



WASTE MANAGEMENT WORLD

TM

JANUARY 2013

PennWell®

Official Publication of:



ALGAE ACTION

ADvancing Biogas in North America

WMW Special
BIOWASTE

World first Autoclaving AD plant

An facility in Plymouth, UK is set to be the first world's first full scale autoclaving AD plant

Hybrid RCVs The next generation

NTM and Volvo Trucks have developed a new generation of hybrid refuse collection vehicle

Trash talking A WEEE debate

Industry leaders discuss the options open to increase critical material recycling from e-waste

SOLID & SUSTAINABLE COVERAGE

global content for all sectors in the solid waste industry

Like Us For Up-To-Date
Information On The
Largest Social Network



FACEBOOK

Follow Relevant
Updates As They
Happen



TWITTER

News. Interviews.
Case Studies.
Just Push Play.



WMW-TV

Relevant Updates On
The Latest In Market,
Policy And
Finance Activity



MARKET MANAGEMENT

A Pulse On The
Industry's Biggest
And Best Conferences
& Exhibitions



EXPO-CENTRAL

Make Sure You're
Staying Informed.
Subscribe Today



SUBSCRIBE/RENEW

Sign Up For Our
Free e-Newsletters
– Paperless Updates
Straight To Your Inbox



GREEN-MAIL

Promoting Sustainable
Waste Management
Worldwide



Inside ISWA

The Official Website For
*Waste Management
World Magazine*



Official Site

WMW
WASTE MANAGEMENT WORLD™



WASTE MANAGEMENT WORLD

TM

JANUARY 2013

PennWell®

Official Publication of:



ALGAE ACTION

ADvancing Biogas in North America

WMW Special
BIOWASTE

World first Autoclaving AD plant

An facility in Plymouth, UK is set to be the first world's first full scale autoclaving AD plant

Hybrid RCVs The next generation

NTM and Volvo Trucks have developed a new generation of hybrid refuse collection vehicle

Trash talking A WEEE debate

Industry leaders discuss the options open to increase critical material recycling from e-waste

The Recycling Specialist.



SHRED IT



GRIND IT



SCREEN IT



CHIP IT

For more information, please visit our website

www.doppstadt.com



DOPPSTADT GmbH
Barbyer Chaussee 3
39240 Calbe, Germany
Tel: +49 (0)39291 55-0, Fax: -350
info@doppstadt.com

Doppstadt

WE CARE

For more information, enter 1 at WMW.hotims.com

CALL FOR PARTICIPATION



WMR INDIA

INTERNATIONAL EXHIBITION & CONFERENCE ON
WASTE MANAGEMENT AND RECYCLING

8-10 April 2013

India Expo Centre and Mart, Greater Noida Expressway, India

www.wmrindia.com

WMR INDIA is a unique, international platform to showcase state-of-the-art products, technology and services for companies associated with resource efficiency and solid waste management & recycling industry. The event will focus on environmental challenges, provide knowledge and solutions to reduce, recycle & reuse waste and further generate revenue.

The world class conference programme offers informative sessions & workshops on latest innovations & trends and strategic issues.

Organised by:



INTER ADS - BROOKS

Supported by:



International Exhibition Associations:

Association of the German
Trade Fair IndustryFor more information, enter 2 at WWW.hotims.com*Don't miss this opportunity, book your space now!*

UK:

Michelle Amer, Exhibition Executive, Mack Brooks Exhibitions, Tel: +44 (0)1727 814400, Fax: +44 (0)1727 814401, michelle.amer@mackbrooks.co.uk

India:

Inter Ads-Brooks Exhibitions (India) Pvt. Ltd., Tel.: +91 124 4524209/ 4524444, Fax: +91 124 4381162
Siddharth Chibba: +91 9810417941, siddharth@interads.in Sushil Sharma: +91 8744879679, sushil@interadsexhibitions.com

CONTENTS

JANUARY 2013

WASTE
MANAGEMENT WORLD®

REGULARS

- 5 From The Editor
7 ISWA Comments
8 News
27 Product News
54 ISWA Information
56 Diary & Index To Advertisers

WMW SPECIAL: BIOWASTE FOCUS

12 Algae: Refining AD

Could the use of algae to refine biogas from anaerobic digestion facilities, while producing valuable products such as Omega-3, open up the North American biogas market?

18 World First: Autoclaving AD

A waste treatment facility near Plymouth in the south west of England is set to become the first in the world to apply full scale autoclave processing to wet advanced anaerobic digestion.

23 Composting in Uganda

A project in the Ugandan town of Busia has been using action research to develop a proper waste collection and composting system.

ANALYSIS

8 Waste Not Want Not

A recent report by the UK's Institution of Mechanical Engineers found as much as 50% of global food production going to waste each year.

FEATURES

29 Another New Hybrid and More

A new generation of hybrid powered refuse collection vehicle has been developed in Finland by NTM and Volvo Truck Corporation. But this newcomer is significantly different - especially when it comes to 'size'.

34 Getting on Down!

Italian manufacturer, Tabarelli's latest 360 wheeled materials handler for the waste and recycling industry is the first to feature a hydraulically operated 'SkyCab', which can be both raised and lowered.

39 Trash Talking: WEEE Debate

Globally, a combination of economic and environmental drivers are making it increasingly important to maximise the recovery of critical materials for electronic waste. WMW asked a number of industry experts for their views on how the industry can meet this challenge.

46 Energy Recovery on Remote Islands

Often isolated from end markets for recyclates, the issue of how to manage waste on remote islands can be difficult. However, the use of thermal treatment technology with energy recovery has been successfully deployed on a number of island communities.

50 Carbon Finance for LFG to Grid

In Canada new regulations aimed at reducing the country's greenhouse gas emissions will soon require landfill sites generating over 1000 tonnes of methane per year to install gas management systems. With its new LFG to grid system, the community of Salmon Arm is one step ahead.

Waste-to-Resources 2013

5th International Symposium MBT & MRF

Mechanical-biological waste treatment (MBT / AWT)
and material recovery facilities (MRF)

Conference – Exhibition – Site Visits

11th – 14th of June 2013 in Hanover, Germany
additional training course 6th - 7th of June

Conference in 4 languages with simultaneous translation

English – French – Spanish– German

- Waste management strategies, new waste treatment technologies
- Targets, legal aspects, boundary values
- Practical experience, optimisation and new plants
- New developments in machine and system engineering
- Emissions and their treatment
- Conditioning, use and sale of MBT & MRF output fractions
- Process control and analytics

Programme and more information at www.waste-to-resources.com



Organisers:

wasteconsult
INTERNATIONAL

www.wasteconsult.de



www.asa-ev.de

For more information, enter 3 at WMW.hotims.com



Published by PennWell International Publications Ltd

The Water Tower, Gunpowder Mill, Powdermill Lane,
Waltham Abbey, Essex, EN9 1BN, UK.

Tel: +44 1992 656 600

Fax: +44 1992 656 700

e-mail: wmw@pennwell.com

web: www.waste-management-world.com

SR. VP & Group Publisher: Tom Fowler

President/CEO: Robert F. Biolchini

Chairman: Frank T. Lauinger

Chief Financial Officer: Mark C. Wilmoth

Group Publisher: Timm Dower

Chief Editor: Tom Freyberg

Managing Editor: Ben Messenger

ISWA Editor: David Newman

Collection & Transport Correspondent: Malcolm Bates

Design: Ross Tucker

Production Coordinator: Kimberlee Smith

Marketing Manager: Tim Chambers

Advertising: for information, please see page 56

Editorial/News Contact: benm@pennwell.com

Editorial Correspondence/Press Releases:

Please send to Waste Management World at wmw@pennwell.com



Member, BPA Worldwide

Published for the International Solid Waste Association: Auerspergstrasse 15, Top 41, 1080 Vienna, Austria. Tel: +43 1 25 36 001. Fax: +43 1 59 999 700. E-mail: iswa@iswa.org web: www.iswa.org

© 2011 International Solid Waste Association. All rights reserved. No part of this publication may be reproduced in any form or by any means, whether electronic, mechanical or otherwise including photocopying, recording or any information storage or retrieval system without the prior written consent of the Publishers. While every attempt is made to ensure the accuracy of the information contained in this magazine, neither the Publishers, Editors nor the authors accept any liability for errors or omissions. Opinions expressed in this publication are not necessarily those of the Publishers or Editor.

Subscriptions: Waste Management World is circulated free to professionals in the waste management industry. To start a free subscription visit www.wmw-subscribe.com


Professionals outside the waste management industry may start a paid subscription. For pricing information visit www.ameda.com/wmw or call +1 847-559-7330.

Waste Management World is published 6 times a year by PennWell Publications Ltd, The Water Tower, Gunpowder Mill, Powdermill Lane, Waltham Abbey, Essex, EN9 1BN, UK, and distributed in the USA SPP at 75 Aberdeen Road, Emigsville, PA 17318-0437. Periodicals postage paid at Emigsville, PA.

Postmaster: Send address changes to Waste Management World, c/o P.O. Box 437, Emigsville, PA 17318.



Reprints: If you would like to have a recent article reprinted for an upcoming conference or for use as a marketing tool, contact Jill Kaletha, E-mail: pennwellreprints@fosterprinting.com
Tel: +1-866-879-9144, ext. 168

Printed in the UK by Williams Press Ltd on elemental chlorine-free paper from sustainable forests.



THE SHREDDER FOR BIG TASKS!

- ✓ Rips through anything – wood, waste, metal
- ✓ Patented T-blade cutting geometry
- ✓ Mobile and stationary versions



ARJES GmbH ■ Werkplatz 1 ■ D-36433 Leimbach
Fon: +49 (0) 3695 / 85 855-0 ■ Fax: +49 (0) 3695 / 85 855-14
Web: www.arjes.de ■ E-Mail: info@arjes.de

DEVELOPED BY
NORBERT HAMMEL

For more information, enter 4 at WMW.hotims.com

WEEE CHALLENGE BIG OPPORTUNITY

For all of the health and environmental challenges it poses, e-waste is also a huge opportunity for recyclers.



Ben Messenger Managing Editor

“

The increased risk of developing lung cancer is due to the primitive incineration techniques being used to recover metals

With waste electrical and electronic equipment (WEEE) being one of the fastest growing waste streams in the EU, and indeed globally, the importance of properly recycling it has never been of greater importance. Just this week I read a report co-authored by Oregon State University, which gave a stark warning over the increased risk of lung cancer being posed to residents living near a site actively burning e-waste in China.

According to the researchers, the increased risk of developing lung cancer is due to the primitive incineration techniques being used to recover metals, but which release a range of toxic substances, including polycyclic aromatic hydrocarbons.

And it is not just the threats posed to health and the environment that should focus our attention on the growing global e-waste mountain. As Andreas Manhart, a researcher at Germany's Öko Institut explains in our Trash Talking feature on page 39, electronics such as laptops contain cobalt, neodymium, tantalum, gold, silver and other critical metals.

These materials may only be present in very small quantities per device, but with millions of tonnes of e-waste being produced annually, the environmental, political and economic imperative to find ways to effectively recover them is growing.

But the waste and recycling industry is just one side of the coin. A key issue being repeatedly raised is that the manufacturers of these products are often making recycling more difficult. For example, in many cases batteries cannot be easily removed from mobile phones, tablet PCs and even some laptop computers.

While the companies which make such products are all too keen to tout their 'green' credentials, is it not time that there was a little more thought put into how those products are ultimately going to be unmade, and the precious resources embodied in them recovered? With supplies of many virgin materials already approaching breaking point, if we are to continue to enjoy our gadgets we will surely have to move to more circular material flows.

Maximising the recovery of both energy and materials is a common theme across the waste industry. When it comes to organic waste treatment there is an increasing buzz in the industry surrounding technologies which can extract high value compounds from wastes for use in the pharmaceutical and food industries.

On page 12 we take a look at one such technology that uses algae to clean up biogas from an anaerobic digester. In doing so it not only reduces odours from hydrogen sulphide, but it also provides additional revenue with the production of Omega-3.

Elsewhere in the issue on page 18 Stephen Barnes takes a look at the world's first wet anaerobic digestion plant to have incorporated autoclave pre-treatment, and on page 29 Malcolm Bates explains the finer points of a new hybrid refuse collection vehicle from NTM and Volvo Trucks.

Ben Messenger
Managing Editor



Follow WMW magazine on Twitter: www.twitter.com/WMW_Magazine

A!

Aalto University

finalsinks.aalto.fi

ISWA BEACON 2nd International Conference on Final Sinks

Sinks a Vital Element of Modern Waste Management

The conference will focus on the following topics:

- Safe final sinks
- Sources, types, and the composition of harmful materials
- Removal of harmful substances from material cycles
- Future needs for handling material flows and stocks to minimize harmful substances
- Landfill aftercare

16–18 May 2013

Espoo, Finland



For more information, enter 5 at WMW.hotims.com

Sponsors



For further information and
regular updates, please go to
finalsinks.aalto.fi

REPORTING FOR DUTY

ISWA and its members have published a number of outstanding new reports lately. Don't miss out.



David Newman President, ISWA

“

Please take the time to go to the ISWA Knowledge Base and download the reports. They make a contribution to our understanding of our sector

ISWA continues to produce a considerable volume of technical papers which are of interest to the waste community, but often, in the myriad of communications that are sent out, do not get the attention they deserve. So I want to use this editorial to bring your attention to the numerous papers ISWA has published recently and to suggest you consult them.

The Working Group on Landfill, under the leadership of Derek Greedy, has produced a series of reports on the State of the Art of Landfills in various nations, beginning with an overview and then looking in detail at six different countries. The texts examine both the regulatory framework and the local practices in landfill management. In addition, coming soon is a Key Issue Paper on Landfill Mining that the Working Group has just drafted.

Under the leadership of Bettina Kamuk the Waste to Energy Working Group has published its 6th State of the Art report, essential reading to those wanting to know about trends, technologies, investments, in this leading sector of waste treatment. That this report is the 6th edition illustrates the rapid development of the sector and the ability of our Working Group to monitor and interpret these changes. The Working Group is also working on two additional papers that will be available shortly: WtE Guidelines for Transitional Economies and a Position Paper on How to Gain Benefits from WtE in Europe.

Other interesting studies and reports have been published by ISWA using external sources funded under our Grant system. I take this opportunity of reminding readers that during 2013 we will finish the projects financed under the 2011 Grant package and will be examining proposals for the following two year period, so look for the updates on this in future ISWA communications.

Jakob Lederer, Paul Brunner, Amosiah Ongatai, Medrine Nabassa, Simon Otim and others have produced a very readable guide for waste managers in Uganda - 'A user-focused knowledge base for goal oriented solid waste management in Uganda' (see p24).

On this note, a further study called 'An analytical framework and tool ('InteRa') for integrating the informal recycling sector in waste and resource management systems in developing countries', studies the complex question of informal sector waste workers. Wherever I speak to people in developing countries this question arises, as it did in Doha last December. The concern is that if we modernise waste systems in developing countries, informal workers risk losing their livelihoods. The study tackles this and proposes a framework for overcoming it. As such it provides an important instrument to help overcome the concerns many governments and NGOs have for developing nations.

This study is part of the series of reports initiated by ISWA within the Globalisation and Waste Management report (part 1) launched in Florence last September and which I hope can be completed in Vienna this October. The Task Force is working hard on this right now. I cannot emphasise too strongly how this report changes the perception of our industry among international governmental organisations (IGOs), NGOs and in developing countries too. The narrative in the report describes situations worldwide which were evident to everyone yet not codified.

Some future ISWA publications to watch out for include papers and reports on Food Waste, Digestate and Sewage Sludge, Global Recycling Markets, Landfill Guidelines - in tropical conditions, and Guidelines on Product Chain Management. Please take the time to go to the ISWA Knowledge Base and download the reports. They make a contribution to our understanding of our sector and help it progress.

I sincerely thank all the authors for their contributions and dedicated work.

David Newman
President, ISWA

NEWS

NEWS

SEND YOUR NEWS TO WASTE MANAGEMENT WORLD
e-mail: benm@pennwell.com

FOOD: WASTE NOT WANT NOT



The UK's Institution of Mechanical Engineers (IMechE) has published a report - Global Food, Waste Not, Want Not - which found that as much as half of the four billion tonnes of food produced globally each year ends up as waste.

According to Dr Tim Fox, head of Energy and Environment at the Institution, the amount of food which could be used to feed the world's growing population – as well as those in hunger today – that is being wasted is “staggering”.

By 2075 the United Nations' mid-range projection for global population growth forecasts the world's population to peak at about 9.5 billion people. That

would mean an additional three billion mouths to feed by the end of the century, a period in which the report said substantial changes are anticipated in the wealth, caloric intake and dietary preferences of people in developing countries across the world.

The report cited inadequate infrastructure and storage facilities, overly strict sell-by dates, buy-one-get-one free offers and consumers demanding cosmetically perfect food as being among the causes for the excessive waste.

In light of the situation IMechE called for urgent action to be taken to address the problem, which has knock on effects such as an

unnecessary waste of the land.

