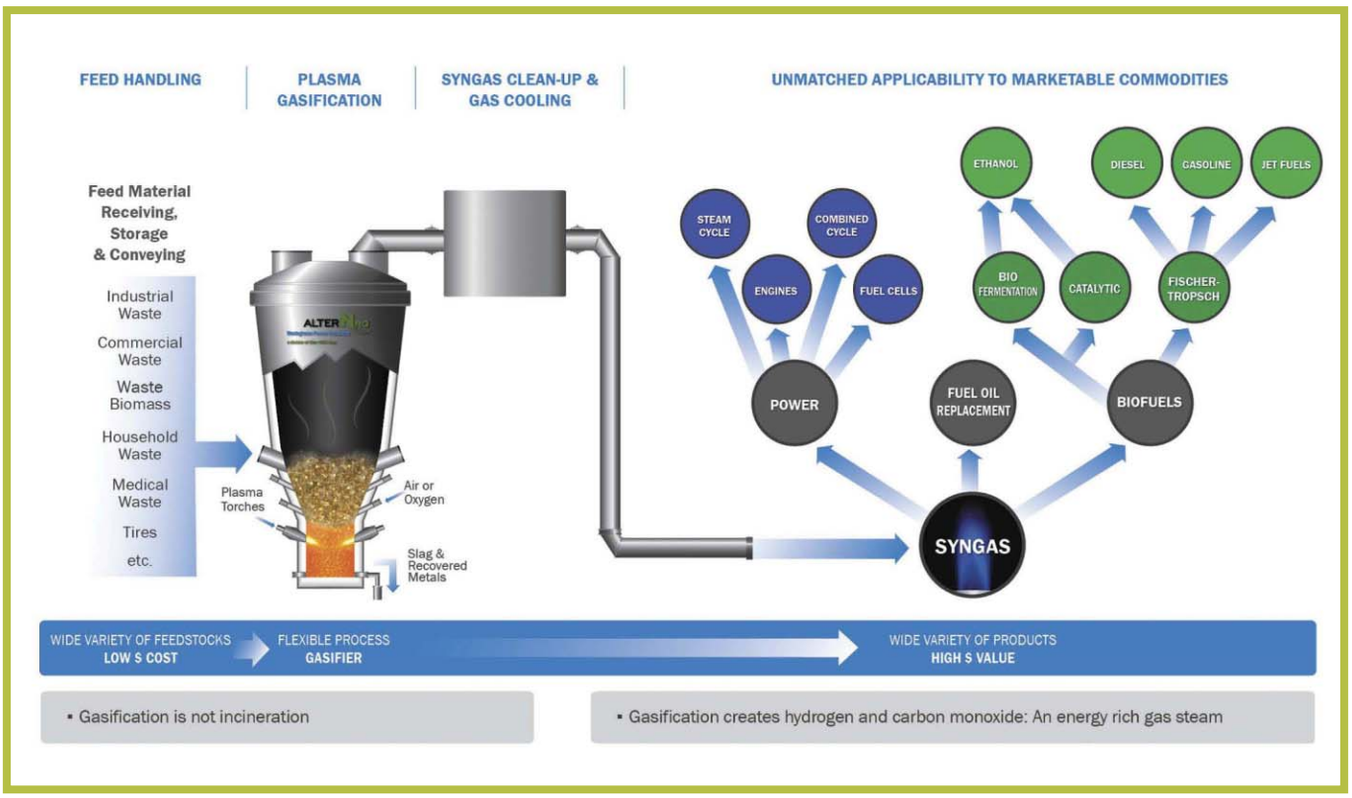
When it comes to waste projects most developers will tell you that public support is almost always difficult to come by in the UK. And that is particularly true of large scale waste to energy projects. Yet according to Jordan, Air Products' Teesside facility has not only received cross party political backing, but has also been given the thumbs up by the public.

"We've had an unprecedented level of support from the public on Teesside and we've had a fantastically good experience with the planning system. We didn't have a single objection to our planning application," she says.

As part of the planning process, the company conducted a series of technical and environmental studies, consulted local and national organisations about the project and shared its plans with local residents and businesses. In October 2010 it held public exhibitions in Stockton and Port Clarence and distributed leaflets to more than 7500 households in the area.

The public backing for the project is also partly explained by its location in a highly industrial area, which has been designated for new energy technologies. Another benefit of the chosen site is that it's close to Teesside landfill, from which it will divert waste, and has good road and electrical infrastructure. Interestingly, the landfill operator, Impetus Waste Management is also Air Products landlord and waste partner for the project, and will benefit from the extended life span of the landfill.

WASTE TO ENERGY FOCUS PLASMA GASIFICATION



One of the key advantages offered by plasma gasification is its ability to produce a range of products including renewable hydrogen Credit: Alter NRG

> *Waste-to-energy plant construction (Baku, Azerbaijan)*

In August 2012 the company secured planning permission for the facility from Stockton Borough Council and received an environmental permit from the Environment Agency.

BRIGHT FUTURE FOR ADVANCED GASIFICATION

According to Jordan the project fits with the country's climate and energy goals. "This was the perfect storm that brought us to the UK. In terms of the need for additional capacity in the electricity market, the targets around renewable energy production and the financial incentives which exist to support that, and the EU Landfill Directive," she explains.

The government then seems to be firmly behind the use of gasification to treat waste, and Deputy Prime Minister, Nick Clegg has even publically backed the technology as having a key role to play in delivering renewable energy. As such, Air Products is confident of the rapid development of additional facilities in the UK and recently unveiled plans for the first of those - a second 50 MW plant in Teesside.

According to Jordan, as with the first plant, the availability of skilled labour, industrial land, good access to electrical infrastructure and excellent road links were important factors in the decision to pursue an additional plant in Teesside. The company also has grander plans to build five or so facilities of this type in the UK.

"One project doesn't make it a business," explains Jordan. "We actually want to do more of these. The UK now has, as we see it, a very stable regulatory environment to enable us to make those future investments."

CONCLUSIONS

Air Products' 50 MW Teesside facility may be the first of its kind in the UK, and the largest of its kind in the world, but there are numerous other waste gasification projects either under construction or in planning both in the UK and around the world.

CHO Power, a subsidiary of the Europlasma Group, recently completed the development of its 12 MW plasma gasification facility in Morcenx, France and is planning four similar plants in the UK with a total output of 37.5 MW. Meanwhile, IES - a joint venture between European Metal Recycling and New Jersey based advanced gasification technology manufacturer, Chinook Sciences is developing a 40 MW gasification plant to treat shredder fluff from end-of-life vehicles in the in UK's West Midlands. Biossense, INEOS Bio and British Airways are working on gasification projects of their own.

In the U.S., Science Applications International and alternative asset manager, Carlyle Energy Mezzanine Opportunities have agreed to provide financing for construction of the $225 million Plainfield Renewable Energy project which will gasify wood waste to produce some 37.5 MW of energy. Also in the U.S. Covanta recently completed commercial demonstration testing on a gasification technology that it claims to be 'first-of-its-kind' and which will gasify unprocessed post-recycled municipal solid waste in a commercial setting (see Tom Freyberg's WTERT Conference review on page 12).

In Sri Lanka a $248 million 40 MW plasma gasification facility, which is planned to treat 1000 tonnes per day of waste, is reported to be under construction.

Around the world a great many more projects are in the pipeline. Not all will make it to fruition, but it would seem to indicate that waste gasification is a technology which may just be coming of age.

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ROC AND ROLL

Shaking Up UK Renewables

The banding review has provided a stable regulatory environment for technologies such as plasma gasification

The UK Government is currently walking a tightrope between managing its budget and supporting the developing low carbon energy industry, which has the potential to create thousands of jobs and boost the stalling economy. But what will be the impact of a recent regulatory review on the waste to energy industry?

by Dr Matthew Aylott

How do recent changes to UK renewable energy legislation affect the waste industry? If the UK is to become a leader in renewable energy and approach anything like self-sufficiency, it needs investment in a wide variety of low carbon sources of energy, including waste to energy (WtE).

WtE offers a very real opportunity to not only reduce waste but also to generate a valuable income through the recovery of energy. However, working out the best way to capitalise on the government support available for such projects is becoming increasingly complex.

With a seemingly confusing mix of incentives, credits and tariffs, it is more important than ever to properly understand the legislative minefield before making a decision. The Government's latest Renewables Obligation (RO) banding review – published in July this year – has delivered important changes to the support available for WtE technologies; bringing certainty and confidence to some investors but raising serious concerns for others.

COMPLEX LANDSCAPE

The RO has been in place in the UK since 2002, with current levels of support at around £2 billion per year. The system puts a mandatory requirement on licensed UK electricity suppliers to source a specified and increasing proportion of electricity from eligible renewable sources or face financial penalties.

The system is administered by the Office of Gas and Electricity Markets (Ofgem), which issues generators with Renewables Obligation Certificates (ROCs) for each MWh of renewable electricity produced. The generators of the renewable energy can then sell these ROCs either to suppliers or to traders, allowing them to receive a premium on top of the wholesale electricity price.

It is this premium which often dictates the viability of renewable energy projects, with the system banded so that some of the more costly renewable energy technologies receive more ROCs than others, in order to encourage their development.

The Government's RO banding review, which

In terms of support for waste to energy, the announcement looks like a boost for gasification and pyrolysis technologies, a cautious scale back of support for dedicated biomass and co-firing, and in the case of anaerobic digestion a serious hiccup at a crucial stage of development in a relatively new industry

was published following a consultation process which started in October 2011, goes some way to confirm Government support for waste to energy technologies. It made some notable changes, particularly for anaerobic digestion (AD), gasification, pyrolysis and biomass technologies.

ANAEROBIC DIGESTION

New bands in the RO mean that anaerobic digestion will receive two ROCs for each MWh of electricity generated until 2015, then degression will see this figure fall to 1.9 in 2015/16 and 1.8 in 2016/17.

This would seem like a positive boost for the industry, especially when other sectors have been hit with more significant cuts. Yet the Department of Energy and Climate Change (DECC) also announced plans to cut off support under the RO for new AD projects below 5 MW from 1 April 2013 .

This surprise move – which was subject to consultation – would have eliminated the existing overlap between the RO and the Feed-in Tariffs (FiTs) scheme for digesters between 50 kW and 5 MW, cutting the legislative burden and focussing the RO on larger scale projects.

However, the industry warned that deployment would be seriously impacted as degression triggers in the FiTs scheme – reductions in the support for renewable technologies based on deployment – would have been reached too easily. There also remains a lack of certainty in the FiTs, particularly following the drastic cuts to support for solar photovoltaics.

As a result of this industry pressure the consultation and proposed move was scrapped by the government. Concerns still exist over the degression mechanism and unambitious triggers in the FiTs budget. Should degression triggers be reached, plants will be reliant on the Renewable Heat Incentive (RHI) to balance the economics, assuming they can make use of the heat.

The RHI consultation for extending the non-domestic scheme is proposing tariffs for larger scale biogas combustion. Heat is likely to be used in on-site plants but larger centralised waste facilities are unlikely to benefit; they will either have to consider the RHI biomethane tariff by going gas to grid, or the RO which should continue to be more attractive for larger facilities.

GASIFICATION AND PYROLYSIS

Pyrolysis and gasification offer a major opportunity for the conversion of waste into energy and other useful products such as renewable fuels, chemicals and gases.

In the banding review the Government decided

Gasification facilities such as the 96,000 TPA plant planned by Energos in Merseyside are set to benefit from double ROC support until 2015 Credit: Energos

not to distinguish between 'standard' and 'advanced' biomass pyrolysis and gasification technologies, meaning all such technologies will receive double support until 2015, then degression will see this figure fall to 1.9 in 2015/16 and 1.8 in 2016/17 as with anaerobic digestion.

This reflects the high capital costs of both 'standard' and 'advanced' technologies. Investors must still decide between tried and tested technologies or focus on new, more efficient techniques but this move eliminates some of the barriers holding back the industry.