It also leads to a waste of water and energy resources that were used in the production, processing and distribution of food which ends up in the bin. By improving processes and infrastructure, as well as changing consumer mindsets, 60% to 100% more food could be produced, according to the report.

Key Findings

- Between 30% and 50% or 1.2 to 2 billion tonnes of food produced around the world each year never reaches a human stomach
- As much as 30% of UK vegetable crops are not harvested due to them failing to meet exacting standards based on their physical appearance, while up to half of the food that's bought in Europe and the U.S. is thrown away by the consumer
- Around 550 billion m³ of water is wasted globally in growing crops that never reach the consumer
- It takes 20 to 50 times the amount of water to produce 1 kg of meat as 1 kg of vegetables
- The demand for water in food production could reach 10 to 13 trillion m³ a year by 2050. This is up to 3.5 times greater than the total human use of fresh water today and could lead to more dangerous water shortages around the world
- There is the potential to provide 60% - 100% more food by eliminating losses and waste while at the same time freeing up land, energy and water resources.

Engineered Solution

According to Dr Fox, as water, land and energy resources come under increasing pressure from competing human demands, engineers

have a crucial role to play in preventing food loss and waste by developing more efficient ways of growing, transporting and storing foods.

The report cited the examples of India, where 21 million tonnes of wheat is wasted each year due to inadequate storage and distribution systems, and South East Asian countries where losses of rice can range from 37% to 80% of the entire production.

The authors added that in mature, developed economies such as the UK and USA, the purchasing policies for fresh produce operated by the major supermarkets actively encourage waste in the field.

Recommendations

In order to help prevent a future global food crisis IMechE made three key recommendations. Firstly, the UN Food and Agriculture Organisation (FAO) works with the international engineering community to ensure governments of developed nations put in place programmes that transfer engineering knowledge, design know-how, and suitable technology to newly developing countries

Secondly, governments in rapidly developing countries should incorporate waste minimisation thinking into the transport infrastructure and storage facilities currently being planned, engineered and built.

Finally, governments in developed nations should devise and implement policies which change consumer expectations and discourage retailers from wasteful practices that lead to the rejection of food on the basis of cosmetic characteristics. The report also recommended that losses in the home caused by excessive purchasing also need to be addressed.

TOUGHER RECYCLING TARGETS AND LANDFILL BANS TO IMPACT WASTE UTILISATION

A considerable quantity of valuable raw materials is lost in waste utilisation and processing chains, according to research conducted by VTT Technical Research Centre of Finland, Aalto University, the Finnish Environment Institute (SYKE) and Lappeenranta University of Technology.

VTT said that with waste being turned into a global trading commodity, there should be better recovery of the valuable metals contained in waste electronic equipment.

According to the report, 'Directions of future developments in waste recycling', stricter recycling targets and the rise in raw material prices are expected to promote the birth of new innovations for reducing material loss.

VTT explained that because only certain materials can currently be sorted, a number of waste materials are mixed at the collection phase. However, the researchers added that recycling processes based on crushing are manifestly unsuited to the separation of raw materials contained in ever more complex products.

"Material recycling can be increased by making waste collec-

tion and sorting more efficient, and by improving processing and sorting methods to maximise recovery of resources," said VTT's principal scientist, Ulla-Maija Mroueh. (see p39 for Ulla-Maija Mroueh's contribution to WMW's Trash Talking feature on e-waste).

According to Mroueh product recyclability should be taken into account as early as the product's design stage.

Waste processing chains in need of development

The researchers said that during the research a new approach to analysing waste value chains was developed. Based on the analyses performed, waste utilisation occurring in the chains, whether in the form of material or energy, is environmentally and often also economically beneficial. New, more cost-effective solutions are nonetheless required for certain kinds of waste materials.

"One of the key problems was found to be a lack of good quality information regarding waste composition and behaviour during the treatment and utilisation processes. The information is necessary in assessing the environmental ben-



efits of raw material recycling and to improve profitability," observed senior researcher, Helena Dahlbo of the Finnish Environment Institute.

Aalto University project researcher, Maria Törn added: "Significant development areas were found to include improving the effectiveness of collection and sorting of material prior to crushing, optimising the recycling process, monitoring in real time, and analysis of materials throughout the value chain."

The researchers also noted that more demanding targets for recycling, coupled with a ban on landfilling organic waste, will have a major impact on waste utilisation.

IN BRIEF

Racketeering Charges in New York Waste industry

Twelve members of three New York crime families have been charged with a racketeering conspiracy in the waste industry following an extensive investigation.

In total, charges have been made against 32 individuals as part of an investigation into organised crime's alleged control of large aspects of the commercial waste-hauling industry in greater New York City and in parts of New Jersey.

Australian Waste Gasification Plant Nears Completion

A waste gasification facility is in the final stages of construction in Carisbrook, Australia, according to a report by the Bendigo Advertiser.

Managing director of the project, Ray Gattisnce of Australian Renewable Energy Parks, explained that once complete the AU\$6 million plant will convert waste timber into Syngas. He added that the plant will also have the potential to use waste from Bendigo or Ballarat, or even Melbourne.

The facility is expected to be operational in around six to eight weeks.

LANDFILL GAS FUELLED TURBINE PASSES INDEPENDENT TESTING

Irvine, California based energy and environmental technology developer, Flex Power Generation has completed successful independent emissions tests of its Flex Powerstation™ FP250 system at the Department of Defense's (DoD) Fort Benning, GA Army post.

The company claimed that the Flex Powerstation is the only landfill gas fuelled turbine to offer energy generation and pollution control for previously wasted landfill gas. The system can generate 250 kW of electricity, enough to power 250 around homes.

According to Flex, the energy

produced has near-zero emissions of nitrogen oxides (NOx) and will reduce the Army's carbon footprint and bottom line.

The independent tests, conducted by Southern Research were carried out in October last year. As part of the process, three, one-hour sampling runs were completed per standard reference methods of the U.S. Environmental Protection Agency.

Among the results, which the company said it will publish formally in coming months, the Flex Powerstation emitted less than 5% of the California Air Resources Board's

2013 allowable limit for NOx.

"The CARB 2013 standard is considered to be among the strictest in the world, and the Flex NOx emission results are unprecedented for a turbine or reciprocating engine running waste gas," commented Boris Maslov, president and CEO of Flex Power Generation.

Meanwhile, Tim Hansen, director of Advanced Energy & Transportation Technology at Southern Research said: "The Flex Powerstation has demonstrated significantly lower emissions of NOx and non-methane organic carbon than many waste to energy solutions."

NEWS

IN BRIEF

ISRI Scrap Yearbook 2012

The U.S. Institute of Scrap Recycling Industries (ISRI) has published its Scrap Yearbook 2012.

The organisation said that the yearbook not only includes useful information about the economic and environmental benefits associated with scrap recycling, but also provides readers with commodity specific overviews of how scrap is generated, processed, traded and used.

In addition, the yearbook contains practical examples of the life cycles and material flows of key recycled goods and commodities.

Annual British Plastics Recycling Survey Published

The British Plastics Federation's Recycling Group (BPRG) has released the results of its 2011 Annual Return Survey, which showed that its members recycled a total of 517,000 tonnes of plastics - breaking the half million tonne barrier for the first time.

The organisation said that its annual survey obtains information and statistics on the total tonnage of plastics recovered by its members and is a critical instrument to better understand the dynamics of the plastics recycling sector.

Annual British Plastics Recycling Survey Published

The cumulative installed capacity of the global biogas power market has grown from 2388 MW in 2001 to 8377 MW in 2011, at a compound annual growth rate of 13.4%, according to a new report by market research company Global Information.

The report added that cumulative installed capacity is projected to register moderate growth over the forecast period, with cumulative installed capacity expected to reach 22,040 MW by 2025.

BACKING FOR UK WASTE PLASTICS
PYROLYSIS TECHNOLOGY DEVELOPER

Swindon, UK based Recycling Technologies - a University of Warwick spin out company - has completed an equity financing deal with the Wroxall Investors Group (WIG), a Midlands-based business angel syndicate.

According to Recycling Technologies it was formed to commercialise a pyrolysis process developed at the University of Warwick which can transform mixed plastic waste (MPW) into heat and electricity. The company was spun out in 2011, with assistance from Warwick Ventures, the University's research commercialisation arm.

In the first phase of the pyrolysis process, the WarwickFBR™ system shreds and dries the MPW. It then injects blended product into a fluidised bed, where in an oxygen depleted environment the long hydrocarbon chains form an energy rich gas.

The company said that this gas is then filtered to remove contamination and cooled to provide a type of heavy fuel oil. This fuel can be used to create steam or to power an engine driven generator. Each installation is tailored to the material to be processed and the facility in which it is installed.

"The concept of a machine that can be installed into existing recycling facilities to turn what most people still regard as waste plastic into electricity and heat in a CHP plant is timely given the increasing costs of landfill and energy prices," commented Adrian Griffiths, managing director at Recycling Technologies.

According to Griffiths the company's first machine is due to go into production in 2014. He added that the WIG investment will allow the company's infrastructure to be expanded at its Swindon base, ensuring that the commercial opportunity is fully exploited.

BIR: BEWARE OFFERS OF CHEAP SCRAP
METAL SHIPMENTS

The Bureau of International Recycling (BIR) has issued a warning to recyclers in light of an on-going spate of spurious business offers involving non-existent cargoes of scrap metal.

According to BIR, over recent weeks it has received several reports of cases where cargoes of scrap metal were offered to member companies at knock-down prices.

These 'deals' were accompanied by a set of documents confirming the quality of the goods on offer.

The Bureau said that following verification through the ICC International Maritime Bureau (IMB), it became clear that the documents were not authentic. In several cases the same documents had been presented on multiple occasions with different company names.

This is said to suggest that either the same individuals were behind the offers, or that the documents were available in the public domain for use by fraudulent individuals.

BIR also cautioned that further analysis of these offers by the IMB revealed that they were quite frequently made in the name of real traders, whose identities were 'cloned' for fraudulent purposes.

CHINESE RESIDENTS AT RISK OF LUNG
CANCER FROM E-WASTE PLANT

A recent study, co-authored by Oregon State University (OSU) researchers, has found that residents near an e-waste site in China face elevated risks of lung cancer.

According to the researchers e-waste is often collected at dump sites in developing countries and crudely incinerated to recover precious metals, including silver, gold, palladium and copper. The process is often primitive, releasing fumes with a range of toxic substances, including polycyclic aromatic hydrocarbons (PAH), a group of more than 100 chemicals.

The main focus of the study

was PAHs, many of which are recognised as carcinogenic and linked to lung cancer when inhaled. Over the course of a year, the researchers said that they collected air samples from two rooftops in two areas.

One was in a rural village in the southern province of Guangdong, less than a mile from an active e-waste burning site and not surrounded by any industry. The other was Guangzhou, a city heavily polluted by industry, vehicles and power plants but not e-waste.

The scientists concluded that those living in the e-waste village are 1.6 times more likely to develop

cancer than their urban peers.

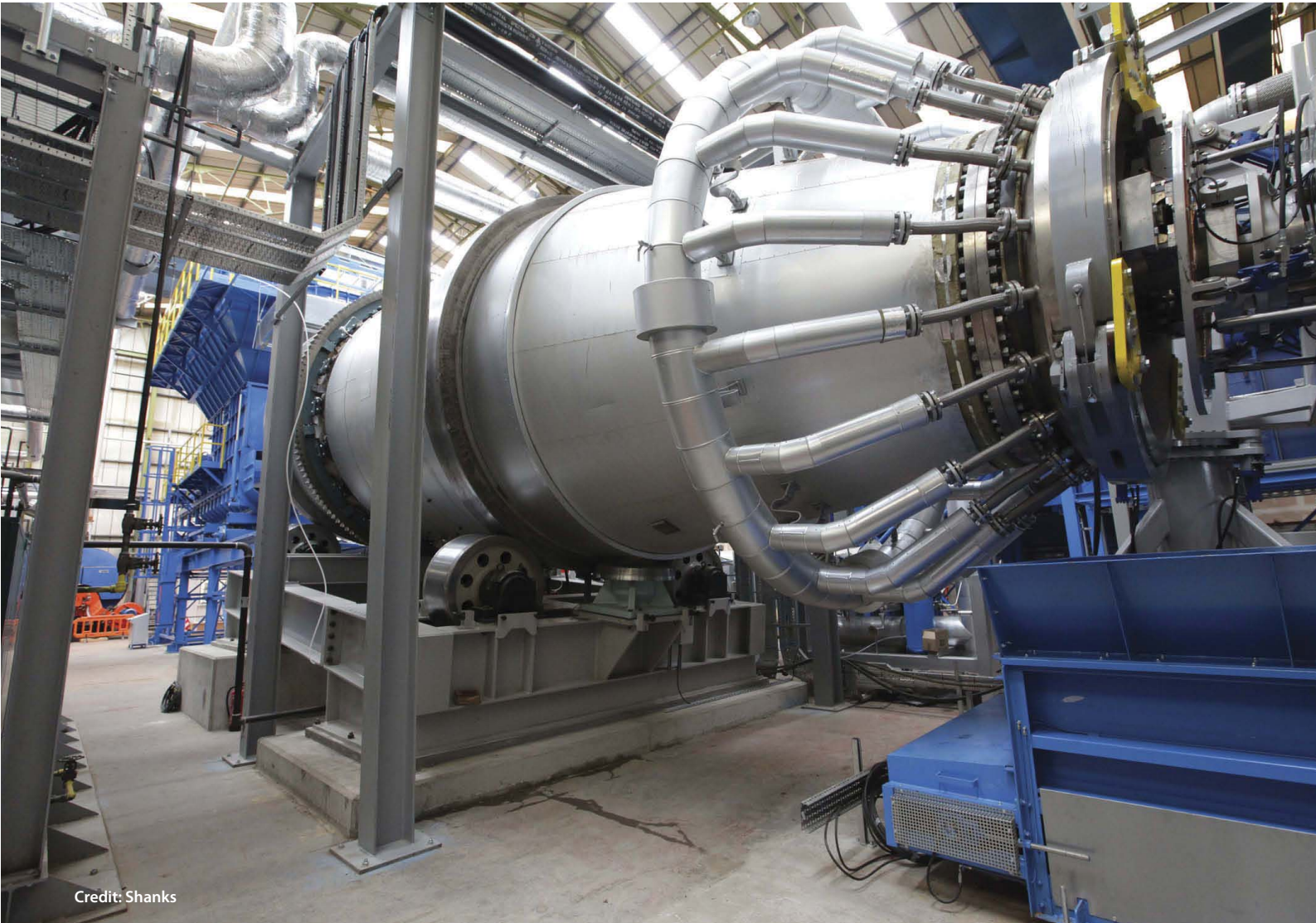
"In the village, people were recycling waste in their yards and homes, using utensils and pots to melt down circuit boards and reclaim metals," explained Staci Simonich, a co-author of the study and a professor of environmental and molecular toxicology at OSU.

Furthermore, the researchers estimated that of each million people in the e-waste area, between 15 to 1200 would develop lung cancer on account of PAHs over their lifetimes, while the likelihood in the city is slightly lower at nine to 737 per million.



WASTE MANAGEMENT WORLD™

BIOWASTE FOCUS



Credit: Shanks

CAN AUTOCLAVING UNLOCK AD'S FULL POTENTIAL?

12 Algae: Advanced AD in North America

A lack of government funding, combined with tight planning and permitting conditions regulating odour control from anaerobic digestion facilities, has hampered investment in biogas plants across North America. Now however, by utilising algae to clean the biogas and capture valuable compounds such as Omega-3, one Canadian company claims to have the solution both problems.

18 World First: Autoclaving AD Plant

An organic waste treatment facility in Devon, UK is set to become the first in the world to apply full scale autoclave processing to wet advanced anaerobic digestion.

23 Composting in Uganda

A project in the Ugandan town of Busia has been using action research to develop a proper waste collection and composting system.

IS ALGAE THE ANSWER FOR BIOGAS IN NORTH AMERICA

With strict permitting conditions regulating odour emissions from anaerobic digestion facilities, and little government funding, the technology has been slow to take off in North America. Now however, by utilising algae to clean the biogas and capture valuable compounds such as Omega-3, one Canadian company claims to have the solution both problems.

by Ben Messenger



CA?

In many countries in Europe the use of anaerobic digestion (AD) facilities to produce biogas and fertiliser from agricultural, municipal and commercial organic wastes is well established. Backed by government subsidies and feed-in tariffs, anaerobic digestion has flourished in Germany, which has well over 6000 operating plants – 70% of them located on farms. Indeed so successful has the German biogas industry been that there have even been warnings of over-capacity and questions raised about the availability and suitability of feedstocks.

Other markets however have not been so quick on the uptake. Notably, North America, where with little government funding the entire continent currently has less than 200 AD facilities. Further hampering developers has been the lack of landfill diversion regulations for organic wastes, and often strict environmental regulations for air and water quality – particularly those relating to the release of odorous hydrogen sulphide – which has made obtaining permits lengthy and costly. Furthermore, as has been the case for other renewable technologies, the arrival of cheap and plentiful shale gas has done little to help the economics.