The announcement has already had a positive impact on the industry, with Air Products recently revealing they plan to build the world's largest advanced gasification WtE plant on Teesside, which is scheduled to enter commercial operation in 2014 (see page 18 for full story). The plant is likely to be the first of many to be built in the UK over the coming years, with Biossense, INEOS Bio and British Airways also working on their own gasification projects.

BIOMASS

Following the banding review there remains uncertainty surrounding co-firing of biomass. DECC has said that it will monitor the uptake of this technology and may review banding costs if uptake is larger than expected, with no precise timescale or limits given.

In the meantime, support is being provided where it is deemed most-needed in plants which use biomass for more than 50% of their feedstock through a new 'enhanced co-firing' sub-band. DECC plans to monitor uptake and trigger cost reviews if uptake is greater than anticipated, which is likely to be a source of uncertainty for industry but reflects the Government's concerns over budget overspends in the current economic climate.

The Government is also concerned about the cost effectiveness of supporting new dedicated biomass plants, which typically produce less than 50 MW of power per year. The support for such facilities remains the same as before the banding review, with 1.5 ROCs issued for every MWh of power generated. However, there are plans to reduce support from March 2016 onwards in order to encourage quick investment and development.

Again here, the Government has put a proviso on support. It is planning to consult upon the idea of introducing a cap on the amount of renewable energy generated by dedicated biomass plants, with the suggestion of a limit of between 800 MW and one gigawatt being introduced after April 2013. Capping development of dedicated biomass facilities, especially so soon, risks new developments being rushed in order to be the first approved before limits are reached.

The proposed limit also represents only a fraction (around 25% in the best case) of the 2020 deployment targets the Government is looking for as part of its renewable energy roadmap for bioenergy. The rest will have to come from co-firing, conversion and whatever advanced conversion can be stimulated in the timescale.

As part of the banding review announcement, the Government has also revealed plans to consult on the RO sustainability criteria for biomass. This is with a view to grandfathering the agreed criteria up until 2020 to improve confidence in supply chain development, which is a positive move. This could mean there is a greater demand for locally sourced biomass and waste feedstocks, which typically have a lower carbon footprint than virgin materials.

CONCLUSION

The RO banding review announcement should have delivered some much needed certainty and confidence in the WtE sector. However, the review reveals concern from government over the rate that some WtE technologies could be deployed, reflecting the risk that governments fixed levy-funded envelope could be exceeded.

In terms of support for WtE, the announcement looks like a boost for gasification and pyrolysis technologies, a cautious scale back of support for dedicated biomass and co-firing, and in the case of anaerobic digestion a serious hiccup at a crucial stage of development in a relatively new industry.

The changes highlight the growing complexity of renewable energy policy in the UK, which remains a minefield and careful navigation is needed to ensure waste to energy technologies deliver the best return on investment for developers.

Dr Matthew Aylott is communications officer at NNFCC – an international consultancy with expertise in biomass to bioenergy, biofuels and bio-based products and the bioeconomy and energy advisors to the UK Government.

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

From April 2013 new Anaerobic Digestion facilities generating under 5 MW will no longer be eligible for support under the RO Credit: Monsal

THE AUSTRALIAN CHALLENGE

Self-sustaining households by waste alone

Society's heavy reliance on centralised waste treatment structures, together with increasing energy demand are driving the need for alternative, decentralised structures at a smaller scale. How far can these systems and technologies go to sustaining a household? Australia might have the answer.

by Adriana Uribe and Frederic Coulon

Households are responsible for consuming 26% of Australia's energy and produce almost 30% of the total solid waste generated. The energy used in households in Australia and worldwide comes mainly from centralised thermal plants in which two thirds of the electrical energy produced is lost in distribution.

As for the wastewater produced in households, human excreta is removed with disproportionate amounts of water and treated in large, costly, centralised plants to later be discharged into water bodies. In the same way, solid waste is also collected and transported long distances to large centralised plants or landfilled. Waste and wastewater often pose health and environmental hazards, especially where appropriate treatment infrastructure does not exist. However, they are a 'valuable resource in the wrong place' which can be used to obtain energy and valuable products through a wide range of emerging and well-established technologies, such as anaerobic digestion.

Due to the low urban population density and the presence of isolated areas and aboriginal communities with no connection to the grid or sewer, the potential for smaller scale alternative decentralised systems is large in Australia.

Small Scale Anaerobic Digestion (SSAD) is a promising decentralised technology in which different feedstocks are degraded in the absence of oxygen to produce methane and carbon dioxide (biogas) and a residue, digestate.

The energy balance in these systems is positive since biogas can be used as a source of energy, whereas the digestate can be used as a valuable fertiliser. Currently many small digesters are installed in rural areas of China, India and other countries ranging from $2m^3$ to $20m^3$. The biogas is used to cook with the use of adapted cooking stoves but a wide range of other applications such as biogas mantle lamps, refrigerators and generators are becoming increasingly common.

Another emerging technology for small scale applications is micro-combined heat and power (MCHP) devices in which an engine, turbine or fuel cell is used to produce heat and electricity. While large-scale CHP systems have been used for decades, MCHP systems are in their relative infancy but have the potential for widespread use. MCHP systems generally produce between 5 and 20 kW. However, due to cost, they are more often used in developed countries to replace conventional boilers.

However, the combination of these two

Decentralised energy and waste solutions make sense in Australia's isolated communities

technologies could significantly contribute to the sustainable production of electrical and thermal energy in the Australian household.

A COMBINED SYSTEM

In a domestic setting the digester is sized according to the amount of wastes produced by the household. Biogas produced by the digester then feeds the MCHP unit whereas the digestate produced can be post-treated and used as an organic fertiliser, preferably on the garden of the household itself in order to eliminate transport costs.

The MCHP is chosen according to the amount of biogas produced. Finally, the heat and electricity produced by the unit are used to supply the household's energy needs.

During trials in Australia it was assumed that the digester was a single stage Continuously Stirred Tank Reactor (CSTR). Its size was calculated using the volume of input flow and hydraulic retention time (HRT), which was set to 15 days as this is recognised as the optimum period for the treatment of black water and kitchen refuse.

When evaluating the best feedstock combination for the digester, two scenarios were considered. In the first scenario kitchen waste and wastewater were co-digested. As water is a scarce and valuable resource in some Australian regions, a second scenario was considered where vacuum toilet black water was used instead of wastewater. In vacuum toilets, 0.7 - 1 litre of water is used per flush compared to 7 - 9 litres in conventional toilets.

Using this waste stream significantly reduced water usage to 22.2 litres per day. Using black water from vacuum toilets also has other environmental advantages as the water is diverted from the wastewater stream and reused on site, smaller amounts of liquid digestate are produced, facilitating disposal and less methane escapes dissolved in the effluent. Furthermore, several studies have considered its potential for co-digestion with kitchen waste and two successful full-scale projects of this type of system exist at Lübek-Flintenbreite in Germany and Sneek in the Netherlands.

The biomethane potential of the two scenarios was calculated using the Buswell's equation where it is assumed that 1g Chemical Oxygen Demand (COD) generates 0.35 litres of CH_4.

The power output of the MCHP depends directly on the fuel input, in this case, the biogas produced by the digester. The required gas flow to run the unit can be obtained by dividing the unit fuel input by the energy contained in the biogas.

For a typical composition of 65% CH_4, the latter accounts for 6.25 kWh per m^3. As an example, the minimum biogas flow required to run a Honda's Ecowill, a gas engine MCHP unit with an input energy of 4.4 kW (assuming that it is adapted to run with biogas) can be seen below:

$$4.4 \frac{kW}{6.25\ kWh\ .\ per\ m^3} 0.704\ m^3\ biogas\ per\ hour.$$

Finally, electrical and heat annual demand for Australian households were collected, showing 5840 kWh of electrical and 13,000 kWh of thermal demand.

SCENARIO OUTCOMES

For the first scenario, the total volume of the digester was estimated to be 8 m^3, which closely aligns with other studies reporting volumes between 6 m^3 and 10 m^3. In the second scenario where vacuum toilet black water was used instead of wastewater, as the flow was reduced drastically, the volume obtained was 0.6 m^3, thus being economically more convenient.

The gas headspace volume considered in both cases was 10% of the working volume. The theoretical biogas production was the same in both scenarios since it depends exclusively on the amounts of organic matter produced in the household and accounted for 276 litres of CH_4 per day.

However, the real biogas production can be expected to be higher in the second scenario, due to the higher Total Solids (TS) content of the mixture. Several studies state that concentrated wastewater sources have a better biological performance than diluted wastewater sources.

It was found that this type of mixture has a high methanogenesis in continuous high rate, as well as a high degradability of up to 96% of the COD. For these reasons it could be considered that for the second scenario, the digester almost reaches the theoretical production potential.

With the theoretical biogas production, the total primary energy produced by the digester would be equivalent to 970 kWh per year. Assuming that the gas is used to run a MCHP unit with a typical total efficiency of 85% the final energy will cover approximately 5% of the Australian household annual energy demand. This figure does not take into account the energy necessary to feed the digester block (grinder, vacuum toilet, heating of the digester to 37°C, pumping and mixing) which accounts for 263 kWh per year, according to the calculations made using the data of the Poeschl study (2010).

No commercial MCHP units exist yet at this scale for the amount of biogas produced (to run the MCHP daily) nor are they adapted to biogas use. The smallest model available on the market is a biogas generator of 0.7 kW that needs a minimum flow of 0.84 m^3 per hour to work.

MATCHING PRODUCTION TO DEMAND

It is therefore still difficult to cover the energy demand of the household with the waste it produces using current state-of-the-art of both technologies. However, some issues could be changed in order to enlarge the energy coverage.

If garden waste was also considered as a feedstock, assuming that 8 kg per household per week is generated, consisting mainly on grass clippings, the biomethane potential would be 118 litres of CH_4 per day, which represents a 43% increase compared to the second scenario. If vacuum toilet black water, kitchen refuse and garden waste were co-digested in an anaerobic reactor, the maximum theoretical biogas production would rise to 606 litres of biogas per day.

Furthermore, the average Australian electrical and thermal demand can change considerably between states. For example, according to the Government of South Australia, the total energy demand in a South Australian household where only electricity is used to cover all the household energy demands is between 7600 and 10,100 kWh per year.

Additionally, the energy used for space heating/cooling will be drastically reduced in new housing which has been built with a greater emphasis on energy efficiency ratings. If a building energy efficiency of eight stars is considered, the thermal demand for a detached household in Adelaide, South Australia, would be 2494 kWh. If hot water could also be provided by another renewable energy, such as solar thermal, the heat demand of the household would again be reduced.

The energy breakdown also differs across

states. In the case of the South Australian household, it accounts for 38% for heating and cooling, 25% for hot water, 16% for appliances, 7% for lighting, 7% for cooling, 4% for cooking and 3% for stand-by power. Ideally, this last share of the energy consumption should be suppressed:

Applying these measures would reduce energy consumption almost to 5000 kWh per year. A mixture of vacuum toilet black water, kitchen refuse and garden waste would produce enough biogas to cover approximately 27% of the energy demand.

THE AUSTRALIAN CONTEXT

The large physical footprint of Australian households, 243 m^2 on average, and the recent transition from room to centralised heating which may increase the energy demand in the future, are problematic factors which could hamper the use of the proposed system in Australia. However, there are many drivers to its implementation such as the structure of Australian cities, the abundance of feedstock and the recent introduction of a carbon tax which will quickly raise environmental awareness amongst the population.

There are other factors not linked to the context but to the technology itself, for example the fact that a MCHP unit cannot produce the heat and electricity in the ratio demanded by the household, since considerably more heat than electricity is produced in the device.

This is the reason why the common implementation strategy is "heat-led" and the electricity produced is usually injected back to the grid. However, this should not be seen as a barrier since very likely more flexibility will be added in the devices as the technology develops.

CONCLUSIONS

In conclusion, in the first scenario, for a wastewater and kitchen refuse production of 450 litres per day and 1.5 kg per day respectively, a digester of 8 m^3 was needed. For the second scenario, replacing wastewater by 22.2 L per day of vacuum toilet black water, a 0.6 m^3 digester was required. The theoretical methane production in both scenarios was approximately 276 litres of CH_4 per day.

The second scenario is the most interesting for household application due to the sparing use of water, the smaller digester needed and other environmental advantages. The energy generated could cover approximately 5% of the Australian household energy demand. With this coverage, the proposed system cannot be used as a stand-alone application at the current state of both technologies. However, several factors can be changed in order for the system to have larger energy coverage, including the consideration of other feedstocks or the reduction of the household's energy demand.

A final coverage of 27% of the total energy demand can be achieved, showing the potential of the system to significantly contribute to the household energy's requirements and reduce water consumption in Australia.

Dr Frederic Coulon is a lecturer in Bioremediation & Resources Management at Cranfield University. Adriana Uribe is an industrial engineer and conducted this research while studying Cranfield University's MSc Environmental Engineering programme funded by a Fundacion La Caixa scholarship.
Web: www.cranfield.ac.uk

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Please visit www.waste-management-world.com

PRODUCT PROMOTION

PRODUCT NEWS

DOOSAN POWER SYSTEMS PUTS COLLABORATION AT THE HEART OF HARLINGEN


The REC Harlingen plant in the Netherlands

The ability to offer a full 'chute to stack' solution based on proprietary technologies is vital for waste to energy (WtE) suppliers. Doosan Power Systems combines proven grate, boiler and flue gas cleaning technologies from WtE Doosan Lentjes with turbines from Doosan Škoda Power to provide customers around the world with complete solutions for their waste facilities

This is supported by after-sales services designed to keep facilities running at peak performance.

According to Gerhard Lohe, director of sales for Doosan Lentjes, the key to the company's success lies in its focus on developing collaborative partnerships with customers. "By consulting with the client at the conceptual stages of a project and maintaining close dialogue throughout, we are able to fully meet their expectations for safe waste disposal and minimise risks. This customer-centric approach, along with the provision of innovative products and services, are the key ingredients of our success."

Doosan Power Systems' most recently commissioned project – REC Harlingen in the Netherlands – is a prime example of this approach. Contracted by Dutch waste management specialist Omrin in 2008 to supply and install the grate, boiler and balance of plant, Doosan Lentjes had already been developing requirements from 2007.

"When the delivery contract was set at the end of 2008, 75% of the design was already completed", says Ronald Dewoske, Doosan Lentjes' Project Manager for the Harlingen project, adding: "The willingness to contribute ideas and share risks prior to finalisation of the contract expedited the project by at least a year.

"This approach also gave us the opportunity to encourage the client to explore technological innovations and, in some cases, make somewhat unconventional decisions to lower costs," explains Dewoske. "It is common to have two incineration lines so that 50% capacity is always available. However, as Omrin has its own logistics system and 'buffer' facility in Oudehaske one high-capacity lower cost line was possible."

An integrated additional gas-fired superheater was introduced to avoid high temperature corrosion. This increased process efficiency to more than 80%.

During project execution, Doosan Power Systems also worked closely with all other project contractors to achieve 'just-in-time' delivery of key systems and equipment on-site. Putting collaboration at the heart of Harlingen delivered the finished facility efficiently and well ahead of schedule.

www.doosanpowersystems.com

HIGH STEAM PARAMETERS - NO CORROSION

Residual municipal solid waste (MSW) contains a substantial amount of energy. Thus to recover as much of that energy in a Waste to Energy plant (WtE) and make it available for further use, can substitute fossil fuels which are becoming scarce and expensive. As MSW is of around 50% biogenic origin its incineration does not add to greenhouse gas emissions.

Modern WtE plants can recover more than 80% of the energy contained in the waste in a steam boiler. When applying flue gas condensation, this figure can be raised to well over 90%. Some of this energy is needed within the plant itself, but by far the largest portion can be exported to external users, as steam for process applications, to supply energy to a district heating/cooling network or to be converted to electricity in a steam turbine, in varying combinations as well.

The efficiency of electricity production from WtE plants is limited due to the corrosive nature of the flue gases. MSW contains chlorine and sulphur, as well as alkaline (Na, K) and heavy metals (e.g. Pb, Zn). Most of these are released into the flue gas during the combustion process. If deposited on the boiler tubes, they can form corrosive mixtures, leading to unplanned shutdowns and high maintenance cost. Therefore steam parameters of 40 bar/400 °C are widely used to give an adequate lifetime for the boiler tubes.

Some countries in Europe are subsidising electricity generated from WtE plants. Thus higher steam parameters, especially temperature, are desirable. Martin has developed two new solutions, allowing the use of higher temperatures with no risk of corrosion. Both are based on the well known and proven principle of 'rear-ventilated tiles'. Refractory tiles are mounted at some distance to boiler tubes, the space in between is purged with air, preventing diffusion of corrosive flue gases and avoiding corrosion.

One solution is the so-called "wall superheater", which is installed in the sidewalls in the first boiler pass. The second solution is the so-called "radiant superheater". Boiler tubes are extended from the roof of the first boiler pass into the flue gas, protected by a specially designed rear-ventilated tile system.

Both systems have undergone successful testing in existing WtE plants and are available for commercial installation, either in new plants or as retrofit to existing installations.

Depending on the specific plant design, the steam temperature can be raised by 40 - 50 °C.

www.martingmbh.de

CNIM WASTE TO ENERGY PLANT FOR AZERBAIJAN

The waste to energy centre at Baku in Azerbaijan commences operations at the end of this year. Every tonne of the 500,000 tonnes of municipal waste and 10,000 tonnes of hospital waste processed annually by this plant will generate as much power as 200 litres of gasoline.

Despite being known for its fossil fuel resources, Azerbaijan thus becomes the first country in the region to acquire a waste to energy plant and exploit an alternative energy source recognised by the EU as approximately 50% renewable. The 231,500 MWh of electricity sent to the grid each year is enough to power 100,000 homes.

This exemplary project forms part of an overall environmental action plan led by the Azerbaijani Ministry of Economic Development under the management of the Temiz Şeher Joint Stock Company. The commission for the design, turnkey construction and operation of the centre over a 20 year period, was awarded to CNIM, which celebrated its 150th contract to construct a waste to energy plant.

The new plant replaces landfill, producing a total benefit in terms of the greenhouse effect of more than one tonne of CO_2 equivalent saved per tonne of waste incinerated - a total of 500,000 tonnes of CO_2 per annum.

The Baku waste to energy centre discharges no wastewater and conforms to European and Azerbaijani environmental regulations. Any pollutants deriving from the waste are eliminated from the flue gases using a flue gas treatment system designed and built by LAB, the CNIM subsidiary specialising in this field.

The Baku waste to energy plant is supported by the European Commission "Intelligent Energy Europe" programme, which is about renewable

www.cnim.com

ACTIVATED CARBON? SIZE MATTERS

Activated carbon is used as an adsorbent to clean waste water and waste gas. Most activated carbons have limited potential for waste gas cleaning and effluent treatment, but RWE Power AG has developed Activated Lignite HOK®, an activated carbon particularly capable of adsorbing macromolecular organic compounds (such as dioxins and furans) found in waste gases.

Activated carbons are good adsorbents due to their high porosity and large surface area. Most activated carbons have pore sizes mainly in the micropore and submicropore range (< 1 nm), which is too small for removing macromolecular compounds. Only those with pore sizes in the high mesopore and macropore range (1 nm to > 50 nm) are suitable for this purpose. The optimised Activated Lignite HOK has a high cleaning efficiency for macromolecular compounds due to its high pore volume of about 50% and its favourable pore structure, with large pore sizes in the mesopore and macropore range.

Activated Lignite HOK differs considerably from most activated carbons in both its production and properties. The lignite is extracted from opencast mines. A rotary-hearth furnace then activates the lignite, resulting in its large surface area with the typical pore structure which has a high adsorptive efficiency for many pollutants.

The finished product comes in different sizes, ranging from granules (HOK grains) to superfine milled (HOK super) Activated Lignite.

Because of its good adsorptive properties and favourable price, this product is used in many different applications in environmental protection and cleaning gases from waste incineration plants.

www.hok.de

Trash talking


Credit: MeWa

TEXTILE RECYCLING

Discarded textiles and clothing are in strong demand from markets across the world for reuse and recycling. Widely viewed as a resource, these materials offer great potential for recycling and a real revenue generation opportunity for local authorities and waste management companies. WMW asked some of the industry's key players for their views on the subject.

TIME TO CHANGE THE CONVERSATION REGARDING CLOTHING RECYCLING

JACKIE KING
IS EXECUTIVE DIRECTOR OF THE SECONDARY MATERIALS AND RECYCLED TEXTILES ASSOCIATION (SMART), AN INTERNATIONAL TRADE ASSOCIATION

Each day, millions of people around the world collect and recycle paper, aluminium, glass and plastic products without a second thought. This has been true for many years as a result of the educational efforts which began with the first 'Earth Day' on April 22, 1970. Unfortunately, the first Earth Day environmentalists did not include clothing and textiles as household materials to be recycled.

In fact, clothing and textiles were being recycled long before those early efforts to inform the public of the impact their actions had on the environment. In 1970, there was a thriving clothing recycling industry, dating back well before the turn of the 20th century. In addition to the for-profit clothing recycling industry, charitable organisations were delivering their message of "donate your gently used clothing items".

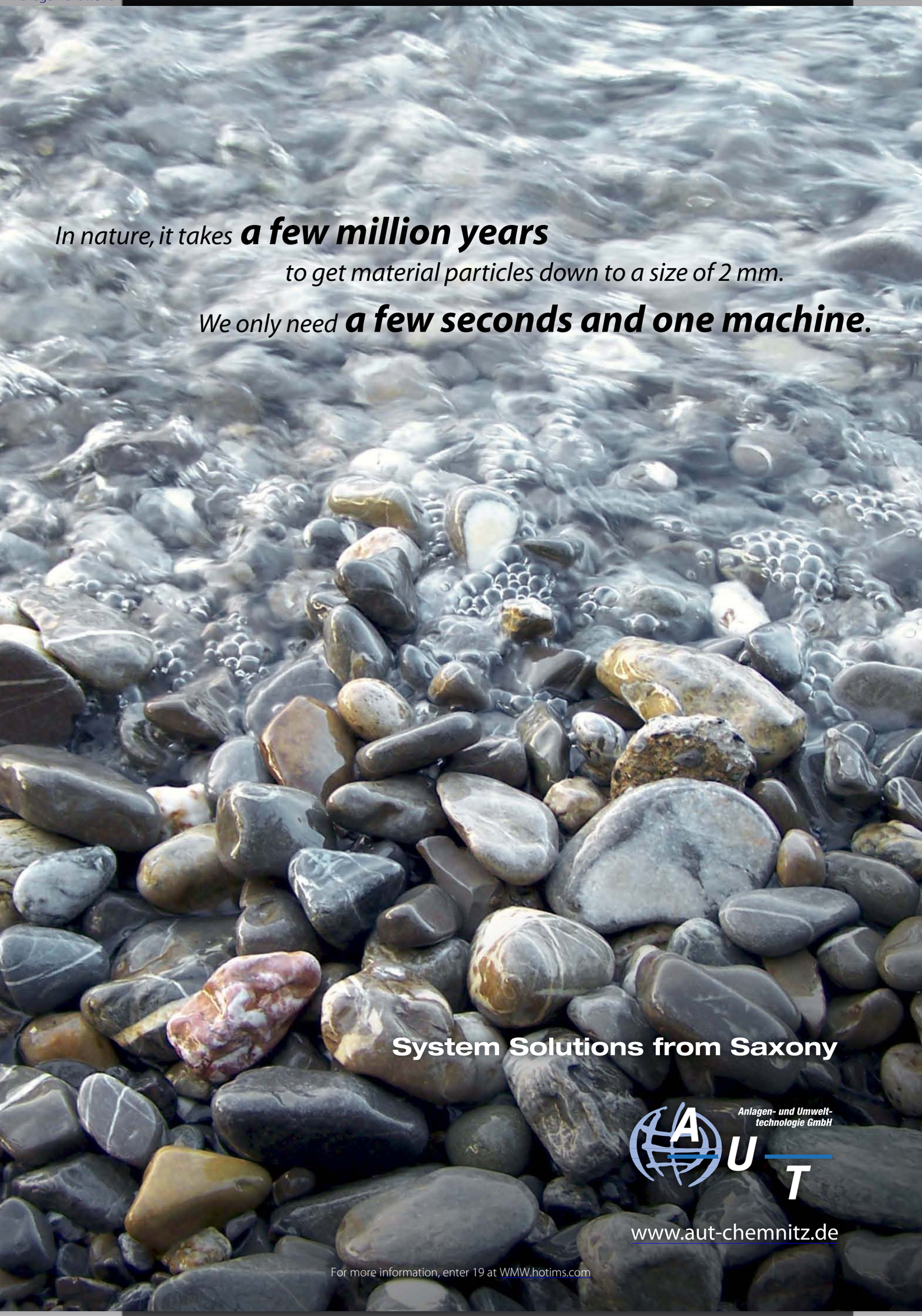
In the U.S., the Environmental Protection Agency (EPA) reports, the average person discards 70 pounds (32 kg) of clothing per year. The Agency estimates 85% of these materials wind-up in landfills or incinerators, with only a scant 15% entering the recycling stream.