Due to these factors AD developers in North America rely heavily on tipping fees, with paybacks typically in the five to seven year range. With all the talk of the 'fiscal cliff', the prospect of North American countries providing the level of government funding which helped build Germany's biogas industry seems unlikely. If AD is to become a more attractive prospect to investors in the region it will be necessary to increase the revenue generating potential for such facilities.

One company with a technology which it claims can do just that is Toronto, Canada based Solutions4CO₂, which has developed what it calls the Integrated Biogas Refinery™ (IBR) platform. According to the company the system can reduce the payback for AD projects to less than three years with the production of high value Nutraceutical and Pharmaceutical co-products such as Omega-3 and Astaxanthin.

BIOWASTE FOCUS REFINING BIOGAS

According to the EPA biogas systems, such as the 100,000 TPA Fremont Community Digester pictured, are feasible at 8000 swine and dairy farms in the U.S.



HOW IT WORKS

According to Dil Vashi, manager of corporate development at Solutions4CO₂, at the heart of the system lays the company's own proprietary Biogas Purifier and Infusion System™ (BPIS).

"What the BPIS does, is it essentially infuses and completely dissolves CO₂ and Hydrogen Sulphide (H₂S) into water because they are soluble gases. The methane (CH₄), which isn't soluble, passes through the water and flashes off. So what you end up with is the CO₂ and H₂S being captured in the water and the methane stream off gassing. You go from a biogas stream which is typically 60% methane, 39% CO₂ and less than 1% H₂S, to a biogas that is over 90% methane and the CO₂ and H₂S being reduced by 85% – 95%," explains Vashi.

"The significance of our system is that when you grow algae in that CO₂ and H₂S infused water, it gives you an increase in your algae growth yield of over two to three times. What we do then, is we take that algae and we harvest it, dewater it, dry the biomass and then extract certain high value oils – primarily Omega-3 and Astaxanthin – and then sell them into the nutraceutical and pharmaceutical industries," he continues.

To infuse the CO₂ and H₂S into the water, Vashi says that the company's BPIS differs from more common fine bubble sparging techniques,

which operate under pressure with very small bubbles, by displacing other molecules present in the water such as oxygen and nitrogen. Infusing the CO₂ and H₂S at a molecular level results in a bubble-less solution, which makes it considerably easier for the algae to consume the infused gases.

Cultivated in an Algae Cultivation System (ACS) that is comprised of an LED lit tank, or photo bioreactor, the algae consumes the CO₂ and H₂S as a nutrient, and essentially processes them into high value compounds such as Omega-3 and other long chain carbon compounds. To harvest the algae, every couple of days around 50% of it is scooped from the top of the photo bioreactor by the Harvesting and Extraction System (HES), which dewater and dries it, and then extracts the high value oil. The remaining 50% remains in the bioreactor as an inoculum to get the next batch of algae started.

According to the company its IBR is a closed loop system which utilises all of the outputs of the AD system as inputs to the co-product platform. Power, CO₂, H₂S, clean methane, water and digestate from the AD are utilised as inputs to the co-product platform, with all residual co-products sold to generate additional revenue. The resulting revenue enhancement effectively reduces project paybacks to less than three years.

ECONOMICS

In addition to allowing the cultivation of algae, another major advantage of purifying the methane is that it allows lower capital expenditure and maintenance costs for the generator set, as well as higher air quality standards for H₂S – particularly significant in the North American market.

In terms of the extra running costs associated with the additional equipment at a facility with an installed IBR, Vashi cites the example of a typical AD plant producing around 300 cubic feet (8.5 cubic metres) of biogas per minute and generating around 6 million kWh of electricity each year. The power consumption of the IBR - the BPIS, the ACS and the HES - in total consume around 1 million kWh per year – with the AD's parasitic load consuming around another 1 million kWh per year, leaving 4 million kWh per year for export to the grid.

But the real money spinner for the system is in the sale of the recovered high value co-products. According to food industry market research company, Packaged Facts, consumer spending on products fortified with Docosahexaenoic Acid (DHA) and Eicosapentaenoic Acid (EPA) from Omega-3 will grow from \$25.4 billion in 2011 to \$34.7 billion by 2016. Meanwhile the market for Astaxanthin - a natural nutritional component which can also be used as a food



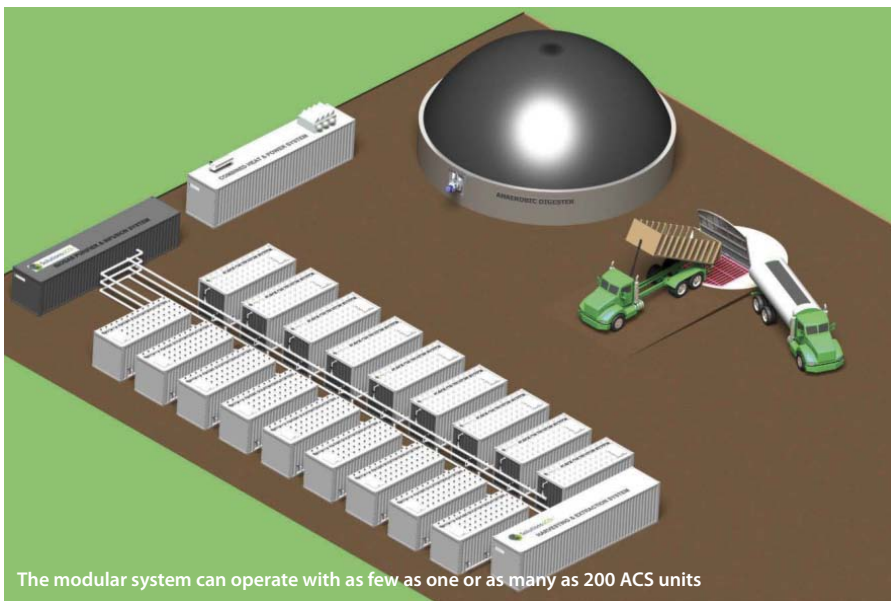
BACKHUS LTC - The innovative system
for composting in closed lanes.



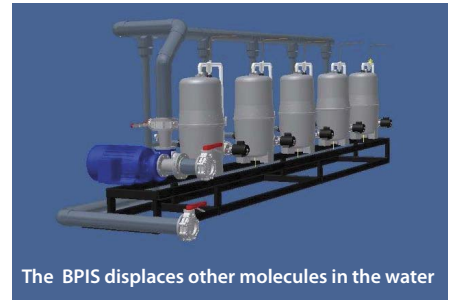
For more information, enter 6 at WMW.hotims.com

www.backhus.com

BIOWASTEFOCUS REFINING BIOGAS



The modular system can operate with as few as one or as many as 200 ACS units



The BPIS displaces other molecules in the water

supplement and is considered an 'E' number in the European Union - is currently estimated at a more modest \$60 million, but is expected to grow rapidly to \$200 million by 2015.

While traditionally Omega-3 oil has been sourced from fish oil, interestingly, the fish themselves don't actually produce Omega-3, it's the algae they eat which produce it and it builds up in the bodies of the fish that typically cannot process it - which ours can.

The company is currently completing its first commercial IBR facility in Canada at an existing AD installation which processes a mixture of dairy waste and commercial food waste into biogas for power generation.

The IBR will be integrated with the AD and will process live biogas from the AD as an input for the IBR to produce algae biomass containing high value nutraceutical and pharmaceutical co-products.

Vashi adds that the IBR is modular and linearly scalable and can be built in scale from one to 20 or right up to 200 ACS units depending on the size of the AD and biogas production, and capital available to invest in a project.

HUGE POTENTIAL

In making its case that the time has come for AD to flourish in North America, the company points to the 60,000+ dairy farms in the U.S.

METHANE EXPO 2013
GLOBAL METHANE INITIATIVE
Vancouver, Canada
12 - 15 March 2013

Join Us in Vancouver, Canada for the World's Largest Forum for Methane Projects, Technology, Financing and Policy
Methane Expo 2013, organized by the Global Methane Initiative (GMI), is the premier international forum for promoting methane abatement, recovery and use projects and technologies. Previous Expos held in Beijing, China and New Delhi, India attracted:

- Over 750 participants from 34 countries
- Nearly 250 featured methane capture and use project opportunities, including 20 success stories
- More than 100 exhibitors

Supporter and Exhibit Opportunities Available
Methane Expo 2013 provides an unprecedented opportunity for companies to present themselves to decision makers from around the world. Supporters will enjoy a highly visible presence at the Expo, including:

- Increased exposure among Expo attendees through signs and presentations
- Recognition in printed conference materials
- Company descriptions listed on the Expo website

For more information on supporter and exhibit opportunities, contact the GMI Administrative Support Group at asg@globalmethane.org.

Canada
EPA
For more information or to register online, please visit:
www.globalmethane.org/expo

For more information, enter 7 at WMW.hotims.com

WASTE
management world.
PennWell®

The Waste To Energy Monthly e-Newsletter
Global Coverage Of The Entire Waste To Energy Sector - Delivered To YOU.

- New Contracts
- Video Case Studies
- Mergers & Acquisitions
- NEW Technology
- Regulatory Updates



Sign Up For FREE Today. Visit Waste-Management-World.com

REFINING BIOGAS **BIOWASTEFOCUS**

alone - 2000 of which exceed 1500 heads in size. At 1500 heads a dairy farm can sustain a digester capable of producing 300 cubic feet (8.5 cubic metres) of biogas per minute. According to the U.S. Environmental Protection Agency (EPA) biogas recovery systems are technically feasible at more than 8000 U.S. dairy and swine operations, and could generate some 13 million MWh of electricity each year.

In addition to agricultural wastes, other organic waste streams also present a significant opportunity. EPA figures show that in 2010 over 34 million tons (31 million tonnes) of food waste was generated in the U.S. from all sources – less than 3% was recovered.

Of the remaining 33 million tons the majority was directed primarily to landfills and incinerators. According to Solutions4CO₂, redirecting these food waste streams into IBR projects presents an enhanced revenue opportunity for AD developers.

And it's not just in North America where the infrastructure to treat organic wastes is somewhat lacking. The UK has traditionally relied on landfill to dispose of wastes and has been slow to jump aboard the AD bandwagon. However, with landfill space rapidly running out and the need to meet the country's obligations under the EU Landfill Directive - that is changing fast.

According to the UK Government's Department for Environment, Farming and Rural

Affairs, (Defra) Anaerobic Digestion Strategy and Action Plan, by April 2011 there were a total of 54 AD plants (excluding wastewater facilities) in the UK – 32 on-farm and 22 off-farm. While these facilities have a combined capacity of over 1 million tonnes per year, the UK landfills around 7 million tonnes of food waste each year and produces approximately 90 million tonnes of agricultural slurry and manure. With government backing now in place the UK is rapidly expanding its AD capacity, and has plenty of available feedstock.

Other EU countries with previously under developed AD capacity are also now starting to ramp up development. For example, in Poland a number of new AD projects have recently been launched.

Unsurprisingly all this activity has not gone unnoticed by Solutions4CO₂ and according to Vashi the company is looking to work with overseas partners to incorporate its IBR technology into AD facilities.

GAME CHANGER?

While there has been some government backing through loan guarantees and Renewable Energy Certificates in the U.S., for years the biogas market in North America has struggled



The Algae Cultivation System is comprised of an LED lit tank, also known as a photo bioreactor

to attract the investment required to really take off. "The main reason is quite simply the lack of subsidies. Power purchase agreements and so forth," explains Vashi. "What our system does is make it not dependent on subsidies."

If he's right, and by reducing payback times and easing permitting difficulties with reduced odorous H₂S emissions, the IBR system could well hold the key to unlocking the potentially huge North American market. And no doubt AD developers further afield will be keeping an eye on the technology.

Ben Messenger is the managing editor of WMW magazine
e-mail: benm@pennwell.com

This article is on-line.

Please visit www.waste-management-world.com

GICOM
COMPOSTING SYSTEMS

**Tunnel Composting for
Reliable & Efficient
Organic Waste
Treatment**

GICOM b.v. 8256 SB Biddinghuizen Tel.: +31(0)321-332682 E-mail: info@gicom.nl
Oogstweg 9 The Netherlands Fax: +31(0)321-332784 Internet: www.gicom.nl

For more information, enter 8 at WMW.hotims.com

BIOWASTE FOCUS AUTOCLAVING AD

The environmental impact assessment for the prepared as part of the planning application considered a number of aspects, including the site's visual impact on the landscape



WORLD FIRST

Autoclaving for ADvanced Digestion

A sustainable waste treatment facility near Plymouth in the south west of England is set to become the first in the world to apply full scale autoclave processing to wet advanced anaerobic digestion.

by Stephen Barnes

Sited on a former china clay refinery owned by mineral extraction and processing giant, Imerys Minerals, the £15 million Lee Moor advanced Anaerobic Digestion (AD) facility is set to become the first of its type in the world. The autoclave processing technology being installed upstream of the AD plant will employ temperatures of 160°C and high pressures to break down lignin and cellulose structures within paper, packaging, cardboard and woody plant wastes, making them suitable for digestion.

The facility is being developed by AAD (South West) – part of the Dorset based AeroThermal Group of small specialist companies which provide turnkey engineering solutions. The firm has also developed the autoclaving technology being used on the project.

Handling up to 75,000 tonnes of municipal, commercial and industrial waste per year, the state-of-the-art technology at the facility is expected to make the AD process up to four times faster than conventional systems. Biogas production rates are also expected to be significantly enhanced, enabling the facility to generate up to 3.2 MW of renewable electricity and to export around 26,000 MWh per year to the national grid. Up to 20,000 tonnes of CO₂ emissions will be saved annually, while nutrient-rich digestate will also be produced for use as a soil conditioner in restoration works at a china clay works on the same site.

One of the big advantages of the autoclave technology being used at the Lee Moor site is that totally unsorted municipal 'black bag' wastes and high organic fraction supermarket

AUTOCLAVING AD BIOWASTE FOCUS



For the first decade of its operation digestate from the plant is likely to be delivered to the Imerys Minerals' controlled sites in the locality for restoration of their china clay workings

and kitchen food waste can be processed simultaneously at the site, at a faster rate than normal and with more renewable energy being produced from a given amount of waste. In addition, materials removed at the screening stage after autoclaving, such as metals, plastics, glass and textiles, will have been effectively cleaned and sterilised - improving the quality of the recyclates.

MODEL PLANNING

The facility will incorporate a high level of site controls, process technology and abatement equipment to ensure that both the public and the environment are protected. These played a key part in the planning application and supporting environmental impact assessment which was prepared by engineering and environmental consultancy Wardell Armstrong, and helped to secure planning permission from Devon County Council in late 2011.

Areas assessed in detail included land use and soils, hydrology and hydrogeology, traffic and access, air quality, noise, ecology and wildlife, landscape and visual impacts, and socio-economic effects. The consultancy also prepared the environmental permit application which is currently being determined by the Environment Agency.

Detailed air dispersion modelling was carried out to assess any potential impacts from the site on residential dwellings, local businesses, surrounding land and nature sites. Using the latest version of AERMOD, a quantitative model based on the Gaussian theory of plume dispersion, the methodology took in a range of input data including the characteristics of the release (rate, temperature, velocity, height, location), the terrain, meteorological data and the locations of buildings and tanks adjacent to the proposed emission points.

It then predicted the concentration of substances in the air, as well as the long term mean and short term peak ground level concentrations over the modelled area. Gases such as oxides of nitrogen, sulphur dioxide,

carbon monoxide, particulates, ammonia and odour were included.

The modelling was reviewed in detail by the local authority, the Environment Agency and Natural England - an executive non-departmental public body responsible to the secretary of state for environment, food and rural affairs. The model showed that emissions will easily meet all statutory air quality standards, and that the projected deposition rates on nature sites of less than 1% of target levels will have no significant impact on the environment.

The noise assessment included continuous surveys over four days to assess the existing background noise levels in the vicinity of the site, both during the day and at night time. Computer modelling using SoundPLAN was then undertaken to predict the noise levels at local residential dwellings which would likely to be generated by the operational activities (including traffic movements) associated with the new facility.

The modelling demonstrated that the noise levels likely to be generated by the site during the daytime, night time, weekdays and weekends are less than background. Noise levels from the site at all residential dwellings will be very low and less than 35dB(A).

Further to this, the water quality assessment studied the impact of potential water discharges from the site on the nearby watercourse of Wotter Brook. Water is used in the AD process, but will largely be treated and reused. As any excess may need to be discharged to the Wotter Brook, it will be treated in an advanced dissolved air flotation and biomembrane system to produce clean, high quality water which is suitable for discharge to this surface watercourse.

Extensive air dispersion modelling, noise calculations, water quality assessments and risk assessments have all combined to ensure that the highest standards of waste management technology and strict controls will be used to ensure that there is no harm to the public or the environment.