To begin the effort to change the attitude of the public from 'donate' to 'recycle', when applied to clothing and textiles, the Secondary Materials and Recycled Textiles Association (SMART) - the international trade association of for-profit clothing and textile recycling companies - is undertaking a nationwide educational effort. Working in conjunction with educators, the association has developed lesson plans aimed at students aged five to 12.

The classroom materials developed by SMART are grade-appropriate lesson plans that include the message of clothing as a recyclable product. The lessons are available to teachers free of charge, and meet all education standards and teach core skills such as math, science, and vocabulary.

The materials are available through various outlets to more than 750,000 educators and 15 million students in the U.S. In the first four weeks the lessons were available, they were accessed online by more than 3000 teachers with additional requests for information being received by mail. The effort is catching-on with hundreds of thousands to be impacted.

By introducing the concept of recycling clothing at the earliest ages, SMART aims to increase the awareness of clothing as a renewable resource. As a result of these efforts, over time, the association hopes to divert the flow of clothing and textiles out of the municipal waste stream and into the hands of all who recycle these valuable products.



COLLECTION KEY TO UNLOCKING POTENTIAL

PHIL GELLER
IS DIRECTOR OF UK BASED TEXTILE RECYCLER I & G COHEN AND CHAIR OF TRADING GROUP RECYCLATEX

An estimated 350,000 tonnes of used clothing goes to landfill in the UK every year. Diverting these materials, which have recognised commercial value, from landfill remains a challenge for the recycling and waste management sectors.

In the UK alone, recent research from WRAP (Waste and Resources Action Programme) showed that recovering just 10% of the 1.4 million tonnes of textiles that are sent to landfill each year could unlock up to £24 million and deliver huge environmental benefits.

One solution lies in how they are collected. More than four out of five textile items donated via established routes such as door to door, kerbside, textile bank and charity shop collections can be successfully reused or recycled. Working with Axion Consulting, I & G Cohen has conducted eight studies into textile recycling on behalf of WRAP which showed reuse and recycling rates of 80% to 89% using these popular public routes.

This project, 'Impact of Textile Feedstock Source on Value', assessed the impact that differing sources of recovered textiles has on the quality and subsequent value of those textiles within the UK reuse and recycling markets. Unsurprisingly, comingled collections were least successful due to heavy contamination and damage from the sorting process causing high levels of wastage.

By forging stronger partnerships with textile recyclers, local authorities and waste management companies can realise more value from their discarded textiles, prevent them being landfilled and help to support thousands of jobs. In November, our 'What a Waste' event explored innovative ways of diverting used clothing and textiles from landfill.

What people don't always realise is that nearly everything they discard has some kind of value as long as it's clean, dry and free from contamination. Each tonne of clothing, handbags and shoes gets sorted and graded for customers across the world. Lightweight clothing is sent to East and West Africa, some heavier weight clothing and lower grades end up in Pakistan and India, while smaller amounts of high value items will go to Eastern Europe. Vintage clothing – albeit around 1% of the total collected – also provides employment in repairing and selling sought-after garments.

Other low-grade items can be recycled into insulation products in vehicles or wiping cloths for cleaning purposes. We should all make more of our old textiles – for the sake of the environment and the world's population.

A NEW PERSPECTIVE ON AN ANCIENT INDUSTRY

IRA BASEMAN
IS PRESIDENT OF COMMUNITY RECYCLING, A PENNSYLVANIA BASED TEXTILE RECYCLER

Often neglected and misunderstood in the world of traditional recycling, textile recycling is poised to become a more central component in our retail buying and social experience. The signs of change abound and the opportunity for personal engagement in textile recycling is clear.

Historically, the act of textile recycling was driven by a donation model that was supported by large non-profit organisations that acquired used clothing and related materials to fuel their charitable programs. This model has been in place for decades and has been widely expanded to keep many thousands of tonnes of textiles from landfill.

While largely a successful model to a specific and limited end, the act of recycling was subordinated to a cause and there was little if any engagement with the recycler about the use or destiny of their clothing. In the recent years, we have witnessed a shift in recycling activity generally, an expansion of social and environmental engagement, and the continued reinforcement of social networking.

Social awareness has been heightened, as witnessed by our strong interest in understanding the impact we are having on the environment. We see these changes everywhere, from the local farm to table food movement, to legislation covering extended producer responsibility for large manufacturers of electronic and a range of other consumer goods. The landscape has shifted and we now understand that recycling is a positive step for its own right.

Nowhere else is this more palpable than in textile recycling. We now can engage people to recycle for reuse and to tell the complete story of where this clothing is destined and why. The pyramid has been inverted and reuse is the best outcome for all parties involved, from the retailer to the consumer and finally to the recipient somewhere else in the world.

Recycling textiles connects people across the globe in a positive and enriching way. With the advent of technology, social networking and modern transportation, we can make the world a smaller, friendlier and greener place.

TECHNOLOGY TO THE RESCUE

DR. ROSHAN PAUL
IS PRINCIPAL INVESTIGATOR FOR THE TEXTILE TECHNOLOGIES DIVISION OF LEITAT TECHNOLOGICAL CENTER, TERRASSA (BARCELONA), SPAIN.

In Europe, around 25kg of textile fibre is consumed per person per year and about half of it is coming from dress materials, bed linen, towels and home furnishings. The dumping of post consumer textile waste is a huge urban waste problem and there is a common practice of collecting the discarded textiles by commercial and charity organisations. A small portion is thus recovered in this way but the rest is normally discarded as solid urban waste.

There is a huge untapped potential for discarded post consumer textile waste and the recycling possibilities are unlimited. In order to recycle at an industrial scale, collected clothes should first be sorted. Many sorting systems and software are either available, or under development for sorting textile waste according by colour and chemical composition. The sorted textile waste can be collected separately to develop different high added value products.

Wool fibres are normally recycled by blending with new wool to produce new textile products. The final product may be little harder, but surely longer lasting. Pure white 100% cotton fibres may be converted to superabsorbent polymers by chemical modification and can be used for the production of medical textiles, such as superabsorbent polymers to be applied in diapers and incontinence products.

With low quality material, there is another possibility for developing superabsorbent agrotextiles for water storage and/or controlled water release for plantations in arid or desert lands. White, as well as coloured cotton has a potential to be converted into art and drawing paper, by proper dissolution and further deposition of the pulp. They can also be used as a raw material for developing new regenerated cellulosic fibres. It may be possible to produce cellulose in the powder form, which can be used as fillers, or for blending with other polymers for developing composite materials.

Polyester/cotton fibre blends, as well as difficult to bleach deep coloured cotton fibres, can be triturated and used for the production of non-woven felts to be used as thermal and acoustic insulation materials in automobile and construction sectors. Blended textiles with high polyester content can be used to develop different types of agrotextile materials.

Polypropylene which is widely used in the production of sportswear can be reprocessed by producing pellets/masterbatches and further moulding into different plastic components. It can also be blended with other polymers to develop composites. If blended with biopolymers like polylactic acid (PLA), the environmental footprint of the developed composites can be reduced considerably.

TOO GOOD AN OPPORTUNITY TO MISS

MARCUS GOVER
IS DIRECTOR OF CLOSED LOOP ECONOMY AT THE WASTE & RESOURCES ACTION PROGRAMME (WRAP), UK

According to a recent WRAP report, we use 2.7 million tonnes of textiles every year in the UK. However, less than a third of this is currently recovered for reuse or recycling. The rest, around 1.4 million tonnes, is sent to landfill. But this is not necessary.

Clothing accounts for more than half the UK's textile consumption. WRAP research shows we could prevent a third of the clothes we buy from ending up in landfill by making more use them through reuse and other routes. However, this is not just about clothing, but also about all the other household non-clothing textile items we discard, such as linens, bedding and items we might usefully describe as 'leisure textiles'.

For many of these items there are opportunities for reuse, and when these options are exhausted, there are other routes for recycling.

So where are all these opportunities? The single greatest chance to increase recovery lies in reducing the amount of textiles (almost a million tonnes) that is currently disposed of as household waste. An established infrastructure exists for both reuse and recycling, yet in 2010 around £238 million worth of reusable or recyclable textiles was thrown out via kerbside residual collections.

Although it's true that there is a good existing infrastructure for clothes, there is capacity for this to grow and for reprocessors to handle greater volumes of both clothing and other textiles.

Another significant opportunity lies in the bulky textile waste sector, particularly in the reuse and recycling of mattresses and carpets.

In 2010, we bought 169,000 tonnes of mattresses. Only 25,000 tonnes was recovered. Collection and recycling of materials from mattresses is challenging and contamination limits end markets for the materials, but some mattresses contain as much as 50% steel. With the market price of steel steadily rising, it's an area of increasing interest and value. In 2010, for example, 84,500 tonnes of steel could have been recovered.

In contrast, the area of carpet recycling and recovery is one that that has seen considerable growth and there is further potential here. In 2007, just 0.5% carpets were recycled or reused, with an additional 4% sent for energy recovery. In 2010, this had risen to 3.5% reused or recycled and 6.5% incinerated. At the same time, several innovative end markets opened up. However, 378,000 tonnes of carpet were landfilled.

There is indeed a long way to travel on the route to increased textiles reuse and recycling, but there is also enormous potential to divert material from landfill, reduce disposal costs and create or develop new revenue streams. Surely results worth pursuing.

OPINION:
Recycling, the Waste to Energy Way

For some time the waste to energy industry has had a definitive yardstick by which to measure its effectiveness. The R1 formula applies strict and objective rules that enable a uniform assessment to be made over a facility's performance. Recycling rates meanwhile are often misleading. Should such a formula be used to provide definitive and meaningful data by which 'real' recycling rates can be judged?

by Jørgen Haukohl

Both in the Denmark and around the world, high recycling rates are one of the primary goals both for the waste industry and for policy makers. However, problems arise as there is not an adequate and definitive definition of recycling and quoted rates are often misleading compared to the real extent of recycling.

The recycling rate is regarded as being the amount of material supplied to the recycling facilities, and is assessed solely on the input to the facility, regardless of the output of the facility in the form of actual material for reuse. As an example, paper is considered a recyclable material regardless of whether a fraction is sorted out for incineration or landfilling. Similar conditions apply to recycling of plastics, electronics, biologically degradable waste and composting/gasification.

The true situation is further obscured due to the fact that the water content is included in the assessment, despite the fact that only the dry fraction of the waste has an actual value.

INCINERATED PLASTICS

In Japan plastics are collected separately. However, ultimately, 75% of the collected quantities are incinerated. Typically in other countries where plastic containers are collected, more than 50% of the volume collected is ultimately incinerated.