“

Biogas production rates are expected to be significantly enhanced, enabling the facility to generate up to 3.2 MW of renewable electricity

BIOWASTEFOCUS AUTOCLAVING AD

AAD (South West) is using autoclaving technology developed by its parent company, AeroThermal Group at the facility



UNLOCKING POTENTIAL

The Lee Moor facility will be made up of two autoclave plants, screening and separation equipment, anaerobic digestion plant with associated buffer and digestate storage tanks, dewatering plant and a combined heat and power (CHP) plant.

The two autoclaves will operate in parallel, each treating mixed municipal wastes in ten tonne batches at temperatures of approximately 160°C for 45 minutes at a pressure of seven bar. After being autoclaved, the waste will then be conveyed to screening equipment to separate the organic and inorganic fractions. Metals and other inorganics will be removed for recycling, while the organic fraction will be transferred to the AD plant for biogas and digestate production.

The biogas will be combusted in the CHP plant to produce up to 3.2 MW of renewable electricity and 3.8 MW of heat. The electricity will be exported to the national grid, while the heat will be passed to a boiler to raise steam for use in the autoclaves and to provide heat for the AD tanks. The technology enables the steam to be recycled between the two autoclaves, significantly reducing the amount of energy needed by the system.

The digestate will be dewatered in a centrifuge plant to approximately 25% dry solids. It will then be used for a restoration scheme at the Lee Moor china clay pits which are located nearby. This will reduce the need to import restoration materials from other facilities which might be located significant distances away, further reducing costs and environmental impact.

As a stabilised and sanitised organic rich soil conditioner and fertiliser, the digestate will contain nutrients such as nitrogen, potassium and phosphorus that are essential for plant growth. A large proportion of these nutrients will be held in organic form and released slowly over a number of years as the material breaks down.

This will allow for better synchronisation with the demands of plants than is normally possible with inorganic nutrient fertilisers. Applying the digestate will also improve soil structure and water retention capacity, encouraging the growth of grassland and other plants used in the restoration scheme.

The autoclaves and screening equipment will be located in enclosed buildings, fitted with fast action doors and surrounding air curtains to prevent any fugitive emissions of odour. Air within the buildings will be drawn by extraction fans through sealed pipes to odour control equipment consisting of a high tech scrubber and a biofilter. The air will be cleaned and discharged to atmosphere via a dedicated stack. Waste will be tipped, stored and treated entirely in enclosed buildings and tanks. Emissions from the odour control stacks and the CHP plant will meet strict emission standards set and regulated by the Environment Agency.

Once fully operational in April 2013, the Lee Moor facility will divert waste from landfill, reduce greenhouse gas emissions, generate energy and produce a high quality soil improver.

"It will unlock both the energy and fertilising potential of municipal solid waste," explains Tristan Lloyd-Baker, managing director of AAD (South West). "With enhanced recycling rates and increased renewable electricity production it will pioneer commercial scale autoclaving to AD or advanced AD and launch it into the 21st century. The local production of significant quantities of 'compost' will also significantly speed up the restoration of Dartmoor's china clay quarries."

Stephen Barnes is an associate director at Wardell Armstrong

This article is on-line.

Please visit www.waste-management-world.com

SHANKS TO WAKEFIELD

In a separate project Shanks Group has been awarded a contract to develop a residual waste treatment facility at South Kirkby, Yorkshire which will also use autoclave technology as part of an advanced anaerobic digestion system.

The Milton Keynes, UK based waste and recycling company says that under the 25 year PFI contract the facility will process up to 230,000 tonnes per annum of municipal solid waste (MSW) from the Wakefield District, helping to increase the local authority's landfill diversion rate towards 90%.

TECHNOLOGY

According to Shanks a variety of materials will be segregated from incoming wastes for recycling, at the residual waste treatment facility. It will also produce a refuse derived fuel (RDF) for processing at a multi-fuel plant being built at the Ferrybridge Power Station. A separate onsite materials recycling facility (MRF) will sort the clean mixed recycle materials for use by specialist markets.

The remaining organic waste will be treated using a state-of-the-art autoclave, which the company says has already been built and rigorously tested. The autoclave process will sterilise the remaining material before it is fed into a 65,000 tonnes per annum anaerobic digestion (AD) plant, where it will be converted into biogas for renewable energy generation. The energy generated will be used both to power the plant and for export to the grid. The company estimates that it will generate sufficient energy to power approximately 3000 homes.

For the design of the AD plant, Shanks has awarded a £10 million contract to a joint venture between equipment manufacturer Ros Roca and technical services provider, Imtech (RRIJV). According to RRIJV it will complete the initial project design by March 2013, while the civil work will be undertaken by construction and civil engineering firm, Kier Infrastructure and Overseas.

The residue from the AD process will be used as a nutrient-rich soil conditioner. Leeds based 4R Recycling, which specialises in the recycling of by-products from industry and utility companies for use on agricultural land and restoration sites has signed a 25 year contract with Shanks to manage this residue. This contract will see 4R handle up to 40,000

USE AUTOCLAVE AT 230,000 TPA PLANT



According to Shanks the autoclave technology has already been built and extensively tested and will sterilise material prior to being fed into the anaerobic digestion system

tonnes of digestate annually when the facility becomes operational. The digestate will be transported by 4R and used in land restoration across Wakefield and throughout the former Yorkshire and Nottinghamshire coalfields.

Green waste delivered to the residual waste treatment facility will be processed via an enclosed air controlled composting plant.

FUNDING

The residual waste treatment facility has been funded by the UK Green Investment Bank (GIB) and a group of international banks including the UK's Barclays, Germany's BayernLB and Japan's Sumitomo Mitsui Banking Corporation.

The GIB says that it will provide up to £30.4 million of senior debt to the project on commercial terms alongside the banking syndicate, which together are providing a total of £121.7 million.

The contract will see approximately 250 people recruited to work on the construction of the new facilities and a further 60 permanent

positions created, making a significant contribution to the local economy.

"The UK Green Investment Bank is committed to reducing the amount of waste which goes to landfill, supporting the UK in its transition to a low carbon economy, whilst driving a commercial return for the bank," comments Lord Smith of Kelvin, chair of the UK Green Investment Bank.

"Each year the UK generates approximately 190 million tonnes of waste, which causes environmental damage and costs businesses and consumers money," he added.

A LONG TIME COMING

According to Peel Hunt, an independent full-service broking and advisory house with an exclusive focus on UK mid and small caps, the contract has been a long time coming.

The broker explains that VT Group had previously been named as preferred bidder back in November 2007 when financial close had been hoped for summer 2008. It was

subsequently postponed until late 2010. In October 2011 an agreement was signed for a contract completion date in February 2012.

However, the VT Group was acquired by Babcock Group plc in July 2010 and Babcock became the lead partner.

According to Wakefield Council, following a review of the former VT Group business, Babcock strengthened its preferred bidder consortium with the appointment of Shanks Group in February 2011 - with Shanks taking the lead role.

"It has been a long journey and at times challenging, but throughout the negotiations we have never lost sight of the need for additional finance to deliver a waste management system for the future," explains Joanne Roney OBE, chief executive of Wakefield Council.

"This is a big step forward in how a key public service is delivered in the District. The agreement means investment in household waste collection and recycling and more jobs for the District," she adds.

THE NEW POWER BEHIND ENERGY FROM WASTE



Efw EXPO

energy from waste Live

16-18 APRIL 2013
NEC, BIRMINGHAM, UK

BRAND NEW EVENT FOR 2013

- Advanced Thermal Treatment Technology
- Anaerobic Digestion & Biogas
- Waste Handling & Pre-treatment
- And much more...

With hundreds of exhibitors and leading content in the free comprehensive seminar programme, visit this vital event to network and keep up to date with all the latest products, services and energy from waste industry developments

Co-located with the leading energy and water exhibitions - **NEMEX** energy Live and **IWEX** water Live, show highlights include:

- See the latest technologies and solutions from over 350 exhibitors
- Learn from more than 300 expert industry speakers in the extensive free seminar programme
- The chance to network with industry peers, make new contacts and catch up with the latest energy from waste industry news

For more information, enter 9 at WMW.hotims.com

Pre-register now for FREE fast track entry at
Sustainabilitylive.com/register_efw



A part of

Sustainability Live
energy • water • energy from waste
the business of solutions

Supported by:



Action Research Tackles COMPOSTING IN UGANDA



Members of the Local NGO Youth Environment Service collect data by interviews and questionnaire survey

Across Africa the population is becoming increasingly urban. With both consumption and waste production growing rapidly many towns and cities are faced with the problem of managing waste for the first time. One project in the Ugandan town of Busia has been using action research to develop a proper waste collection and composting system.

by Jakob Lederer

BIOWASTEFOCUS COMPOSTING IN UGANDA

Years ago, in the 1960s, solid waste was not a big issue in Uganda. Only 4% of the seven million inhabitants of the country lived in towns which were mostly small and characterised by smallholder farms and backyard farming. Solid waste usually contained biodegradable organics, and was either fed to animals or just disposed of on the farmland. 50 years later, the picture has changed – dramatically.

Uganda is now home to over 35 million people, with more than five million living in ever growing cities. Simultaneously both consumption patterns and the composition of waste have changed and waste generation has increased. The main result of this development is a new cognition of solid waste as an issue of serious concern, not only by authorities and policy makers, but also by members of the community.

THE TOWN OF BUSIA

The emergence of this new problem and the changing perception of it can at best be explained by telling the story of the East-Ugandan town of Busia.

The town owes its existence to the border drawn between the former British colonies of Kenya and Uganda after independence. Until the mid 1990s it was only a line of small shops, hotels and petrol stations, hosting a population of around 15,000. Changes came when Busia was declared to be the capital of the District of Busia. The population tripled within 20 years, buildings sprouted in every corner of the town and roads were constructed. One result of this development was the accumulation of solid

waste in the streets and backyards as there were simply no vegetable gardens left on which to make use of it.

The town reacted, first by hiring a truck to collect the waste once it had accumulated to a certain extent and later by acquiring its own truck and collection containers. German donors, the National Ministry of Works, and a local NGO, Youth Environment Service (YES), provided financial and institutional support.

Recently the town has been selected for the second round of the Uganda Municipal Solid Waste Composting CDM Program, which will deliver not only a composting plant, but also new collection equipment. On one hand the town will benefit through new infrastructure replacing old. On the other hand, the experience from Ugandan towns participating in the first round of the CDM Program suggests some organisational and financial challenges for Busia.

Under these boundary conditions the Busia Municipal Council, YES, the Makerere University of Uganda and Austria's Vienna University of Technology have formulated a small research project which aims to establish the knowledge required to manage Busia's solid waste in a sound and goal oriented manner.

ACTION RESEARCH

From stakeholders to knowledge users, research on waste management is often criticised for not considering the demand of local stakeholders, such as authorities, private operators, or local communities. The consideration of this demand must start even before the research takes off - namely with the formulation of the specific research questions by local stakeholders. Then,

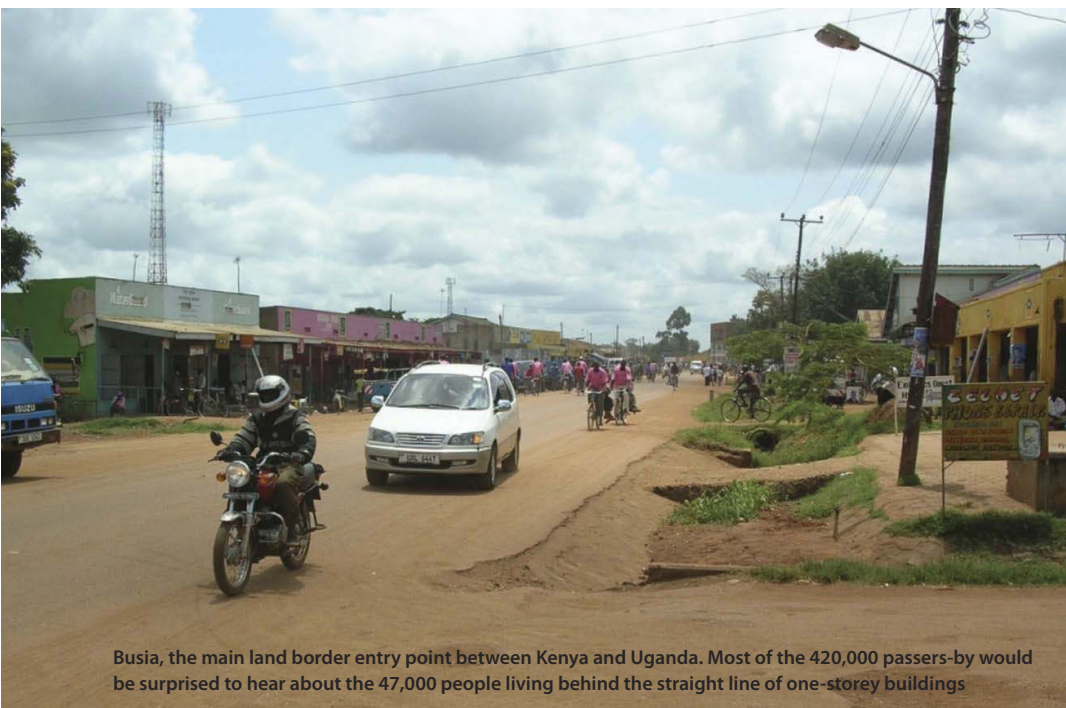
the knowledge which is generated will more likely to benefit the stakeholders who may make use of it. Stakeholders are then not just considered as actors, but as users of knowledge. However, being a user does not mean to be somebody who only receives knowledge. In fact the users are at the same time carriers and thus sources of knowledge.

A methodological approach that includes stakeholders to an extent so that they can define the research problems, participate in the research and become carriers, sources and users of knowledge, is action research.

Stakeholders involved in the beginning of this project were the Municipal Council authorities and members of YES. They collected and processed data on waste management practices and concerns by various other stakeholders. After presenting the results of this part of the research to around 60 lower local government members from Busia the main concerns were summarised. Based on this feedback work packages for the subsequent research phases were formulated.

ISSUES OF CONCERN

Based on the results of the first phase, Busia's authorities and the NGO partner decided to focus first on the improvement of waste collection and second the use of compost by farmers in local agriculture. Collection was chosen as it proved to be the main concern of local communities, while the use of compost was selected by the municipal authorities, as they had heard of other towns composting waste that they don't find farmers willing to buy the compost.



Busia, the main land border entry point between Kenya and Uganda. Most of the 420,000 passers-by would be surprised to hear about the 47,000 people living behind the straight line of one-storey buildings



Members of the local NGO Youth Environment Service collect data by interviews and questionnaire survey

COMPOSTING IN UGANDA **BIOWASTE**FOCUS

“

Waste collection is probably the one field of basic infrastructure with the highest contact between provider and customer

In accordance with the principles of action research, the circle of stakeholders involved was then extended to local level politicians, concerned community members, waste workers and farmers. With them, the same procedure of problem formulation, investigation, action formulation, implementation, reflection, and revised action plan was followed. Depending on the formulated problem the outcome was quite divided.

CITIZENS' INVOLVEMENT IN DESIGNING COLLECTION SYSTEMS

Waste collection is probably the one field of basic infrastructure provision with the highest contact between provider and customer. Thus, a waste collection system will only function if the cooperation between the provider on one side and the customer on the other side works effectively.

Therefore, it is required that the customers are involved to a certain extent in planning waste collection. In Busia, this has been achieved through concerned community members forming committees aiming to improve waste collection. Investigations guided by the YES led to several activities being suggested, from self-management of a communal collection centre to community sensitisation by door-to-door visits.

The results were quite diverse. Although the sensitisation of the community showed some positive results in waste management practice, and the community activists could manage some urgent problems such as the management of a collection centre, other

actions failed. It was concluded that at some level, communities themselves are lacking the required infrastructure and arbitration skills to solve waste management problems. At this level, a better communication with authorities, policy makers and service providers is required.

DEMAND FOR COMPOST

The experiences of other towns in Uganda practising medium-size composting at around 70 tonnes of raw waste per day, shows that most of them face the problem of marketing their product. Lack of awareness by local farmers is the common, but unproven explanation by some stakeholders.

Therefore, to really investigate some possible reasons, action research was carried out with around 50 farmers from Busia. Focus group discussions, the setting-up of demonstration fields and individual compost application by farmers scientifically guided by Makerere University researchers led to some useful results, which were collected during a final project workshop and questionnaire survey with farmers.

The statement that compost and its value for soil fertility is quite unknown in Uganda can be confirmed. The use of other organic fertilisers, such as manure and raw solid waste is common.

This practice would be a good base for compost marketing, as it suggests that farmer's reservation from using a waste derived product is not too big. However, the price charged for compost at Uganda's composting plants was found to be way too high.

Not only in terms of the willingness of farmers to pay, but also in terms of fertilising

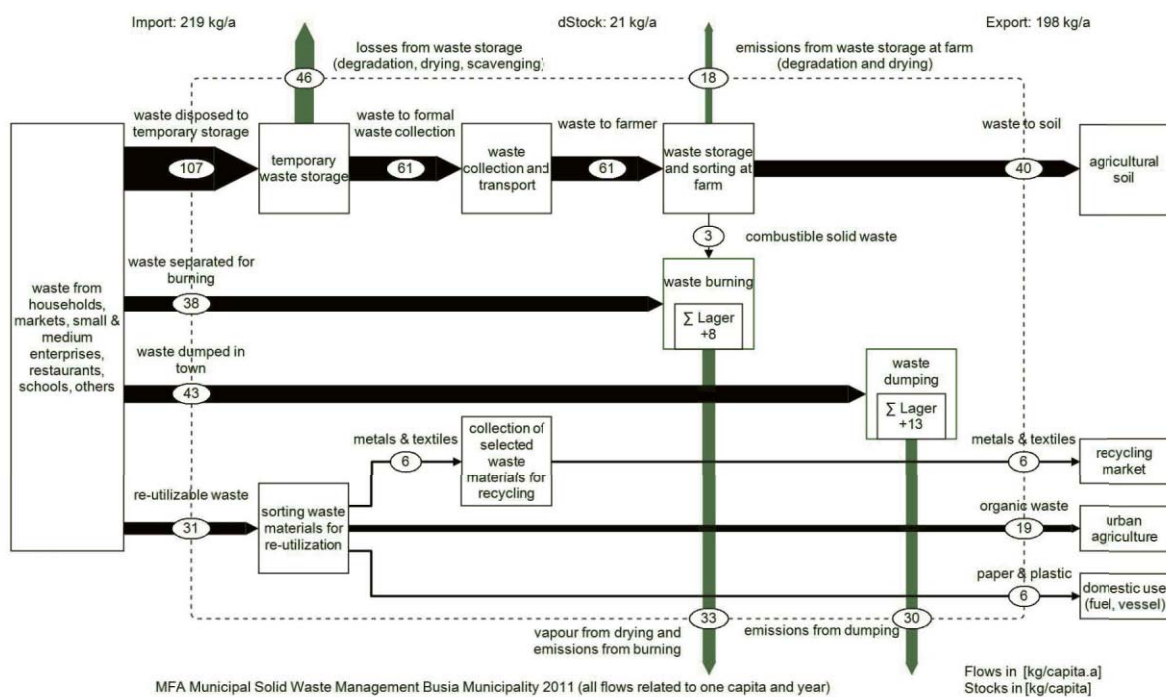


Presentation and discussion of results with the public



This waste collection centre in Busia was amongst the biggest concerns of neighbouring residents

BIOWASTEFOCUS COMPOSTING IN UGANDA



efficiency. Competing available organic fertilisers, such as poultry or goat manure is, per unit of nutrient content, up to five times less expensive.

Though the farmers gave high marks to the compost after application, most suggested to improve the compost quality. In farmer's eyes, the compost was too dusty and rich in extraneous materials, like broken glass and even injection needles. Compost producers and wholesalers are well advised to take this feedback seriously.

SYSTEM ANALYSIS

The analysis of the waste management system as a whole showed how important the recommendations of farmers are. Though Busia will benefit from the CDM program by receiving a composting plant and new waste collection equipment, the financial burdens for the municipal budget might be challenging.

New infrastructure means higher running costs. If the municipality does not want to collect waste collection fees to cover these costs, the revenues from the certified emission reduction (CER) and compost sales are the only sources of income.

As the CER-revenues will not flow immediately, Busia will have to market and sell most of its compost, with the mutual benefit of reducing the negative soil nutrient balance and relieving the municipal waste management

budget. To do so, good relationships with potential customers - farmers - are required in order to produce a marketable product. Besides acquiring a higher income, an eye should be kept on expenditures.

A comparison to other towns in Uganda shows that there is still some space for improvement, meaning reducing the costs for waste collection.

APPLYING KNOWLEDGE

U.S. sociologist, Kurt Lewin argued that knowledge which just produces books will not suffice to solve the current problems of societies, such as solid waste management, as it often does not contribute to actual problem solving.

It is true that there is a trend of buying knowledge through expertise, particularly in this field. Around the world many municipal governments are commissioning experts to do research on waste management and the result is delivered in the form of reports which may end up somewhere on a bookshelf along with all of the valuable knowledge that it established. Reports, articles and books are an important backbone of scientific and institutional progress, but some discomfort about solely relying on these modes of knowledge expression will remain.

Action research is therefore an alternative to complement the aforementioned ways of

knowledge expression. Local stakeholders as knowledge carriers which have been involved in various steps of the processes of knowledge generation will make better use of the established knowledge. The case of this research is a good example and manifests in new project ideas for improving solid waste management in Busia. An example is a follow-up project by YES and the Municipal Council.

Initial suggestions for actions to solve current waste-related problems would have led to the installation of parallel structures - small-scale composting by local initiatives and a municipal composting project on the way.

Contrary to that, the current proposal of actions avoids this double-structure, but contains solely coordinated actions, such as building-up decentralised door-to-door collection systems through the informal waste collectors already operating in this field. A traditional research approach would very likely not have led to these results.

Jakob Lederer is a research associate at Vienna University of Technology's Institute for Water Quality, Resource, and Waste Management
e-mail: jakob.lederer@tuwien.ac.at

This article is on-line.

Please visit www.waste-management-world.com

PRODUCT NEWS

GICOM TUNNELS SUCCESSFULLY USED FOR BIOLOGICAL DRYING OF MANURE

GICOM tunnels were introduced to compost mushroom substrate. The focus has therefore always been on creating a product from waste. From there it was only a small step to make a good quality compost out of kitchen or green waste.

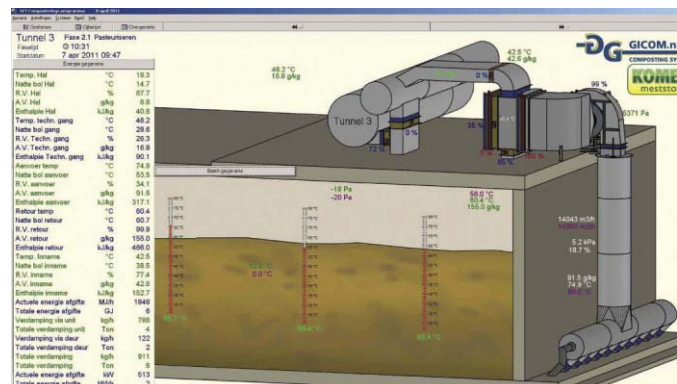
It was soon proven that the tunnels are also capable of using the organic energy in these waste streams to dry material as far as is biologically possible. The first tunnels for bio-drying sludge from waste water treatment plants were built in 1988 and are still operational. Bacteria in the sludge is activated, causing the temperature to rise which takes care of pasteurisation, and allow for a highly effective and energy efficient drying process.

If it works for sludge, it also works for other organic waste

streams. So similar tunnels are also used for biologically drying municipal solid waste. This minimises the amount of waste and makes it safe and efficient to sort out recyclable materials within the MSW.

Since 2011 GICOM has constructed several tunnels for the biological drying of cow and chicken manure in Western Europe. By pasteurising the material it can be exported, which means that minerals within the manure can be sent to areas where such minerals are lacking, enclosed in organic matter.

The organic matter improves soil fertility. Once enough water has evaporated from the manure, the biological stage starts to slow down in the tunnels as the bacteria requires water. However within the enclosed tunnels the manure is



GICOM's tunnels can minimise the volume of MSW making it easier to recycle

then further dried by thermal heat to achieve less than 16% moisture. This is dry enough to put the manure through a palletising press.

In order to feed all the months in the world, the distribution of minerals is very important. These tunnels enable organic minerals to

be safely transported from places where there is a surplus to places where there is a shortage.

For more info contact Luc Klunder of GICOM Composting Systems. info@gicom.nl, tel +31 321 332682.

www.arjes.de

CONTROLLING COMPOST – THE BACKHUS LTC

The BACKHUS LTC is a specially designed Lane Turner capable of transforming organic waste into valuable compost inside an enclosed system. Therefore not only are emissions reduced, but inside an enclosed system important factors influencing the quality of the final product, such as temperature, moisture and oxygen, can be easily controlled.

The process

Output material from the fermentation process undergoes aerobic treatment within agitated and partially enclosed lanes. During the first intensive composting stage of the process micro organisms cause a biological degradation of the organic matter. This causes a self heating of the input material

which leads to hygienisation and a self drying process. During the second stage of the composting process a further stabilisation as well as maturation of the material is reached.



The Arjes Raptor XL is designed for easy maintenance

The BACKHUS LTC moves across the lanes mixing and loosening the material inside, enabling fresh air, injected from the bottom of the lanes, to circulate.

Organic matter is inserted at the beginning of each lane. With each

turning cycle it is transported further to the end of the lane, while at the same time maturing into stable compost. As this happens new material can be inserted, making it a continuous process with a finished product coming of each lane.

Due to the water evaporation during step one a volume reduction takes place which is compensated by the BACKHUS LTC in step two.

The rotting lanes consist of two concrete walls, equipped with piping installations for the collection and transfer of exhaust air, as well as rain water collection, concrete flooring with fresh air supply and distribution system, floor heating and concrete

roofing with rubber sealing. The input zone of each lane is equipped with hinged and/or swivel mounted doors or valves for easy access to the lane in case of filling or emptying by front loader.

Transportation between the lanes is done by a transfer wagon the BACKHUS TW, so the BACKHUS LTC is capable of turning every lane of the system. Every lane consists of an enclosed part in step one and an open part for maturing in step two.

A ventilation system is installed between the lanes providing them with a combination of fresh and exhaust air. The ratio depends on the temperature, moisture and the oxygen level of the exhaust air and can quickly and easily be changed to the ratio needed.

www.gicom.nl

www.ie-expo.com



Presented by IFAT CHINA + EPTEE + CWS

中国环博会

IE expo 2013



The largest environmental show in Asia

International Trade Fair for Water, Sewage, Refuse,
Recycling, Air Pollution Control and Energy Conservation

13-15 May 2013
Shanghai New International Expo Centre

MMI-ZM Trade Fairs (Shanghai) Co., Ltd.
Tel: (86 21) 5459 2323
Fax: (86 21) 5459 2358
E-mail: ie-expo@mmi-zhongmao.com



For more information, enter 10 at WMW.hotims.com

HYBRID RCV

COLLECTION & TRANSPORT



This new 'Elhybrid' refuse collection vehicle (RCV) is the result of a partnership between NTM of Finland and Volvo Truck Corporation. It is currently on trial working with waste contractor Sita in Stockholm, Sweden

ANOTHER NEW HYBRID AND MORE

Following-on from the launch of the MAN 'Metropolis' prototype with Faun compaction equipment and Zoeller binlifters in 2012, NTM has developed a new generation hybrid refuse collection vehicle in co-operation with Volvo Truck Corporation. But this newcomer is significantly different - especially when it comes to 'size'.

by Malcolm Bates

COLLECTION & TRANSPORT HYBRID RCV

“

This new NTM Hybrid is based on an 18 tonne gross chassis which should make it better suited to operations with narrow city streets



New 'Elhybrid' outside Stockholm City Hall

HYBRID RCV COLLECTION & TRANSPORT

When I first suggested that the initials of 'Narpes Tra and Metal' could just as easily stand for 'Never Too Many' (meaning that the company always seems to have several exciting projects on the go at once), it raised little more than a polite chuckle over in Finland. Where in Finland? Oh come on, try to keep up - the NTM plant is in the neat northern Finnish town of Narpes. It's the 'N' in NTM, you see. The 'T' and 'M'? They relate to the key materials utilised when the company was founded in the late 1940s - 'wood' and 'metal'. However, things have moved on a bit since then.

But I'm not in Narpes today. I'm in Stockholm, Sweden. And I'm waiting outside City Hall, in temperatures of minus ten degrees for the arrival of the latest 'project' from the NTM research and development department. Any minute now, I hope to get my first look at a compact, 7.5 cubic metre split body RCV mounted on a compact Volvo FE340 chassis. Here it comes.

My first observation? While most hybrid RCVs to date have been designed to fit within a 26 tonne gross weight bracket - the maximum legal in Europe - this new NTM 'Elhybrid' is based on a more compact 18 tonne chassis which should make it better suited to operations within the narrow congested streets of an inner

city 'old quarter' than a three axle 26 tonner. This could translate into big business for NTM.

How else does it differ? Well, I know that 'EL' stands for 'electricity' (in that all the compaction functions are electrically-activated) to enable it to operate without the diesel engine running. Don't all hybrids do that? Well, yes they do - or at least they claim to - but be patient as we haven't even started on our journey through the specification of this new baby yet. That's partly because it's still 8.30 in the morning and I've only just seen it for the first time, but also because it's such a new concept that the full specification has yet to be translated into English!

SMALL IS BEAUTIFUL

But I also know that the second partner in this project is Volvo. And that the chassis is 'only' a two axle, 3.7 metre wheelbase Volvo FE340/D7F. It is a 'smart hybrid', offering an ability to drive in battery-only mode for up to one kilometre at a speed of up to 40 kph, without the diesel engine cutting-in to charge the battery pack.

For waste collection operations, the FE comes with a 7 litre, 340 hp (250 kW) Euro-5 diesel engine coupled to an 'I-Shift' automated transmission. And the hybrid element? After a great deal of debate (and it must be said some differing views), this latest hybrid RCV solution comes with two lithium-ion battery packs, when

there's you and me thinking that surely one is going to be expensive enough, right?

There are very good technical and operational reasons why this is so. To put it in simple terms, the electrical requirements for the truck chassis differ considerably from the output needed to power the body compaction and binlifter systems. The 600 volt DC chassis pack delivers 340 volts for traction purposes (the automotive electrical systems remain at 24 volts), while the body-mounted pack provides 96 volts to power the compaction/lifter systems - enabling it to be operated without danger to life. It doesn't stop there - the high torque 120 kW electric drive motor boosts take-off from standstill, while the battery packs are new 'LiFePO4' units from European Batteries of Finland. These are designed to offer much-improved safety in the advent of serious accident damage.

Wait, there's more. Niclas (Nicholas) Pada, the recently appointed director and general manager of NTM's RCV division (NTM also has a transport and distribution truck bodywork and trailer manufacturing division) has not only agreed to let me go out with this new prototype for the day, but has also agreed to come over to Sweden in person to bring me up to speed on where NTM plans to go with this - and other - new projects in 2013.

NTM ELHYBRID
GREEN THINKING.

The future is here!

Experience cleaner air and less noise with the NTM Electric Hybrid!

NTM Electric hybrid

- Cleaner air and less noise
- Lowered fuel consumption
- CO₂ emission reduced
- No emission while the vehicle is standing still during

Electric hybrid with Lithium-Ion batteries manufactured in Finland!

Please visit our website at www.ntm.fi

NTM Finland Phone: +358-6-2626200

For more information, enter 11 at WMW.hotims.com

COLLECTION & TRANSPORT HYBRID RCV

In addition to many 'new generation' features such as electrically activated compaction and binlifter functions, the 'Elhybrid' is based on a compact, two-axle chassis of 18 tonnes gross weight - making it ideal for tight turns in 'old quarter' downtown districts



Team effort. Left to right: NTM director Niclas Pada, driver Michael Skoglund, Eric Lennolf from Volvo, Anders Hagglund NTM Sweden and fleet operations manager Sita Sweden, Bent Hansen



Why operate a hybrid RCV? In downtown areas, there is often a mix of residential, retail, and office buildings. A quiet, electric RCV could make good operational sense and reduce fuel costs and CO₂



Going Down. At locations such as hospitals an electric hybrid can offer an enhanced service by operating at night, as the truck is free from delay by busy daytime traffic

OUT ON THE ROUTE

Before we sit down for a detailed discussion, I need to get out there on the road with driver Michael Skoglund. Making introductions is Bert Hansen, eastern region manager at SITA Sweden - who has come out of his nice warm office, especially. And as Bert explains, SITA Sweden is keen to see if the Elhybrid can meet the strict set of parameters to pass Stockholm's environmental regulations relating to noise - the advantages of a vehicle that can work in battery electric-only mode without the diesel engine.

Firstly, it cannot be much over 3 metres high (the prototype is 3030 mm) otherwise it won't fit into the maze of service tunnels and underground loading bays in the downtown area. Secondly, as there is a mix of small businesses, retail premises and apartment

blocks downtown, but to get into such areas requires a short wheelbase and a good steering lock as well - as Michael is about to demonstrate.

"This is the main city Eye Hospital," he announces, as we swing off a suburban street and prepare to dive down a steep ramp to basement level. It looks like the steel entrance door only has enough headroom for a high-roof Transit van. Why underground? Waste and recyclable containers are routinely located undercover in Sweden. It keeps them free of snow and ice. We're working on recyclable materials today, so the loading is light, but I'm already impressed by how easily the Volvo hybrid chassis stays with car traffic away from the traffic lights. Michael Skoglund was keen to tell me how stress-free the Elhybrid is to drive in heavy urban traffic too, but now he is going to impress me with how manoeuvrable it is in this

underground loading bay. He has to get the rear hopper up to a loading dock, but the another contractor has left a hooklift container a bit out of line. Never mind - a deft four-point turn and he's on. This 9.15 metre long truck can turn around in a space that many drivers of private cars would find difficult!