Source separation of plastics can be an excellent solution in countries that lack incineration capacity and are thus not capable of harnessing the energy content contained in the non-recyclable waste plastics. However, in countries which do have adequate incineration capacity, it is difficult to environmentally justify the establishment of schemes to recycle the plastic fraction that is ultimately sent to thermal treatment facilities for energy recovery. This is because the plastic is too contaminated or is for some reason considered ineligible for recycling. For example, the amount of source separated plastics that are incinerated in Denmark is unknown – but you are allowed to guess…

GLASS BOTTLES

One particularly unfortunate example can be found in the Danish recycling system: glass bottles used for beer and non-alcoholic beverages.

These bottles are collected, washed and reused up to 33 times. However, this supreme form of recycling at best is accounted for as if the bottle has been recycled once, when the bottle is discarded. For the sake of the recycling rate, it would have been better to use the bottle only once and discard it in a glass recycling container. The remaining 32 times that the 300 gram bottle is reused should in reality account for 10 kilograms of recycling. Hence, the system we have for assessing recycling is flawed. So what can we do about it?

NEW DEFINITION

Based on such examples, there is a need for a formula and a set of rules equivalent to the R1 formula for waste to energy, which defines the degree of energy recovery. Crucially, the R1 formula is based on the output of the waste to energy plant, such as the amount of heat and electricity sold, and not what enters the facility.

In the same manner as the R1 formula, a formula for recycling should exist that classifies the value of output products from recycling facilities. If we had such a formula it would be possible to determine a recycling rate that reflects the actual quantity of recycled materials. Furthermore, using an R1 equivalent formula would enable the grading of recycling, to visualise if the recycling processed are resulting in the same quality products or if the recycled material is downgraded to a less valuable material. The grading in the formula must be determined on the basis of a Life Cycle Assessment, attributing values corresponding to the raw materials and resources depleted.

The result of a new way of evaluating recycling will be that the recycling rate, not just in Denmark but globally, will change. For high-value output products, the rate, will increase, whereas the rate will decrease for low-value output products. By measuring the output instead of the input, we will get a true picture of how much is in reality recycled.

CONCLUSION

The existing assessment of recycling rates makes no sense. We need a formula that defines 'real' recycling and real recycling rates which make up an applicable data basis to increase recycling, where it actually matters.

By moving to a formula to determine the real recycling rate, all waste handling initiatives will be somewhat comparable, there will be incentives to increase the quality of recyclable products and it will become meaningful to talk about recycling.

Jorgen Haukohl is vice chair of ISWA Working Group on Energy Recovery and project director for Ramboll.

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The latest Johnston truck-mounted sweepers are now fitted with JCB 'Ecomax' auxiliary diesel engines. This is the latest VT651 mounted on a Volvo chassis.

SWEEPING IMPROVEMENTS

Having produced an engine to power its own products, JCB is now looking for further outlets for the 'Ecomax' diesel. At the same time, UK based Johnston Sweepers has been looking for a more rugged auxiliary power unit for its truck-mounted sweeper range. What benefits can the partnership between these two global brands should offer to operators?

by Malcolm Bates

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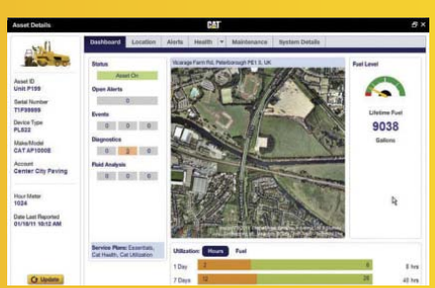

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Before we discuss the actual benefits that might result from Johnston Sweepers installing the JCB 'Ecomax' diesel engine to power the fan and sweep systems on the latest range of Johnston truck-mounted sweepers, I should mention an even more significant change to the Johnston product line-up. As of next month (January 2013) potential customers of the VT 'one' range can actually delete the auxiliary engine completely!

The reason? Johnston has been building single-engined truck-mounted sweepers with hydrostatic drive for specific markets such as France, Germany and Australia for some time. Yet as of next month, when the new 'one' range goes into production, Johnston will join Faun Viatec and Scarab Sweepers in offering not two, but three different sweep system drive options - traditional two-engined, single engine/hydrostatic and single engine/PTO drive. How to decide?

"Here at Johnston, our prime concern is to offer our customers an efficient, reliable sweeper that will work efficiently throughout a long service life," Graham Howlett, general manager at Johnston Sweepers explains. "But we also recognise that our customer's requirements and priorities will vary - sometimes within the same national market, but Johnston can now supply a machine ideally matched for use at an airport, a city municipality, or a commercial sweeping contractor which recognises that the global market for truck-mounted vacuum sweepers is becoming increasingly sophisticated," he adds.

So why is the move to the JCB Ecomax diesel as auxiliary engine of choice such a big deal? "Today, every truck-mounted sweeper has to work harder for its living and do so without unplanned downtime, wherever it is in the world," Howlettt replies.

Paradoxically he explains, operators demand more sophisticated - and expensive - options, which in turn, require more power. However, more power can easily result in more weight, higher fuel consumption and in some cases the need for a more expensive heavy duty truck chassis with a greater carbon footprint, to provide a suitable margin for the payload.

And as if that wasn't enough of a problem for the designers to wrestle with, auxiliary power units have to increasingly meet ever-tougher exhaust emissions standards and noise reduction measures, while fitted into the restricted space between the truck cab and the sweeper hopper, where it is easily forgotten.

Auxiliary engine failure on a truck-mounted sweeper is clearly something that both manufacturer and operator can do without. "To meet all these demands, we need a power systems supplier with a global reach and high standards of after sales service. JCB has that capability," Howlett confirms.

EVOLUTION OF THE SPECIES

"Designing a new generation of truck-mounted sweepers that is more reliable, more versatile and at the same time, delivers an improved payload was a tough mission," he explains. "But I think the new range delivers on all counts, he adds.

I'm talking with Howlett at the Johnston plant in Dorking, Surrey, UK. In front of us is one of the first Johnston VT651 truck-mounted vacuum sweepers powered by the new JCB Ecomax auxiliary diesel engine.

Johnston compact sweepers already feature a 'one' in the model designation (like the 201), so it will come as no surprise that from January 2013, the updated truck-mounts will follow suit. The JCB powered VT651 takes over from the existing VT650. This demo unit is mounted on a 16 tonnes gross weight Volvo FLM-260 truck chassis and it's all mine for the day.

My mission? To see if the Johnston design team have got it right and that 'evolution' has indeed delivered a new generation of sweeper that will meet the needs of an increasingly demanding global market. At the product launch back in September Johnston claimed the new 'one' range models featured some 1000

The hopper and hopper tailgate on the latest Johnston truck-mounted sweepers is raised by electro-hydraulics - so the main truck engine does not need to be running

design improvements over the current models. 1000! I've clearly got my work cut out here, so let's get on with it.

Straight away, I spot improvements. Climbing into the Volvo cab, the new 'A-post' mounted control panel puts all the key control functions at the driver's finger tips. But once I'm seated, I'm doubly impressed by the design of the main central console. The latest CanBUS control system has enabled the designers to reduce the bulk of the unit, while incorporating a 7-inch (17.5cm) multi-function touch screen, which includes CCTV camera images. Everything is within one single unit.

I go to engage the main hydraulics to lift the hopper to take a closer look at the Ecomax installation and discover yet another example of 'evolution'. Most truck-mounts require the main truck engine to be running while undertaking these functions. Yet on these latest Johnstons both the main hopper raise and rear door opening functions are now electrically-activated.

"When we asked our customers which features could be improved, this rated highly as it enables maintenance crews to raise the main body for access to the auxiliary engine and other key components without having to start the truck engine. This has safety benefits, but it also helps reduce heat, noise and vibration in the workshop," explains Howlett.

NOW YOU SEE IT, NOW YOU DON'T

With the body raised I can now have a closer look at the Ecomax unit. On my way up the access steps to the catwalk (another new design feature), I note that the auxiliary engine fuel tank is now made from a plastic material. This not only saves weight, it makes optimum use of space. Time for another surprise. One of the biggest claims made by JCB is that the 55 kW output Tier-4 Ecomax produces maximum levels of power at low engine revs. This is while meeting all current emissions regulations without the need for 'Ad-Blue' or performance-strangling features such as particulate filters.

What I can't see during my brief working shift is how little fuel is being used by the Ecomax. But Howlett has the results of recent tests and it works out at 3.8 litres per hour. JCB suggests this is around a 10% improvement on the original Dieselmax version of this engine, but it's worth noting that this was already considered to be very fuel efficient.

True, the JCB unit is heavier (and more expensive) than many of the competing auxiliary diesel engines used in this application - so it's all the more credible that Johnston designers have produced this 'next generation' range with significant reductions in gross weight over the current models.

> **Operators demand more sophisticated - and expensive - options, which in turn require more power. However, more power can easily result in more weight**

I soon get accustomed to driving this new Volvo/Johnston combination - ensuring I'm driving at the optimum speed to obtain the best results. This Volvo chassis has a manual gearshift, so I'm trying to decide which gear is best to meet the conditions. I'm also holding a normal conversation with my company 'minder' in the passenger seat, so initially I didn't spot that something was missing. Have I actually got the vacuum fan drive engaged? Is the Ecomax still running?

I check the data on the central console and my mirrors - the nice clean highway behind confirms everything is working fine, but the lack of noise and vibration is significant.

Modern Euro-5 and Euro-6 trucks are much quieter than the trucks I learned to drive in but that highlights noise and vibration from any ancillary engine. No, of course a vacuum sweeper can never be 'silent' - but I have to say, even with the door window open in the cab, noise from the Ecomax running at 1500 rpm is no more than 'reassuring'. I can't actually hear (or 'see') the extra one cubic metre of hopper capacity, or the 20% increase in water tank capacity either, but along with some 900 odd other minor improvements which I didn't have time to spot, they all add up to a much improved product.

Close-up of the JCB Ecomax installation underlines clean design of engine, with no need for additional filters to meet emissions regulations

The new truck cab door-post-mounted panel gives finger top control within driver's eye-line

Latest Johnston truck-mounts feature this new integrated centre console incorporating CCTV screen

Use of plastics material for auxiliary fuel tank has helped save weight

INFORMATION IS POWER

With potential sales of around 1000 units per annum, JCB is keen to provide more than just engines. "We have been most impressed by the support we've had from JCB power systems engineers," says Howlett. "The choice of JCB as a power systems partner enables our customers and our service engineers to obtain a far greater amount of data regarding power unit status, which will help us increase economy even further," he adds.

At present, this data can be downloaded at the end of each shift but Johnston and JCB are thought to be talking about the inclusion of a 'live link' capability in the near future - enabling line managers to check on the performance of each and every unit while out at work, from a PC. This data will help prevent abuse and can also be used for driver training. There is also the advantage of an automatic engine shut-down to prevent overheating becoming terminal, for example.

And there's another significant option on the way too - 'Bird View' CCTV camera systems are the latest innovation in refuse collection vehicle (RCV) operations. Think about it - the benefits are even greater to the driver of a highway sweeper - especially as left side steering is usually adopted in right hand drive markets (and right side steering in left hand drive markets) to enable the driver to get a better view of the kerb. Currently, an excellent four-camera system is standard.

In addition to the actual physical improvements there have been some significant corporate changes at Johnston Sweepers, too. Top of that list is the recent announcement that the company's Swiss parent, Bucher is to invest some £11 million to finance the building of a brand new production facility. This will enable all production to be centred on the Dorking plant.

The other significant change? Fuel consumption may not have been a major priority before when specifying a highway sweeper. Wherever you are in the world, it is now. Johnston and JCB have recognised that fact.

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

New body/hopper profile (common to all three sweep system drive options) gives increased loadspace volume and increased water tank capacity

Star turn? The new 'Fly Cab' option will shortly be available on the Taberelli T712 materials handler

ECOMONDO

Doing it with style!