DUAL MODE

Why does the binlifter pick containers off a loading dock? "We have to design our binlifter controls for dual mode operation," explains Anders Hagglund, NTM's Swedish sales manager, "as lots of commercial premises run containers out on loading docks for collection, rather than storing them at ground level." While Anders explains, driver Michael Skoglund operates the lifters from a higher set of controls, but a remote control keypad option is also available. This

HYBRID RCV COLLECTION & TRANSPORT

The Elhybrid may be 'compact', but it is still equipped with a two compartment split compaction body capable of collecting two waste factions. The rear hopper split can be specified as 50/50, 70/30 or 60/40



Smaller hopper has its own binlifter and compaction system

negates any chance of him - or anyone - falling into the loading hopper. What a brilliant idea.

Job done, he drives back up the steep ramp, before merging back into the city traffic - still with no sound coming from the diesel engine. The compact FE Hybrid chassis is also packed with clever 'thinking' features such as automatic 'stop-start' when in diesel mode. If left alone,

the computer automatically decides when it's best for the diesel engine to charge the battery packs, but there is an electric-only override should the vehicle be working in a sensitive area - like a hospital - for some while.

Equally, the Elhybrid can be 'held' in diesel engine-only mode by the driver, thanks to another override. The Volvo-NTM Elhybrid is a lovely little truck to drive and with regen braking and that engine stop-start system, as well as the all-electric body/hopper/binlift, it really is state-of-the-art.

MORE SURPRISES

To help test all that technology in 'real life' operations, Volvo is making the hybrid available on a "favourable fixed rate (subsidised) five year lease with maintenance package". That equates to something like a €50,000 premium over the cost of a conventional 4x2 diesel RCV of comparable capacity. The hybrid package is also available on a 26 tonne 6x2 rearsteer as well so this represents a considerable corporate commitment for Volvo - comparable to when Toyota introduced the Prius hybrid car. While it's still too early to judge the 'real life' fuel and CO₂ savings - a 20% fuel saving is expected - so I plan to go back to Stockholm in six months to see how the costs pan out.

The Elhybrid project is also a major corporate commitment to NTM as well. But to illustrate that my joke about the "Never Too Many" new projects at NTM rings true - as I was

about to leave, Niclas Pada mentioned a further new development. In addition to the Elhybrid (which can be single or two compartment 'split' body), NTM has also designed a new 'split-body', two compartment 'Uno' for loading recyclable containers by hydraulic crane. The single compartment Uno is already a favourite amongst commercial contractors in Sweden. A version capable of loading wheeled containers of up to 1200 litre capacity (from the rear), has also been produced, but the new split body unit can collect more than one waste faction.

While this basic, rugged design might be at the opposite end of the technological spectrum to the high-tech Elhybrid, the large loading hopper of the Uno could replace the traditional skip truck on waste and recycling operations because instead of taking just one loaded container, it can take a greater cubic capacity of two different recyclable factions per trip.

What will this new product be called? 'Uno-2'? Or 'Duo', perhaps? It's so new NTM doesn't even have a name for it yet, but based on what I do know, we could call it the 'Skip Truck Killer'!

Malcolm Bates is Waste Management World's collection and transport correspondent

e-mail: malcolm@automotivespecialists.co.uk

This article is on-line.

Please visit www.waste-management-world.com

COLLECTION & TRANSPORT MATERIALS HANDLER

GETTING ON! DOWN!



The Tabarelli brand isn't that well known outside of the Italian domestic market. But as WMW's collection and transport correspondent explains, thanks to an innovative new option on its specialist materials handlers, that could change.

by Malcolm Bates

First unveiled at 'Ecomondo', Rimini, the FlyCab option is now available on the Tabarelli 712 materials handler

MATERIALS HANDLER COLLECTION & TRANSPORT

The hard-hit Italian economy looks set for a significant boost - at least in the Verona region - as investment in infrastructure will be needed to handle the increased number of visitors from all around the world. How so? A major sports event? A new International trade fair, perhaps? Or a new theme park based on the rise and fall of colourful ex-prime minister of Italy, Silvio Berlusconi, even?

No. The answer is none of the above. But even without a 'Bunga-Bunga World' theme park, I still predict a significant increase in traffic from the main A4 Autostrada at Verona, down to the sleepy little town of Mozzecane, 30 kilometres to the south. Why? The answer is quite simple - if you are in anyway involved with scrap metals, waste or recyclable materials handling, you should already be contacting the modest headquarters of Tabarelli to make plans for a visit.

Your mission? Visitors to the 'Ecomondo' event at Rimini Fiera, back in November last year will already know the answer to that question, because by my estimation the unveiling of the FlyCab option on the Tabarelli 712 materials handler was one of the highlights of the whole event. But in case you missed the significance of this innovation, think of it as the 'next step' in the development of the hydraulically-raised cab wheeled materials handler.

If you're still operating fixed-cab 360 excavators on waste picking and materials handling operations, a meeting with company boss Roberto Tabarelli - or sales director Alessandro Vantini - should already be on

your list of New Year resolutions. If you haven't previously had 'Tabarelli' on your list of potential suppliers before, then I hope by the end of this article you will. Because the first thing Roberto Tabarelli will explain is that there is a considerable difference between a purpose-built wheeled 'materials handler' and a more common (and cheaper to buy) 360 degree excavator.

NOT AN EXCAVATOR

Just about every construction equipment brand has a 360 excavator in its product line-up. Most were originally designed as tracked machines and then 'converted' to wheeled ('wheely') configuration. Some are then converted again (from excavators into 'materials handlers') by adding different boom configurations and the addition of full scrap/waste handling guards, additional filters and up-rated cooling pack. You could say the end result is therefore a compromise.

"The Tabarelli product line does not include construction equipment," Roberto Tabarelli confirms. "Here in Mozzecane, we only build wheeled materials handlers for the scrap, waste and recyclable sectors." He reminds me that excavators need massive breakout force to dig into the ground by pulling the bucket back and upwards - in many cases from below ground level. Materials handlers don't. They reach out to the full extent of the pile, then lift and load - much like a crane in fact.

Roberto Tabarelli is not suggesting up to this point that the range of machines carrying his family name are in any way unique - there are a couple of German brands and several

other Italian manufacturers that likewise don't build construction equipment, but do build specialised materials handlers - of which Fuchs, Sennebogen and Solmec are perhaps the best known. He also acknowledges that other 'specialist' brands (such as Liebherr) are active in the same operational sectors - in addition to several of the larger international brands which have, in recent years, upped their game by manufacturing more waste and recycling sector-specific machine options. But this makes a 'USP' like the SkyCab all the more interesting.

Until now the Tabarelli range of materials handlers has comprised of four different skid (chassis frame) sizes, starting with the 27 tonne machine weight '510' and ending with the top-of-the-range '916'. In between is the best selling model - the 30 tonne '712'. Specifications tend to include a nicely-designed hydraulically-raised cab giving a driver's eye-line of 5 to 6 metres above ground level at full extension. The remaining specifications include top quality components such as Cummins diesel engines and Rexroth hydraulic systems. Which brings us to that USP.

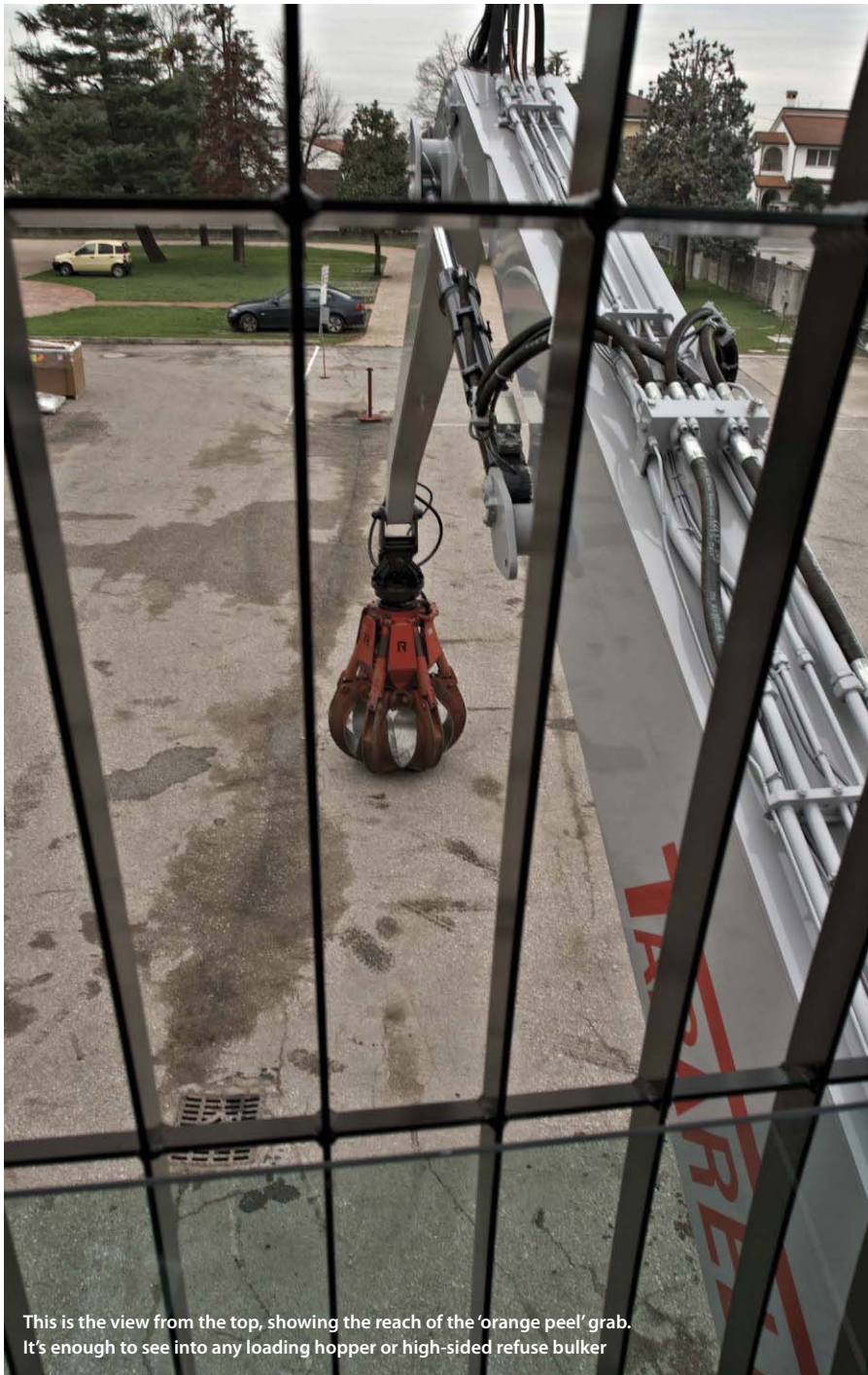
FIRST AMONG EQUALS

While Roberto Tabarelli agrees that the concept of a hydraulically-raised cab that can also deliver the machine operator right down to ground level is not a Tabarelli 'exclusive' (it is already available on several designs of large tracked machines used in the quarry and port handling sectors) he does claim the availability of this feature on a 360 wheeled materials handler as a first.



Going up in the world. The operator of the 712 can get in and out of the cab at ground level, then operate the machine from deck level or select any suitable eye-line up to six metres

COLLECTION & TRANSPORT MATERIALS HANDLER



This is the view from the top, showing the reach of the 'orange peel' grab. It's enough to see into any loading hopper or high-sided refuse bulker

But if the idea isn't 'new', how come the SkyCab is patented? "The unique feature of our design is the parallelogram lifting system," Roberto Tabarelli explains. "It enables the driver to go from ground level anywhere up to the full working elevation of six metres in one operation by engaging a single switch on the control panel."

To prove his point, we walk out into the factory yard where the prototype 712 FlyCab is waiting. First Roberto talks me through all the features of the basic machine. Then he starts the engine, pulls the machine out of a line of new machines awaiting delivery and demonstrates

the action of the cab. It all looks so easy. Roberto explains the basic parallelogram principal of the cab lift arms - which enable the cab to both rise (and fall) while projecting further forward when lowered - and explains how this is achieved by a single hydraulic ram. Now it's my turn...

This is a double first for me. Firstly, I've never operated a Tabarelli machine before. And secondly, while I've previously worked with several hydraulically-raised cab machines, I've never tried a machine that enables me to step into the cab at ground level and go right up to a working eye-line level of six metres. It's an exciting prospect.

WE HAVE LIFT-OFF

In order to clear the deck of the skid (the chassis), the machine has to be 'parked' with the superstructure slewed away from the centreline to enable the SkyCab to be lowered right down to ground level. The forward projection provides suitable clearance. In normal situations, the base of the cab doesn't touch the ground - it floats above it. I step in and get seated. The cab structure is the same as the cabs used by standard hydraulically-raised units featured on the rest of the Tabarelli range - the lift structure is the difference. I take a minute to check where everything is located - I've got a double joystick seat console with a collection of additional coloured buttons for auxiliary services and a 'deadman' control grip on my left joystick. I've also got my automotive controls, controls for the substantial 'dozer' blade at end and for a pair of hydraulically raised jackleg stabilisers at the other - although these are not normally needed when travelling and working.

With the cab lowered, the boom functions are immobilised for safety reasons. I'm in what we might call the 'Green Zone' - a light on the main control console is glowing green. By gripping the deadman and hitting the cab raise button, I'm soon going up in the world. The action is smooth and amazingly rapid - I watch the under-cab CCTV camera image on the in-cab screen. It reminds me of those TV images of the Lunar Module taking off from the Moon's surface. Remember?

The green light goes out once the cab structure has cleared the deck of the skid, so I can slew back onto the centreline and get the boom into position to start work. In this case, I'm only in the Tabarelli factory yard, but I go through some moves all the same. I'm soon up at six metres above ground level - enough for me to see into any loading hopper or high-sided refuse bulker, while also giving a panoramic view of what's going on all around the machine.

Significantly, there is no concern about the stability of the machine - nor was there any unnerving lateral movement when raising, or lowering the cab. All the hydraulic controls work with a progressive fluid precision and while I wouldn't call the cab interior 'luxurious', it has all the features I'd expect - although some extra storage space for personal items would be good and I'm wondering if a reinforced glass 'window' in the cab floor - like a street sweeper - might also be useful? The cab glass roof panel was certainly useful when keeping an eye on the boom and orange peel grab when raised above the screen rail.

In some markets, there is likely to be a requirement for the cab door to have an automatic interlock to prevent the door being opened while the cab is raised. A 'Bleeper' (like

MATERIALS HANDLER COLLECTION & TRANSPORT

the reversing aids fitted to most new cars and vans) would be also useful to warn the operator of obstructions under the point where the cab is dropped and prevent damage - a simple modification which is being looking into.

If we're looking for 'downsides' aside from the added cost there is also an added weight penalty. But on a 30 tonne machine, an extra 1.5 tonnes is no big deal. Tabarelli is also already offering the SkyCab option on the larger 34 tonne machine weight 813 machine, but Roberto Tabarelli confirms it will also soon be available on the smaller 27 tonne 510 machine, as well.

CONCLUSION

The fluid raise and lower action, from ground level up to six metres on a wheeled 360 machine is unique, and should project the Tabarelli brand from small (total production is currently under 300 units per annum) specialist manufacturer competing within the hard-hit Italian market, into one with a wider global customer base. That's a massive leap and as Roberto Tabarelli confirms, it cannot be achieved without working with some new partners.

"We are already known in wider global markets for manufacturing heavy duty shears and presses for the scrap metal sector," he explains. "For example, in the Americas, we work with Sierra International and the Idromech (the second manufacturing facility owned by the Tabarelli family) range of shears and presses is also well known in the wider European market, but we acknowledge we will need to find and work with new sales and service partners to take the Tabarelli brand of materials handlers to the next level," he adds.

The SkyCab feature is a major leap forwards in operator and wider site safety. In developed economies, Health & Safety legislation is sometimes seen as adding to time and cost by requiring more complex and expensive modifications, while in developing economies, it could be seen as a 'luxury'. Being able to 'get on down' to ground level therefore takes on a new significance, but if you share the view that 'no machine is ever sold on safety', then I'd argue that even when leaving the added safety issues aside, the FlyCab is still worth considering on the grounds of increased productivity.

And that alone is a good enough reason to visit Mozzecane.

Malcolm Bates is Waste Management World's collection and transport correspondent

e-mail: malcolm@automotivespecialists.co.uk

This article is on-line.

Please visit www.waste-management-world.com

Malcolm pronounces the interior of the FlyCab is a neat and attractive place to spend a shift



Malcolm Bates, tries the SkyCab for size



LET'S GET DOWN TO REAL BUSINESS

**TYRANNOSAURUS®****MAKES
STRONG
SENSE****WASTE
TO
FUEL**

For more information, enter 12 at WMW.hotims.com

You need energy to fuel up your business. You need solid, first-class solutions that you can rely on. The Tyrannosaurus® System is just that. An integrated process, the most advanced technology, the most heavy-duty machinery, a high degree of automation. We've got tools for men, not toys for boys. Finnish know-how, high level professionals, maintenance and renewal service – you can have it all. You can help save the world. And you can save a lot of worldly goods in the process. Cash, if you will.

**BMH TECHNOLOGY***The home of Tyrannosaurus***BMH Technology Oy**

P.O. Box 32 (Sinkokatu 11), FI-26101 Rauma, Finland

Phone +358 20 486 6800, Fax +358 20 486 6990

Email bmh@bmh.fiwww.bmh.fi

Trash talking

A WEEE DISCUSSION

Around the world a vast and increasing quantity of e-waste is being produced each year. As supplies of certain critical materials tighten, and the price of precious metals continues to rise, the recovery of these materials from the waste stream is of growing importance. WMW asks a number of industry experts how the challenge of recovering more of these materials from e-waste can be met.

TRASH TALKING

DESIGN TO OPTIMISE END OF LIFE OPPORTUNITIES



WAYNE RIFER
IS DIRECTOR OF STANDARDS
AT EPEAT, OREGON, U.S.

Figuring out how to specify products that are easier to recycle is one of the most elusive environmental goals for sustainable electronics. It's a system problem – the two parts of the system, product design and End-of-Life (EoL) processing, are separated by distance, time and different actors. The admirable attempts through Producer Responsibility (EPR, IPR, etc.) to transfer incentive from the back end to the front have not yielded significant results.

Moreover, technology is changing rapidly. Products are becoming smaller and design is driven by fashion, while EoL systems, handling greater and greater volumes, are increasingly mechanised.

At the same time, the embodied resources in products are also increasing as highly sophisticated technologies demand more manufacturing energy and critical materials. Sustainable technology that delivers value to the entire human population calls for optimal utilisation of the energy resources and effective recovery of the material resources. In other words, optimal reuse and material recycling. That necessitates product design with EoL in mind.

The challenge is to know what to require of product designers. What will be most meaningful to EoL managers for products designed today when they enter the waste stream (for reuse or recycling) in five or more years? The best we can do is to maximise the opportunities for EoL managers.

I increasingly believe we must develop a multifaceted approach to product design that facilitates a variety of management options despite different capacity in EoL management systems. I'll call this Df4R – Design for restoration, refurbishment, reuse, and recovery.

Design for restoration at end-of-first-use means to repair products and to restore their original capabilities. Refurbishment is a more substantial renovation of the product, where parts are swapped out and the refurbished product, though it may resemble its predecessor, likely contains many new and/or

reused components. Reuse focuses on extraction of the highest value parts which have not reached EoL.

Design for recovery creates products which can be disassembled into material streams that provide the highest readily achievable resource value. Disassembly may be performed entirely manually or mechanically, or through some combination. However, the more mixed the material types coming out of a treatment facility, the lower the achievable recovery.

Design for recovery will make high-grading the embodied resources – precious metals, critical materials and volume materials – economically practical. Moreover, these resource recovery objectives must be safely achievable by the full range of recycling operations in the real world, from informal to technically sophisticated.

The bottom line is that product manufacturers must be incentivised to design products for optimal EoL. Developers of standards and guidelines should adopt an approach that maximises opportunities, versus dictating a single EoL approach. Manufacturers should have a number of possible options depending on their product. But Df4R options chosen by manufacturers should be intentional, should follow some common principles shared by many products, should create viable opportunities for all EoL operations and should be made known to EoL managers.

Stakeholders involved in the revision of the Electronic Product Environmental Assessment Tool (EPEAT) standard for computer products, a project long overdue and now rapidly approaching, must find practical ways to create incentives for such multifaceted Df4R design.

The objective is not to design products for the way that recyclers now do their business, but to give them the greatest set of opportunities. When the current batch of products emerge from use, new processing technologies and markets will have emerged. EoL managers will be aided by design decisions made today to realise the maximum value.

**Precious metals recycling isn't
always about profits**

**In fact, it's not even about
precious metals**



umicore
Precious Metals
Refining

It's about life.

www.preciousmetals.umicore.com
Contact: preciousmetals@umicore.com

For more information, enter 13 at WMW.hotims.com

*Like taking things to pieces?
You'll love our machine.*



www.aut-chemnitz.de

For more information, enter 14 at WMW.hotims.com

TRASH TALKING

FROM SINGLE MEASURES TO SYSTEM THINKING



ULLA-MAIJA MROUEH
IS PRINCIPAL SCIENTIST AT THE
VTT TECHNICAL RESEARCH
CENTRE, FINLAND

Finding economically viable measures for the recovery of critical materials from e-waste is a challenging task.

It is difficult to find single measures or technical innovations which on their own are sufficient for increasing the recycling rates of critical materials from e-waste. The integration of suitable technical and non-technical measures and a more systematic optimisation of the whole production and recycling chain is required. One may also question whether the weight based recycling targets do advance the recycling of critical materials from electronics.

A challenge identified in the analysis of waste value chains, made by a group of four Finnish research institutes was the lack of good quality data, which is essential for modelling based assessment of economic viability of recycling. In the future, more and more electronics will be found in sources other than consumer appliances, including end-of-life vehicles, demolished buildings, infra networks, etc., which makes data collection even more difficult.

Modelling tools and methodologies are needed for systematic analysis, integrating the technical, economic and environmental aspects of recycling processes and concepts. The use of system dynamic modelling concepts enables an understanding of the viability of activities in changing business environment.

The volume of e-waste which is never collected is significant. Improvement of collection rates requires a combination of technical and non-technical measures which improve the user-friendliness of the systems, minimise recycling triggers of consumers and improve the efficiency of the collection logistics. The introduction of tagging and tracing systems could contribute both to reduced materials losses, and increased use of automatic identification system in sorting products, components and materials.

Another important step needed for enhancing recovery of critical materials is the pre-processing stage. Those components containing valuable materials should be separated as far as possible.

Because of the difficulty of finding economically feasible technological recycling solutions for valuable materials present in low concentrations in complex products, the integration of better recyclability into product design should be an integral part of the solution.

Theoretically, 'design for recycling' is one of the best potential measures enhanced recycling. In practice, it seems that the drivers have not been strong enough for real progress, yet. One of the challenges is decision making in product and recycling chains with multiple stakeholders with different individual targets.

Plastic or steel baling wire?

Choose both!

Macpresse is the only baling press that can use either standard baling wire or the new plastic baling wire in the same machine.



MACPRESSE
EUROPA S.R.L.

Presse - Nastri trasportatori - Trituratori - Impianti di selezione



Loc. S. Giuseppe 20080 Vernate - Milano - Italy
Tel. +39-02.905.24.20 - Fax. +39-02.905.28.93

www.macpresse.com

For more information, enter 15 at WMW.hotims.com

PUTTING THEORY INTO PRACTICE



THIERRY VAN KERCKHOVEN
IS GLOBAL SALES MANAGER
FOR RECYCLABLES AT UMICORE,
BELGIUM

Exploring the opportunities for increasing the recovery of critical metals from WEEE is a complex challenge. The recycling chain consists of a number of steps with a wide range of actors. Optimisation potential lays not only lie in the improvement of each step, but also in the optimisation of interaction between steps.

Good collection is an essential first step as it feeds the rest of the recycling chain. A particular challenge is the collection of small devices such as mobile phones, MP3 players and USB sticks. These can easily be stored but also contain interesting amounts of metals.

By collecting the devices into groups based on their metal content, they can be sent to the most suitable pre-processing operation. Manual dismantling is very effective, while mechanical processes can lead to high losses of precious metals when the shredding/separation intensity is too high. So, depending on the chosen technology, over half of the precious metals can be lost. From a value perspective this is a big deal.

Finally, metal recovery takes place. Processes that use best available technology have high recovery efficiencies and recover a wide range of metals, combined with excellent environmental performance. Umicore Precious Metals Refining recovers 17 different metals including many critical metals from printed circuit boards and other e-waste.

Best available technologies leverage economies of scale and operate in a global market place. At the other end of the spectrum is the informal sector where only few metals are recovered, with low yields and detrimental impacts on environment and human health. Replacing this kind of low quality end-processing with the best available technology offered on the world market would greatly increase the amount of scarce metals recovered.

Besides e-waste recycling, there is future growth potential in the recycling of new generation rechargeable batteries. This is mainly driven by the electrification of vehicles and more stringent laws enforcing collection and recycling all over the world.

However, important challenges still exist in the improvement of collection rates from portable batteries and in the EHS risks in handling and treatment of the end-of-life batteries. To address this opportunity, Umicore started a 7000 tonne per year industrial pilot scale recycling plant for Li-Ion and NiMH rechargeable batteries in Belgium. The recycling process recovers valuable elements such as Nickel, Cobalt, Copper and Rare earth elements from the batteries, putting these metals back into the value chain.

For a sustainable recycling chain transparency, collaboration and trust is necessary.

we reduce it.

LINDNER
Recyclingtech

Robert Moser
Production
Manager

State of the LindnerART:
Reduce to the max

We reduce everything. Almost everything. But never our know-how.
You can profit from this too, because you are in good company among our numerous renowned customers worldwide. More than 1.000 shredders and plants for processing refuse derived fuels sold – they speak for themselves.

www.l-rt.com

The ART of innovative SHREDDING!

100% ORIGINAL
Since 1988

For more information, enter 16 at WMW.hotims.com

TRASH TALKING

WEIGHT TARGETS HAMPERING CRITICAL MATERIAL RECOVER



ANDREAS MANHART
IS A RESEARCHER INTO
SUSTAINABLE PRODUCTS &
MATERIAL FLOWS AT THE
ÖKO-INSTITUT, GERMANY

Scarcity of metals and in particular of some of the rare earth metals are high ranking issues in the public debate. And it's true that waste electronic products provide a major potential for many of these materials.

A study by Öko-Institut found out that in total, all of the notebooks sold to private consumers in Germany during 2010, contained 460 tonnes of cobalt, 16 tonnes of neodymium, 12 tonnes of tantalum, 3 tonnes of silver and many other critical metals. Nevertheless, the study also showed us that most of these metals are not recovered by current e-waste management systems in Germany. In fact all that is recycled is less than 40% of the gold, silver, palladium and cobalt.

While there are good reasons for this, there are also many ways to improve. We know that the highly mechanised pre-processing technologies installed in the 1990s are mostly not ideal in terms of segregating fractions with highest concentrations of critical metals. They might be good in reducing labour costs and to manage large quantities of e-waste according to all environmental standards, but they do not help recover critical resources.

However, we cannot only blame the recyclers. On collection sites mixing various devices in one container is still common. We cannot expect recyclers to dig the most resource-relevant pieces out of this mess.

Also the producers can and should play a role. The days when everybody could easily take the battery out of a mobile phone are gone. Today recyclers have to struggle with new designs and many smartphones and tablets are built in a way that it takes just too much effort to get out the cobalt-containing Li-ion batteries.

We have to remember that more than 50% of the world's primary cobalt supply is mined in the Congo, mostly under terrible working conditions. In addition, cobalt is listed as critical metal in the EU and I cannot see a sound reason why we should continue to tolerate product designs that clearly stand against the idea of a circular economy.

In addition, regulators need to learn their lesson: Both, the old and the new European WEEE Directive contain quantitative material recovery and recycling targets. These targets can only be achieved if recycling processes are optimised for mass-fractions such as steel, glass, plastics and aluminium. With a strong focus on critical metals, recyclers simply run the risk of being non-compliant.

So, many players have to rethink their strategies. Apart from isolated optimisations it will also be of crucial importance that all players are open to learn from each other and to jointly work on better solutions for the future.



**HAMMEL®**
RECYCLINGTECHNIK

RED GIANT

The multitalent for wood, waste and scrap!



VISIT US!
Upcoming shows
you can find on
www.hammel.de

WE SHRED EVERYTHING

mobile systems & stationary plants | economical & reliable | service worldwide

HAMMEL Recyclingtechnik GmbH
Phone: +49 (0) 36 95 / 69 91 -0

Leimbacher Straße 103
E-Mail: info@hammel.de

D-36433 Bad Salzungen
Internet: www.hammel.de

For more information, enter 17 at WMW.hotims.com

THE FUTURE OF ELECTRONIC WASTE



PATRICK FERRY
IS A SALES EXECUTIVE AT
DYNAMIC RECYCLING AND
AUTHOR ON THE SUBJECT OF
E-WASTE
WISCONSIN, U.S.

Electronic waste has become a prevalent discussion in the recycling industry. With new technologies regularly emerging onto the market and the need for individuals to obtain the newest gadgets, our society is being forced to make ethical decisions in regards to proper e-waste disposal and reuse.

Cell phones, laptops, computers, televisions and monitors all contain small amounts of critical materials and rare earth elements (REEs), which are essential for the progress of future technologies and for the renewable energy industries. The opportunities for increasing the recovery of critical materials from e-waste has prompted new industry standards, legislation and producer responsibility measures.

REE's and critical materials possess luminescent, magnetic and catalytic properties. The U.S. Department of Energy's (DoE) Critical Materials Strategy report stated that "supply challenges for five rare earth metals - dysprosium, neodymium, terbium, europium, and yttrium - could affect clean energy technology deployment in the coming years." However, proper steps are being made to address the shortages in REE's and critical materials. The DoE recently awarded the Ames Laboratory in Iowa \$120 million over five years to create the Energy Innovation Hub, which will deal with the shortages

of REE's and critical materials that are essential to the future of energy sustainability. As stated by Assistant Secretary David Sandalow, "The three pillars of research for critical materials include supply chain diversification, substitute materials and recycling."

LEGISLATION

According to the Environmental Protection Agency, our national laws do not allow the EPA to establish federal regulations on recycling. With this being the case, mandated laws and regulations must start at a grass roots level in your city, county or state. A slim majority of states have implemented laws, but 24 states have not. That number is frightening as the reuse, refurbishing and recycling of e-waste should be at the forefront of social issues.

Implementation of federal recycling laws is not completely out of the question, but at the present time, there is no federal mandate to recycle e-waste.

It is imperative that our government and business sector work closely together to implement and push for responsible recycling practices. Regulations in the recycling industry are in place, but the United States still has a long road ahead to mandate laws that hold corporations, recycling companies and downstream vendors responsible for improper recycling practices.



**Our Solution For Your
Transport- & Storageproblems:**

rotowrap

**Fast Solid Reliable Efficient
All bale sizes! Up to 60 bales/h!**



PTF Häusser GmbH

D33829 Borgholzhausen

Tel.: +49 5425 930186

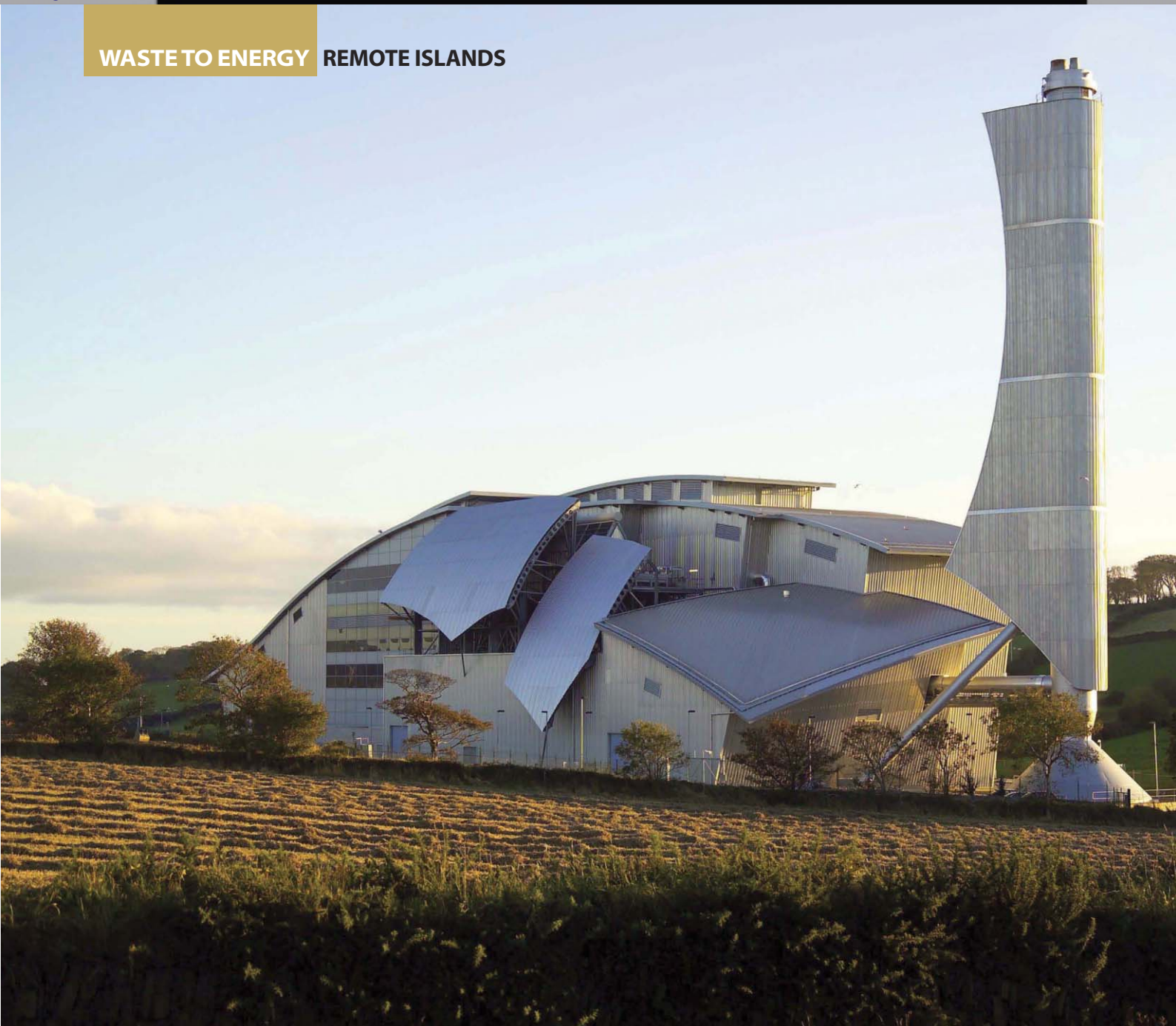
Fax.: +49 5425 930188

Info@PTF-Haeusser.de



For more information, enter 18 at WMW.hotims.com

WASTE TO ENERGY REMOTE ISLANDS



THE ANSWER FOR REMOTE ISLANDS?