Although all of southern Europe's domestic economies are suffering hard times, Italian manufacturers continue to design and produce new products suitable for the global waste and recycling market. So what's missing? WMW's collection and transport correspondent suggests that although Ecomondo was busy, more waste and recycling operators and scrap dealers should visit Italy in person to see what is on offer.

by Malcolm Bates

exhibition venue', too in my book. The seaside resort of Rimini is so well stocked with hotels and restaurants that market forces guarantee the prices are more in tune with our difficult economic times than many big city venues.

While it's also true that 'Italy' might not automatically stand out as a major potential trading partner, the recent - and controversial - 'management style' of its political elite has at least produced a trading climate where very few regimes around the world have reasons not to trade with Italy as a result of some foreign policy issue or other.

If that doesn't sound especially positive, then perhaps I should add that difficult economic times or not, Italy is still one of the most innovative and dynamic countries on the planet when it comes to translating a good idea into solid metal. And if the end result requires plenty of hydraulics, fresh thinking - and perhaps a dash of style? So much the better.

In contrast to the easily missed booth of 2011, this year the Gapo was shown on a much larger stand and was in action outside on the demonstration area. Each time I went over to say hello to Marco Gaverini, he was surrounded by potential customers. My point? The Gapo was designed and built in Italy. And it was first shown at Ecomondo.

So if the Gapo was my star find back in 2011, what is the rising star at this year's event? There is no question - it has to be the Taberelli 'Fly Cab'. And totally in character with the modest nature of many great engineers - I'm thinking of Ferruccio Lamborghini, the tractor manufacturer who decided he could produce a sports car to better the Ferrari - the prototype Fly Cab was not bathed in spotlights, or blasted by loud music. And just like when I first saw the Gapo, I almost walked right by, until I realised that I'd never seen a 360 Materials Handler before with a hydraulically extendable cab that went 'low' rather than high before.

How low can you go? The answer is down to ground level when the superstructure is slewed away from the centreline

I'm Taberelli, fly me. Interior of the Fly cab showing twin multi-function joysticks and touch screen control panel

It's around this time of year that promotional calendars and personal diaries start to arrive through the post. Sure, ever since electronic personal organisers and computers started to take over our lives, the number of printed 'freebees' has reduced each year. However you organise your life, turn to the 'November 2013' slot now and write "Must visit Ecomondo exhibition, Rimini Fiera, Italy" into the allotted space for the 6th to the 9th.

True, there are larger exhibitions of waste and recycling equipment in the world. But while 'Wastexpo' in the US and 'IFAT' in Europe fight for that title, Ecomondo must surely win the 'having the most relaxed and laid back atmosphere' title. This is as well as having a very good chance of taking a podium place for 'most attractive

You may recall that during my last visit to 'Ecomondo' in 2011, I spotted the 'Gapo' remote-controlled waste container mover (or 'dock spotter', as those in the transport world might call it). Designed originally to help get large sections of crane boom into very narrow spaces on construction sites, the manufacturer - Gaverini Gruppe - only decided to go exhibit at Ecomondo at the last minute.

READY TO TAKE ON THE WORLD?

This year? In recent months, managing director Marco Gaverini has had enquiries from around the world. As a result, the Gaverini Gruppe has found a whole new direction to its business.

Remember, we are still in a world where some major brands have only just got around to manufacturing hydraulically raised cabs as line-build items. Yet here is a modest-sized Italian manufacturer that stood back and realised all the big boys had missed a trick.

They asked the question of how great would it be if the driver's cab could not only be raised up to a viewline of 5.6 metres, but could also drop right down to ground level to enable the safe exit of the driver without the need for any steps? Ever see a camel drop down to let the rider get onto its back? Same idea, but the Fly Cab provides a more comfortable ride.

COLLECTION & TRANSPORT SHOW REVIEW

Busy all week. Last years 'find' - the Gapo remote control hooklift container mover was a major attraction this year

Another new idea. This year Gaverini Gruppe demonstrated the Gapo outside. This is the 'Dolly' axle with fifth wheel to shift laden bulk semi-trailers

Smaller thinking. The compact 7.5, 10 and 15 cubic metre compaction type RCV range from Brescia-based OMB offers a competitive 'midi' range

Smallest Option. The new 'Power Green' from Officini Pilla is based on the Piagio Porter battery electric chassis

Big Idea. Nord Engineering's improved 'Easy Street' container system to handle underground and surface-located containers

SIGNIFICANT SAFETY FEATURE

Production of Taberelli materials handlers fitted with the new Fly Cab option are not due to start for a few months, but the prototype model T712 should be available for demonstration from the start of 2013.

The current 'standard' T712 is a 175 hp, 30 tonne operating weight machine available in two boom lengths (11.3 and 12.5 metre max reach) with a hydraulically raised cab fitted with nitrogen-filled accumulators on both boom and cab arms to absorb shocks. Taberelli machines are popular in the tough conditions found in the metal recycling sector. Sure, it's necessary to slew the turret to enable the cab to be dropped to ground level, but the availability of Fly Cab option is a significant safety feature that is sure to be of value throughout the entire industry.

So if Mozzecane (VR) - based Taberelli was the star of Ecomondo this year, what else was worth a look? Surprisingly - considering Italy is home to at least a dozen brands - Austrian manufacturer Penz Cranes chose the event to launch a new range of trailer-mounted grab cranes. The R20L series has an outreach maximum of up to 10 metres. Scalvenzi - another well known Italian brand - announced it has teamed-up with Nord Engineering to produce a new generation side loading unit to service underground waste and recycling containers. Scalvenzi specialises in the design and production of stationary waste compactors, but has designed a new hooklift demountable body/container for this venture.

'UNDERGROUND' VENTURE

Nord Engineering already has a marketing presence in Italy, France and Spain, most eastern European states, Canada, Mexico, South America and India. Aldo Montagnini, who heads sales and marketing at Scalvenzi, says he is very excited at the potential for the new 'Easy City' system, as not only can waste and recycling containers be sited underground - if required attractive surface-mounted units can be supplied, to enable the system to be installed without the need for all the underground infrastructure.

With a universal growth in the size and complexity of refuse collection vehicles (RCVs), it's inevitable that many operators will need smaller compact units. The 'narrow' 7.5, 10 and 12 cubic metre capacity 'Euro-G' range from Brescia based OMB International offers a full compaction-type machine and binlifter, combined with a very short rear overhang - essential in tight old quarter districts.

If the minimum overall width of the Euro-G is still too much, how about the 1.4 metre width of the 'Power Green 96V'? The smallest model in the Officine Pilla range, this 2.5 cubic metre capacity 'Satellite Unit' is based on the 'zero-emissions' Piaggio Porter Electric mini truck chassis, powered by a 96 volt DC motor. The bin lifter and tipping action are also of electro-hydraulic design.

With over thirty new products listed in my Ecomondo press guide, some old fashioned Sherlock Holmes-style 'sleuthing' uncovered several more - many of which will form the basis of more detailed coverage in our Collection and Transport 'Special' edition in 2013.

The word 'hybrid' continues to feature in new truck chassis developments. So why is it taking the manufacturers of materials handlers and wheeled loading shovels so long to introduce a hybrid option?

True, specialist Italian manufacturer Venieri had a diesel-electric hybrid wheeled loader at Ecomondo last year - but what about the leading international brands? The news is that while Cat has the technology available, new production machines suitable for our industry are still many months away.

German based Terex-Fuchs does however have an electrically powered 360 materials handler in production - the 20 tonne operating weight 'MHL820'. While this requires an electric cable supply, there are also rumours of a diesel electric hybrid coming soon. Mid next year perhaps? And my final 'Ecomondo innovation'?

The Modulo Beton modular system provides a safe efficient method of hooklift container loading at 'Bring Sites' - without expensive earthworks

It has to be the amazingly simple 'Modulo Beton'. Using modular concrete and steel components it's possible to erect a complete CA 'bring site' to enable local residents to deposit waste and recyclable materials into hooklift containers, without the need for expensive, time consuming earthworks. The inverted U-shaped modules manufactured by Modulo Beton of Poggio Rusco (Mantova) are joined together with entry and exit ramps to provide a platform 2 metres above ground. A 'kit' of components includes safety rails so the available space can be utilised to take the maximum number of hooklift skips.

Conclusions? Three things. Italy is a useful source of innovative new products. The Ecomondo event at the Rimini Fiera in November should be on your schedule. And thirdly? Plan ahead. Log on to www.ecomondo.com and find out about next year's exhibition and conference programme for yourself.

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Please visit www.waste-management-world.com

Twin-compartment compact 'satellite' unit from CM Industrie of Belpasso (CT) Italy, has obvious potential for foodwaste collections. Both body/hoppers have their own bin lifter

Italian specialist manufacturer Venieri already has hybrid technology on loading shovels, but the company also manufacturers telehandlers suitable for waste and recycling operations

Chips (left) and sawdust (right) at the GRAS sawmill at Sao Hill in Tanzania

SAWMILLS

CHOPPING DOWN WASTE

Even the most modern sawmills are hard pressed to turn half the volume of a log into lumber, creating huge quantities of waste wood. Depending on the geographic location of the mill there is a wide range of opportunities for utilising this waste, including pulp for use in paper production and energy recovery.

by Jack Lutz

In the 19th century, sawmills - like almost everything else in the world - were steam-powered. They generated this steam by burning their waste wood, but generated more waste than they needed for their steam boilers. The mills piled some of it but in North America much of the excess was burned in tall, conical burners known as teepee or wigwam burners in the U.S. and beehive burners in Canada.

In the early 20th century North American mills began converting to electrically powered machinery and installing kilns to dry their lumber. While some of the wood that had produced steam for power was now burned to produce steam to heat the kilns, increasing quantities of waste were being burned in the teepee burners.

In a bid to better use this material, pulp mills were built in western North America and the larger solid pieces of waste wood were chipped and processed into pulp. For most of the 20th century those pulp mills were furnished almost entirely with sawmill chips.

However, sawmill capacity was reduced as the U.S. National Forests were closed to timber harvesting in the 1990s. Add to this an increase in the use of smaller, second growth timber and as a result, western pulp mills started using roundwood pulpwood.

Additionally, the clean air laws introduced in the 1970s severely restricted the ability of sawmills to burn wood waste and resulted in an intensive effort to find other outlets for these materials. Sawmills in other parts of North America also had to develop markets for their residuals. Pulp mills in the East, which had historically purchased small logs that they chipped themselves, added equipment to handle sawmill chips.

The history of sawmill waste utilisation in other parts of the world is similar to that of North America. In the initial stage of developing a lumber industry, sawmill residuals are piled or burned (or sold in local markets for fuel or animal bedding). Some products (e.g., chips) require mills of a minimum size to produce because the cost of the equipment needed to produce pulp-quality chips requires a sufficient volume of material to justify the investment.

There is also no sense in installing chippers to make pulp-quality chips unless there are pulp mills in the area that can pay a good price for them. When the lumber industry is large enough to produce significant volumes of these materials, facilities that consume them will be built.

MARKETS & VALUES

Residue values vary greatly around the world. It is estimated that about 15% of a lumber mill's revenues are from residues. There are both industrial and retail markets for residues.

Chips for pulp, panels and residues for wood pellets and hog fuel move through industrial markets. Bark, hog fuel and shavings can be sold through industrial markets for fuel or retail markets for mulch and animal bedding. These are often sold bagged in garden centres or farm supply stores or by the pick-up truck load at the mill.

Pulp-quality chips usually bring the highest prices, so lumber mills located near pulp mills will usually realise higher revenues for their residues. Lumber mills without access to chip markets will earn less from their residues.

Prices for sawmill chips vary with location and market conditions. Since pulp markets and lumber markets are not perfectly correlated, the supply of chips and the demand for them is often not in equilibrium. When lumber prices are high, sawmills will squeeze every piece of lumber out of a log that they can, which reduces the volume of chips they produce.

When lumber prices are low and chip prices are high, mills may send some of the material that would make low quality lumber to the chipper. Very poor lumber markets result in sawmills eliminating shifts or the number of days of operation, lowering lumber (and chip) production. This pushes chip prices up and keeps some sawmills operating when lumber prices alone would suggest the mills should close. This is important in some rural areas where a sawmill is the primary employer and closing it would cause significant problems in the local economy.

PRODUCT QUALITY

Large, high-volume sawmills can afford to install machinery that allows them to increase their production of lumber and the quality of the by-products produced. Yet even small sawmills may not be able to take full advantage of local markets for certain products even if they do exist.

There are small sawmills all over the world. These mills usually do not remove the bark before sawing their logs, so their slabs and edgings still have the bark attached and chipping this material would produce inferior-quality chips that most pulp mills would not want to buy. They also do not produce enough solid wood waste to justify the cost of installing chipping equipment.

Small sawmills often saw a variety of species, which may also be a problem for a pulp mill,

Fuel for a co-generation plant at Aurora Forestal sawmill in Uruguay

especially if the sawmill saws both hardwoods and softwoods. So small sawmills may not be able to take advantage of the pulp chip markets even if they are located within delivery distance of a pulp mill. They have to dispose of their waste in other ways.

CASE STUDIES

The value that can be obtained from sawmill waste depends on local markets and the sawmill itself. Markets also change over time as new uses are developed for the by-products. The differences (and changes) in markets across the world can be illustrated by looking at timber processing investments held by the Phaunos Timber Fund (PTF) - a Guernsey based investment fund traded on the London Stock Exchange. PTF has timber-related investments in nine countries across six continents, including four sawmills and two pole plants - which turn long logs into utility poles.

Located in Oregon, PTF's GTFF investment includes a sawmill that processes hybrid poplars grown on the investment. The mill is located in an area with a highly developed economy and a highly developed forest products industry, so it has well-developed markets for all of its by-products. Clean chips from the GTFF sawmill are currently sold to four pulp mills in Oregon and Washington. Some sawdust is sold to two other pulp mills and the remainder of the sawdust is sold for animal bedding. Bark and coarsely-ground solid wood waste are processed into hog fuel. Three of the six pulp mills buy that hog fuel to burn in their boilers for heat and power. Additional hog fuel is sold for animal bedding.

Another PTF investment located in northern Uruguay, Aurora Forestal (AF), includes a medium-sized sawmill which saws pine grown on its timberland. The forest products industry is less developed in Uruguay than in Oregon, so it has fewer markets for some of its by-products. While the pulp industry in Uruguay is expanding, the AF facility is located too far from the new pulp mill on the border between Uruguay and Argentina for AF to make and transport chips to that mill.

This sawmill has been burning its waste wood to generate steam for its dry kilns, but that has not kept up with the volumes produced and has had to pile the waste.

To better cope with the situation the site has recently built a combined heat and power (CHP) plant, which burns wood residues to produce steam for the kilns and electricity that is both used on-site and sold into Uruguay's power grid. This CHP plant will consume the vast majority of wood waste of all types produced by the sawmill.

Co-generation plant at Aurora Forestal sawmill in Uruguay

"The biomass cogeneration plant is the perfect complement to Aurora Forestal's activities, leveraging synergies within its forest industrial complex. In addition, it helps diversify markets by meeting the growing demand for power in Uruguay," comments Helizander Brecailo, director of Investments and Acquisitions at FourWinds Capital Management.

Meanwhile, in Africa PTF's Green Resources AS (GRAS) investment operates two sawmills and a pole plant in Tanzania and a pole plant in Uganda. The sawmills in Tanzania process softwoods and the pole plants process eucalyptus. Some of the slabs are chipped and sold to the local pulp mill but the mills do not have the capacity to chip all the slabs. Some of the unchipped slabs are reprocessed into short pieces for pallets or sold into the local market for fencing or other similar uses.

The sawmills currently have no markets for their sawdust, so it is burned but GRAS is looking for alternative uses for this material. Shavings are sold to chicken farms for bedding. Bark at the mills in Tanzania is ground and combined with rice husks to produce growing medium. At the pole plant in Uganda the bark is removed in the forest, where it decomposes and provides nutrients for the next tree crop.

The GRAS facilities operate in a part of the world where charcoal is a commonly used industrial and domestic fuel. The ends trimmed off the logs are processed into charcoal. Prior to 2012, the waste and trimmings from the pole plant in Uganda were sold to a nearby panel plant that either chipped them to make particleboard or burned them to make steam.

"Not only does charcoal production from waste wood provide a significant revenue to Green Resources, it also alleviates pressure on native forests and provides a cleaner source of fuel for the rural poor," explains Kristen Kleiman, director of Investments and Acquisitions at FourWinds Capital Management.

SUMMARY

Only around half of a log gets turned into lumber at a sawmill. The 'waste' from the process is utilised to produce a wide range of materials used for pulp, panels, pellets and energy production. The markets for these products and their value depend largely on where the sawmill is located and the condition of the economy and forest products industry in the area.

As new technologies are developed the possibilities for using this resource have increased. The by-products of the timber industry which were once simply burned for convenience have the potential to not only increase the sustainability of the industry but to boost its bottom line.

Jack Lutz, PhD. is a forest economist at Forest Research Group and consultant to FourWinds Capital Management.

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SAWMILL WASTE EXPLAINED

Bark is removed from the log before it is sawn into lumber. It has a number of uses, such as in the production of Hog fuel, where it is combined with other waste products and coarsely ground ready either to be burned for heat, or used as animal bedding. Bark can also be mixed with other materials such as sawdust to produce wood pellets. However pellets with bark added make more smoke than those without. Another common use for bark is as landscape mulch.

Sawdust is created as individual boards are sawn from the log. Sawmills may use circular saws or band saws. Circular saw blades are thicker than band saw blades and thus create more sawdust with each cut. As with bark, uses for sawdust include hog fuel, wood pellets and animal bedding. It is also occasionally used by pulp mills.

Solid pieces of residues such as offcuts and chunks are created at several steps in the lumber production process:

- Log ends: Logs are usually delivered to the mill in specified lengths. In much of the world, they may be 4, 8 and 12 meters long, or in much of North America they may be from 8 to 20 feet (2.5 to 6 metres) long in two-foot increments. Logs are usually cut a few centimeters longer than a specified length in the forest as field conditions make it difficult to cut logs to precise lengths in the woods.

These extra centimeters may be trimmed from the log before it enters the sawmill, or they may be trimmed off the individual boards at the trimmer. Logs may also be delivered tree-length. In this case, the small end of the logs may be too small to make lumber, so they are cut off and sent to the chipper.

- Slabs are the round parts of the log that are sawn off the outside as lumber is being produced.
- Edgings are the round parts on the side of many boards as they come off the head rig (main saw). The edging process produces boards of standard width and a narrow strip of waste wood with a rounded side.
- Trim is wood cut off the ends of individual boards. The trimming process produces boards of standard length and in some cases can create a more valuable board by removing low-quality material from the end.

One of the main uses for offcuts in areas with pulp mills or panel plants is as chips. Chips are usually produced to tight size specifications and are more uniform and of higher value than hog fuel. As the offcuts are chipped, some of the resulting material will be too small (fines) or too large (overs) to meet the chip specifications. These fines and overs are sent to one of the other byproduct lines for further processing.

Another use for offcuts is in the production of charcoal. In some developing economies, chucks are processed into charcoal for local markets where it is used for domestic cooking and heating. Offcuts are also used to produce hog fuel and pellets.

Shavings are produced when dried lumber is smoothed and shaped into its final form in the planer mill. Shavings differ from other sawmill wastes in that they are produced from dried lumber and have a higher energy content.

Other materials must usually be dried before they can be burned or further processed. These shavings are often used as fuel for dry kiln boilers, as animal bedding and in the production of wood pellets.

TRI-GENERATION THE REAL THING

As part of its ambitious sustainability program Coca-Cola has been making a concerted effort to mitigate its carbon footprint. WMW takes a look at its latest initiative to purchase all of the heating, cooling and power output from Mas Energy's 6.5 MW tri-generation landfill gas to energy facility in Atlanta.

by Ben Messenger

As the term 'carbon footprint' becomes increasingly ingrained in the social psyche, consumers are placing rising importance on environmental factors. As a result, around the world companies are making growing efforts to be seen to be 'green'. Many of the large multinationals which rely heavily on the public perception of their 'brand' to sell huge quantities of consumer products, are publically upping their game in terms of energy efficiency, recycling and the all important carbon footprint.

A prime example of this is The Coca-Cola Company. Ranked third on Forbes' list of the world's hundred most powerful brands - behind Apple and Microsoft in first and second and ahead of IBM and Google in fourth and fifth, respectively - the beverage manufacturer's brand alone is valued at over $50 billion.

When a company spends $3.25 billion each year on advertising - a billion more than Apple and Microsoft combined - it's a fair bet that it cares deeply about its corporate image. And this is in a world where companies are increasingly judged not only by the quality of their product but by the environmental impact of their manufacturing, distributing and disposal activities.

Coca-Cola has clearly decided that an ambitious Corporate Social Reasonability (CSR) program has a major role to play in growing its business and its brand. When it comes to CSR it's easy to talk the talk, but the world's biggest drinks company seems intent on walking the walk. Recently it has invested in plastics recycling infrastructure in the UK and France, as well as distributing more than 10 billion fully recyclable PlantBottle™ packages - a recyclable PET bottle made partially from plants - across 24 countries. It has also conducted 382 community water projects in 94 countries and it claims to have the largest zero-emission fleet of trucks in the U.S. The company also has a long term goal of becoming zero waste.

Significantly, thanks to the recent installation of an innovative landfill gas fuelled combined cooling, heating and power plant at one of its Atlanta facilities, the company has also recently earned third spot on the U.S. Environmental Protection Agency's (EPA) list of the largest on-site green power generators. The Green Power Partnership is a voluntary program that encourages organisations to use green power as a way to reduce the environmental impacts associated with conventional electricity use.

TRI-GENERATION

The traditional set up for a landfill gas to energy project is to simply hook up a gas engine driven generator set to a gas extraction system. It's tried and tested, but unfortunately not particularly efficient, as in most cases there is no local demand for the heat being produced, and that energy effectively goes to waste.

However, due to its proximity, when a landfill gas project was developed at the Hickory Ridge Landfill, Coca-Cola's nearby facility was able to take full advantage not only of the electrical output from the 6.5 MW installation, but also of its heat to provide both heating and cooling. The project, supplied by Republic Services' Hickory Ridge site in Conley in Atlanta's metropolitan area, has been developed by Ponte Vedra Beach, Florida based renewable energy developer, Mas Energy, which also owns and operates the facility. According to the company, back in 2010 it acquired the gas rights for the landfill from GES Live Oak-Hickory Ridge, secured financing, negotiated agreements and oversaw all permitting, regulatory compliance, design, construction and operations.

"This is Mas Energy's first tri-generation project and, to the best of our knowledge, the first operational tri-generation project fueled by landfill gas to be developed in the United States," explains Jason Byars, vice president, of business and project development at Mas Energy. "The total achievable efficiency for this project is approximately 56% to 58%, without jacket water recovery, depending on the steam and chilled water demand at any given moment," he adds.

According to the U.S. EPA's Combined Heat and Power Partnership, the average efficiency of electric-only, fossil-fueled power plants in the U.S. is 33% and has remained virtually unchanged for four decades.

The tri-generation plant comprises three GE Jenbacher J616 reciprocating engine generators, each rated at 2175 kW for a rated gross output of 6525 kW. These are combined with three heat recovery steam generators which convert the engines' heat exhaust into steam. A steam-turbine-driven chiller then uses this steam to produce chilled water and enables the plant to achieve overall efficiencies higher than both traditional and cogeneration facilities.

Prior to its combustion in three GE gas engine generators the LFG is cleaned and piped six miles

GAS EXTRACTION AND SCRUBBING

The gas collection system which supplies the fuel for the tri-generation plant comprises collection wells (generally perforated or slotted plastic pipe), wellheads, collection piping that transports the collected gas to the location of the treatment system, a blower skid that induces a negative pressure on the well field to facilitate gas collection and a flare.

"After it is collected the gas is cooled in a heat exchanger to prevent condensation in the oil system. The LFG (landfill gas) is then compressed to approximately 50 psig (4.46 bar) and cooled in a gas-to-air heat exchanger," explains Byars.

"It then flows through a glycol chiller and is cooled to 40°F (4.4°C). Next, the LFG passes through a moisture knock-out pot and re-enters a regenerative heat exchanger where it is re-heated to 80°F (26.7°C). At this point, the LFG passes to a siloxane removal skid," adds the vice president.

The siloxane removal skid comprises two trains of siloxane removal beds and carbon polishers, each capable of processing 100% of the landfill gas flow. Only one train operates at any given time while the other side is either in regeneration or standby mode. An auxiliary flare was permitted and installed to accommodate the siloxane removal skid regeneration process. The siloxane removal skid is generally in regeneration mode for six hours each day, during which it regenerates the off-line bed.

"During regeneration, a blower and electric heater mix approximately 1000 scfm of heated ambient air with a slipstream of approximately 120 scfm of LFG, which flows in reverse through the regenerating bed and before being routed to the auxiliary flare. The two siloxane removal beds operate on an alternating 24-hour adsorption/desorption cycle," continues Byars.

The gas is finally delivered to the tri-generation plant through a dedicated six mile HDPE pipeline.

CONCLUSION

Through its exclusive agreement to purchase all of the energy generated by Mas Energy's tri-generation plant, Coca-Cola says that it is able to meet most of the energy demands for its Atlanta facility. The project is just one of many initiatives which the company hopes will enable it to achieve its 2020 Vision for growth, whereby it will double the size of its business while reducing its overall carbon footprint by 15% by 2020, as compared to a 2007 baseline.

In an age where there is a growing desire to move to a more sustainable model of production and consumption, there have been numerous accusations of corporations seeming to take advantage with so called 'greenwashing'. It's refreshing then to see such an icon of the consumer society in which we live stepping up to tackle its own carbon footprint on a number of fronts, including energy consumption and production, in addition to resource management, landfilling, recycling and sustainable packaging.

However, as with many companies looking to move to more sustainable business practices, Coca-Cola's core expertise does not extend to many of the technologies that offer the carrot of sustainable growth. Such expertise lay with energy companies such as Mas Energy and recycling companies such ECO Plastics - which has a joint venture operation with the beverage manufacturer in the UK.

"We realise we can't do this alone and we don't believe for a moment that we have all the answers," Muhtar Kent chairman and CEO, of The Coca-Cola Company commented in his introduction to the company's latest sustainability report. "Partners, in this day and age, are an absolute must. The scope and scale of today's challenges demand cooperation across what we like to call the golden triangle of government, business and civil society."

Mas Energy's Atlanta tri-generation landfill gas facility is a perfect example of the type of partnerships which Coca-Cola, and a host of other multi-national household names, will be increasingly turning to in a bid to change their CSR ambitions into reality. For well positioned clean-tech companies that already represents a huge opportunity, and it looks set to grow.

Ben Messenger is the managing editor of WMW magazine
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This article is on-line.
Please visit www.waste-management-world.com

ISWA INFORMATION

VISIT WWW.ISWA.ORG FOR MORE INFORMATION

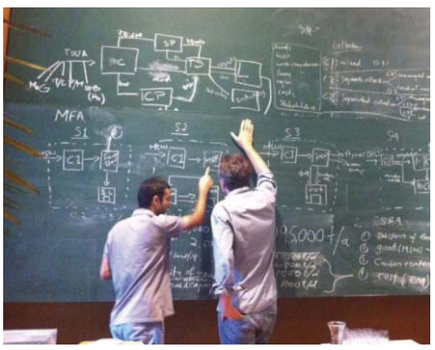
ISWA EVENTS RECORD YEAR 2012

It can already be said that the year 2012 will be a record year in regards to events organised by ISWA. More than 1,200 participants at the Florence World Congress (see report in the last issue); five Beacon Conferences (Copenhagen, Vienna, Singapore, Lobito and Zagreb); two Study Tours, one on Waste to Energy, the other one on Separate Collection; three International Workshops on Hazardous Waste and Biological Treatment of Waste; ISWA's appearance at IFAT, Rio+20 and COP 18; the ISWA Summer School. All events were very successful. We would like to highlight three of them.

ISWA SUMMER SCHOOL

In cooperation with the Institute for Water Quality, Resource and Waste Management at the Vienna University of Technology, the first ever ISWA Summer School iTOOL – Analysis, Evaluation and Design of Waste Management Systems has been held during the first two weeks of September.

29 students and waste management professionals from 20 different countries dealt with Material Flow Analysis, urban metabolism, waste collection and recycling, several methods of waste treatment and waste disposal in a combination of theoretical seminars, practice orientated exercises and project work. The programme was rounded off by excursions to waste treatment plants and a social excursion to historic sites in Austria.



ISWA STUDY TOUR: WASTE-TO-ENERGY

From 24 – 28 September 2012 the ISWA Study Tour on Waste to Energy took place in Austria. This Practical Seminar on Sustainable Waste Management focused on Recovery, Treatment, and Intermediate Storage that result in a diversion of all organic waste exceeding 5% TOC from landfill.

This was the second edition of the ISWA Study Tour on Waste to Energy and not only have the site visits been increased but also the number of participants has increased by nearly 50%.

Situated between the cities of Vienna and Linz, the Study Tour took the 28 participants from 18 different countries to 10 state of the art Waste to Energy plants in operation, amounting to an "…exciting programme. There was both theoretical and practical exposure for promoting environmental development", was how one of the participants put it.

ISWA BEACON CONFERENCE IN LOBITO, ANGOLA

The first International AFRICA Sustainable Waste Management Conference took placeat the end of July in Lobito, Angola. This very successful event was organised by the Association of Portuguese Sanitary and Environmental Engineering (APESB) and ISWA, together with the Community of Portuguese Language Countries (CPLP) with national support from the Government of Angola and local support from the Government of Benguela Province and Municipality of Lobito.

More than 260 attendees participated in the conference which covered an array of topics within the scope of sustainable waste management and climate change such as biological treatment of waste; communication and social issues; and technologies for collection and transport. A full report is available in the ISWA Knowledge Base.

ISWA

ISWA CALENDAR

2012

NOVEMBER

7-8 Working Group Meeting on Landfill
Lisbon, Portugal
rwilliams@iswa.org

8-9 Working Group Meeting on Recycling and Waste Minimisation
Porto, Portugal
ghabenicht@iswa.org

14-16 ISWA Hazardous Waste Seminar & Workshop
Buenos Aires, Argentina
rwilliams@iswa.org

DECEMBER

5-6 ISWA European Group Meeting
Brussels, Belgium
kwinternitz@iswa.org

2013

JANUARY

28 STC Meeting
Vienna, Austria
rwilliams@iswa.org

29 Board Meeting
Vienna, Austria
hkoller@iswa.org

FEBRUARY-MARCH

28-1 Working Group Meeting on Communication
Lisbon, Portugal
ghabenicht@iswa.org

APRIL

11-12 Working Group Meeting on Energy Recovery
Copenhagen, Denmark
aholzschuster@iswa.org

MAY

2-3 Working Group Meeting on Legal Issues
Brussels, Belgium
ghabenicht@iswa.org

16-18 ISWA Beacon Conference "The 2nd International Conference on Final Sinks - Sinks a Vital Element of Modern Waste Management"
Espoo, Finland
jukka.heiskanen@aalto.fi

28-29 MSW: Management Systems and Technical Solutions
Moscow, Russia
konovalova@sibico.com

JUNE

24-28 ISWA Study Tour Waste-to-Energy 2013
Austria
jschoenherr@iswa.org

AUGUST

7-9 ISWA Beacon Conference: Landfill and Transfer Stations
Gold Coast, Australia
kwinternitz@iswa.org

12-23 2nd ISWA Summer School
Kuala Lumpur, Malaysia
kwinternitz@iswa.org

SEPTEMBER

5-6 Working Group Meeting on Communication
Vienna, Austria
ghabenicht@iswa.org

12-13 Working Group Meeting on Energy Recovery
Turin, Italy
aholzschuster@iswa.org

OCTOBER

5 STC Meeting
Vienna, Austria
rwilliams@iswa.org

5 Board Meeting
Vienna, Austria
hkoller@iswa.org

7-11 ISWA World Congress 2013
Vienna, Austria
iswa@iswa.org

10-11 Working Group Meeting on Legal Issues
Vienna, Austria
ghabenicht@iswa.org

DIARY

DIARY OF EVENTS

12TH INTERNATIONAL ELECTRONICS RECYCLING CONGRESS
Salzburg, Austria
16-18 January 2013
T: +41 62 785 10 00
E: info@icm.ch
W: www.icm.ch

WASTE TO ENERGY+RECYCLING
Bremen, Germany
19-20 February 2012
T: +49 2802 9484 840
E: info@wte-expo.de
W: www.wte-expo.de

ENERGY FROM WASTE
London, UK
27-28 February 2013
T: + 44 (0)1722 717024/33
E: Julia@markallengroup.co.uk
W: www.efwlondon.eu

PV MODULE RECYCLING CONFERENCE
Rome, Italy
28 February 2013
T: +32 2 400 1049
W: www.recycling-conference.org

13TH INTERNATIONAL AUTOMOBILE RECYCLING CONGRESS IARC 2013
Brussels, Belgium
13-15 March 2013
T: +41 62 785 10 00
E: info@icm.ch
W: www.icm.ch

GULF ENVIRONMENT FORUM
Riydah, Saudi Arabia
14-16 April 2013
W: www.gulfenvironmentforum.com

BIR SPRING CONVENTION
Shanghai, China
27-29 May 2013
T: +32 2 627 5770
E: bir@bir.org
W: www.bir.org

WASTE-TECH 2013
Moscow, Russia
28-31 May 2013
T: +7 (495) 225 5986
E: waste-tech@sibico.com
W: www.waste-tech.ru

SWMT (SOLID WASTE MANAGEMENT TECHNOLOGY) BRAZIL
Sau Paulo, Brazil
03-04 June 2013
W: www.greenworldconferences.com

RWM IN PARTNERSHIP WITH CIWM
Birmingham, UK
10-12 September 2013
T: +44 (0)20 8651 7088
E: rwm.exhibition@emap.com
W: www.rwmexhibition.com

ECOMONDO
Rimini, Italy
06-09 November 2013
T: +39 541/744 456
W: www.ecomondo.com

POLLUTEC HORIZONS
Paris, France
03-06 December 2013
T: +33 (0) 1 47 56 21 12
E: ristiana.rabusin@reedexpo.fr
W: www.pollutec.com

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International Solid Waste Association (ISWA) Specialised Conference

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- State-of-the-art technologies for waste collection, transportation, sorting and recycling
- Advances in MBT Systems
- Thermal treatment and waste-to-energy
- Technologies of environmentally friendly waste landfilling

Participants

The Conference is intended for a wide circle of waste industry professionals and experts from educational, research and development institutions; municipal and governmental agencies; technology and equipment vendors

Please submit your abstract/paper no later than 15 January 2013
to iswaconference@sibico.com or konovalova@sibico.com
Author's guidelines can be found at www.iswaconference.ru

WasteTech-2013

The ISWA conference will be held as a part of the conference programme of the International exhibition for waste management, recycling , renewable energy and environmental technologies – WasteTech 2013.
For details go to www.waste-tech.ru

For further information and regular update please go to www.iswaconference.ru

I am interested in participation
(please fill in and send back by fax +7 (495) 225 5986 or e-mail: konovalova@sibico.com)

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e-mail: waste-tech@sibico.com
www.iswaconference.ru

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konovalova@sibico.com

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Participant name _____

Tel. _____

E-mail _____