While Islands can range in size from the smallest rock to the 2.1 million km² of Greenland, for those with a human population, the issue of waste management can be problematic. Often isolated from end markets for recyclates, does waste to energy technology offer these remote communities the ideal solution?

by Andrew Street

REMOTE ISLANDS WASTE TO ENERGY



Due to their relatively small scale, the development and operation of on-island waste treatment and disposal facilities which meet increasingly stringent legislative requirements is a challenge. Whilst many remote island communities are not usually subject to the same level of legislative control as larger mainland states (for example, with regard to key EU Directives relating to waste management), it is usual for an island authority to seek to adopt an approach, and to introduce facilities and technologies that at least go some way to reflecting the high standards set out in European or other similar legislation.

Within EU legislation, including that relating to waste management, such as the Waste Framework Directive and Landfill Directive, there is explicit recognition of the challenge of seeking to apply the same strict standards to small islands, and in these cases exemptions or derogations often apply.

This should not of course be seen as a 'licence' for any local, island based authority to adopt standards which give rise to wholesale environmental damage. Indeed given the reliance many small islands have on maintaining the environment either for the purposes of supporting tourism or local agriculture, that would clearly be counter-productive.

LESSONS FROM HISTORY

In the past there have been plenty of examples of inappropriate waste management on small or remote islands, with very little attempt at adopting a sustainable approach that protects the local environment. On many small remote islands across Europe – and across the globe – indiscriminate dumping of waste was often the norm, with open burning and sometimes the tipping of the residue in a remote corner of the island. For example, for many years on the Greek island of Santorini waste was tipped over a high cliff. However this is no longer practiced and great strides have been made across many of the Greek islands in addressing these issues.

An extreme example of poor waste management – described in the worldwide press in 2012 as 'apocalyptic' and a 'floating toxic time bomb' – is the island of Thilafushi in the Maldives. With an indigenous population of around 330,000 but with nearly 800,000 tourist visitors each year, the Maldives archipelago is considered one of the most beautiful holiday destinations in the world. Of the 1200 islands in the group, 200 are inhabited and half of these are designated as resorts. Consequently, pressure on the environment is enormous, and waste management has simply not been adequately planned for or invested in.

The result is an open dump receiving over 300 tonnes of rotting waste each day, and on an island that is increasingly threatened by rising sea levels; this clearly means something has to be done.

The relatively small permanent population and the potential impact of a transient tourist population can place considerable pressure on local governments in terms of funding waste management services. Most remote island communities can only afford the most basic of waste management systems without external funding, simply because they do not have the local tax raising capacity to fund the full range of infrastructure required to deal with issues such as power generation and supply, water supply and wastewater treatment, let alone to manage solid waste in line with modern standards.

POPULATION CRITICAL

There are examples of larger islands having the capacity to develop modern facilities, and to attract the investment required to do so. Two recent examples include the Isle of Man (population of 85,000) and Jersey (population of 98,000), both of which have state-of-the-art waste to energy facilities in place. A third example is the Western Isles (population of 26,000) off the north-western coast of Scotland, where a new integrated waste treatment facility has fairly recently been commissioned.

Islands with much smaller populations simply could not support the development of this sort of facility without external funding from central government, or through grants. A current example of this is the Isles of Scilly – one of the most beautiful island archipelagos in Europe – but with a very small indigenous population of just 2200 people. Without the current commitment from the UK government to provide substantial funding it would simply not be possible for the island's local council to address the urgent need to replace an existing but ageing incinerator with a modern waste to energy facility and at the same time remediate a site which has been impacted by waste management over the last 50 years.

A parallel situation also arises for St Helena in the South Atlantic – one of the most remote islands in the world. St Helena, a British Overseas Territory, has an indigenous population of around 6600, and currently a relatively small number of tourists. That is due to change in the coming years with the development of a €240 million airport, which will make the island far more accessible. Major improvements to the Island's waste collection, treatment and disposal system are currently underway, but largely reliant on funding provided by the UK government.

SITA's waste to energy plant on the Isle of Man handles all of the island's waste and exports 5 MW to the grid - around 10% of the island's needs
Image credit: SITA

WASTE TO ENERGY REMOTE ISLANDS



LIMITED MARKETS

The size of the local economy and industrial/agricultural base often cannot sustain consistently high levels of material reuse, limiting local markets for recycled materials and for compost products. This is particularly pertinent for an extremely remote location, where the transfer of materials off-island would be both expensive, and difficult to justify in terms of sustainability. This is clearly less of an issue for islands close to a mainland market, and in these cases recycling should be encouraged and established transport routes utilised to transfer materials to mainland markets for recycling.

There will however always be some scope for local reuse and recycling. Particularly in the developing world the imagination of the local population appears to have no limit when it comes to converting waste into something of real value. In most cases however, the market is limited by the size of the local economy, or impacted by the transient nature of any tourist traffic to the island. Therefore a degree of realism is needed when it comes to the level of recycling and reprocessing that can be sustained.

Additionally, on many islands there are seasonal increases in waste generation, and high levels of packaging associated with the

necessary importation of food and other goods. These variations make it difficult to sustain both local and off-island commitment to resource efficient recycling and composting. Seasonal variations are often related to tourist activity, which although valuable to the local economy, will always bring additional pressures to the local environment, including the generation and importation of waste

VIABLE OPTIONS

Experience indicates that there are normally just a few viable approaches to waste management that could be said to reflect 'good practice' (although not necessarily 'best practice') within a western, mainland state subject to strict legislative controls (such as would be the case for European Member States).

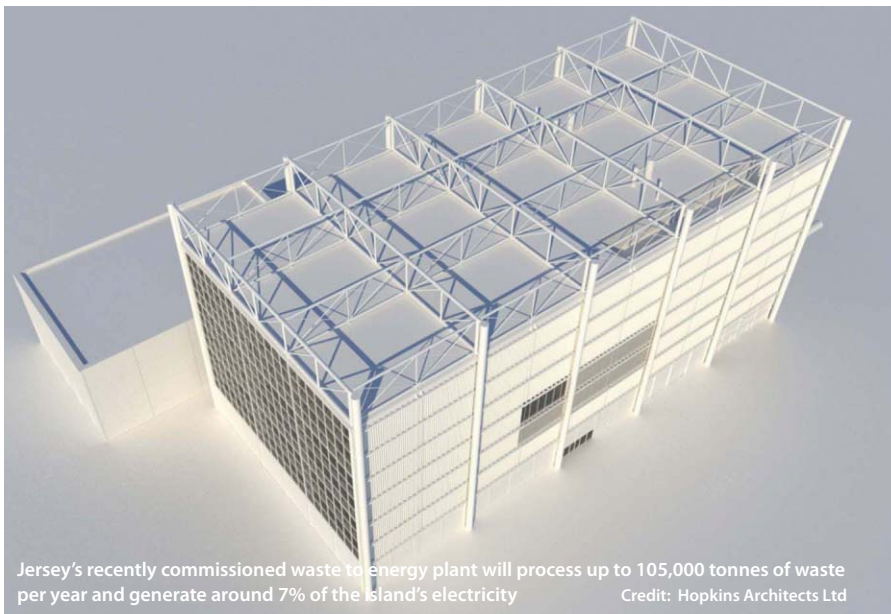
As outlined, it would not be appropriate to adopt the same approach to dealing with waste on a small remote island as one would for a large European metropolitan authority with access to local and central funding, a range of options for collection, treatment and disposal, and an established and mature market for a range of segregated materials and process outputs.

For a remote island community, or indeed any remote location, the range of realistic options for managing waste are inevitably

The Western Isles Integrated Waste Management Facility was the first in the UK to use anaerobic digestion to treat source separated organic waste to generate energy

REMOTE ISLANDS WASTE TO ENERGY

Existing landfill operation of St Helena in the South Atlantic – soon to be upgraded with funding from the UK government



Jersey's recently commissioned waste to energy plant will process up to 105,000 tonnes of waste per year and generate around 7% of the island's electricity

Credit: Hopkins Architects Ltd

much more limited. Experience across the globe shows that the most likely options to be adopted are:

Landfill: Reliance on landfill as the principal disposal route, with some limited recycling and reuse, but within the limits of local markets. Efforts are typically focused on ensuring that the landfill site (normally a single site, unless the island happens to cover a very large area, or is made up of an archipelago of islands) is developed and operated on a sanitary basis and is subject to appropriate levels of management and control so as to minimise the environmental impact. There are many islands across the world where this approach remains the strategy, and is the preferred approach going forward.

Thermal treatment: On some larger islands, where the quantity of waste is sufficient

to justify the investment, it is quite common for the principal disposal route to be thermal processing through incineration. The preferred technology would be conventional incineration, and it would be unusual for a plant to be smaller than 10,000 – 15,000 tonnes/annum (although there are a few examples of smaller sized facilities on islands). Rarely is this on a combined heat and power (CHP) basis, simply because typically there will be few opportunities for use of the heat, but almost without exception power will be generated and exported to the local network. Any residual wastes that cannot be incinerated would be sent to landfill, along with incinerator residues.

What is notable is that it is very rare for other waste treatment technology to be introduced on small remote islands – whether that be the

treatment of residual waste to create RDF for thermal processing (simply because it would not make sense to introduce two expensive treatment processes for such a small quantity of waste), or the treatment of organic waste by anaerobic digestion or composting.

Anaerobic digestion would normally be inappropriate in a remote island situation due to the relative complexity of the technology, and also the challenges of disposing of the digestate. There are often similar challenges in disposing of organic waste derived composts, simply because the local demand for such materials on remote islands is often minimal, and it could therefore end up being sent to landfill – which somewhat defeats the object of investing in a relatively expensive treatment process in the first place.

CONCLUSION

Developing and implementing a truly sustainable waste strategy for small islands can be challenging, and this becomes all the more difficult for those islands that are very remote. However, with appropriate levels of realism and pragmatism it is possible to adopt an approach that provides adequate protection to the local environment. Funding is often a major issue, and external support is an inevitable requirement if modern standards of environmental protection are to be met.

Andrew Street is a director at SLR Consulting Limited

Web: www.slrconsulting.com

This article is on-line.

Please visit www.waste-management-world.com

LANDFILL GAS TO GRID

CARBON FINANCE FOR LFG_{TO}GRID

With the implementation of the new Landfill Gas Management Regulation imminent, small communities across Canada will soon need gas management systems at landfill sites producing over 1000 tonnes of methane per year. With its new LFG to grid system, the community of Salmon Arm is one step ahead.

by April Boehm

GAS TO GRID **LANDFILL**

Columbia Shuswap Regional District's LFG capture System
Credit: www.videonexus.ca



LANDFILL GAS TO GRID



Methane flaring at the Salmon Arm Landfill
Credit: Columbia Shuswap Regional District

The clock is ticking across small communities in British Columbia (BC) to come up with plans to meet the province's Landfill Gas Management Regulation. The regulation, which is part of BC's commitment to reducing greenhouse gas levels by at least 33% below 2009 levels by 2020, stipulates that from 2016 all landfills generating 1000 tonnes or more of methane annually must install a landfill gas management system.

The community of Salmon Arm, part of the Columbia Shuswap Regional District (CSRD) in BC's central interior, is meeting the demands of this regulation well ahead of time through the establishment of a landfill gas capture system. This award-winning grid injection system has been part of the CSRD's agenda for some time, but it took the power of carbon finance and the support of local utility FortisBC to make it a reality.

PLANNING

"It was back in 2007 that we started investigating and doing pre-planning," explains Darcy Mooney, deputy manager, Environment & Engineering Services for the CSRD. "That was also when we started hearing talk from the provincial capital of new regulations for emissions offsets." By

2008, this talk had solidified into ambitious new emissions reduction plans for the province's public sector, which included the founding of Pacific Carbon Trust.

Pacific Carbon Trust's mandate was twofold. Firstly to foster the growth of BC's low carbon economy. Secondly, help the province and other clients meet their carbon neutrality goals through the purchase of BC-based greenhouse gas offsets. In this way, the Province would not only ensure access to high quality, verified offsets, but would support the province's emerging low-carbon economy by providing expert knowledge and acting as a reliable offset buyer.

CARBON FINANCE

According to Mooney the establishment of Pacific Carbon Trust allowed the CSRD to implement a landfill gas capture system before regulation demanded. "By acting ahead of schedule to voluntarily reduce emissions from the landfill, we gained the right to issue carbon offsets," he explains.

Knowing it would have the option to sell offsets after the project was up and running gave the CSRD the security needed to finance the landfill gas capture system.

"If we hadn't had the ability to sell offsets, the probability is extremely high that we wouldn't have been able to move forward," says Mooney.

"This innovative project can be a model for other regional landfills across the province," says Pacific Carbon Trust CEO Scott Macdonald. "Putting a price on carbon provides a strong incentive for cutting-edge projects like this one that reduce emissions, create local jobs, and provide long-term economic benefits."

The first phase of the project capped the landfill and captured the resultant methane, preventing it from being released into the atmosphere. The methane, which has 21 times the global warming potential of carbon dioxide, is now being converted into natural gas and piped into FortisBC's local distribution network.

Mooney notes that the project will remove approximately 150,000 tonnes of methane from the atmosphere over the course of 15 years. The cost of the project comes in at some \$2 million, with a large proportion of that coming back from the sale of carbon credits.

"Having the ability to repay the capital over 15 years is an important piece of the economic model," adds Mooney. "We were in a position to say that the \$2 million is not going to be needed as a tax requisition."

Just as important, the deputy manager points out, was that they were able to borrow money from municipal reserves knowing these funds could be paid back without impacting closure plans for other sites. "Although everyone was in this for the environmental efficiencies, the substantial return on investment makes it more palatable politically," according to Mooney.

GRID INJECTION

While capping the Salmon Arm landfill prevents harmful emissions from escaping into the atmosphere, having the option of feeding it into the local grid means that 300 homes can be provided with a clean, renewable energy source.

"When you think about it, it makes sense – it's almost a no-brainer," says Mooney of the plans to transform the methane into gas that can be used to heat homes in the community.

While the decision may be a no-brainer, Mooney says without the commitment of utility FortisBC, it would not have been possible. When the CSRD was exploring what it would take to implement the landfill gas project, FortisBC was looking for opportunities to expand their renewable energy capabilities.

"We approached Fortis through an expression of interest they had issued, and there was an immediate and overwhelming response," he remembers. "Within weeks of us expressing interest, we had teams of guys coming up from Vancouver to chat with us and find out how serious we were."

GAS TO GRID LANDFILL



The Landfill Gas Management Regulation is part of Canada's commitment to reduce GHG levels
Credit: Greg Patterson

“
If we hadn't had the ability to sell offsets, the probability is extremely high that we wouldn't have been able to move forward

Before the landfill gas could be used in FortisBC's system, it first needed to be upgraded, as it has a much lower methane content and higher CO₂ content than natural gas, which makes it less efficient as a heat source. In addition, it contains contaminants such as hydrogen sulphide, siloxanes and volatile organic compounds.

The upgrading process involves removing water and contaminants before a compressor is used to push the gas into a device called a pressure swing adsorber (PSA). At that stage, biomethane is separated from carbon dioxide, oxygen and nitrogen. Once separated, the biomethane passes through a final check by FortisBC and it emerges ready for injection into the gas pipeline.

UTILITY BACKING

Partnering with FortisBC brought some technical challenges, as some of the parameters for the project were outside their normal range, but Fortis' support was unfailing. They even invested their own money in system upgrades in order to meet the landfill's needs. "There was a huge concerted effort in getting this project online," Mooney says.

After months of close cooperation with FortisBC, the landfill will begin injecting gas into the utility's pipes in January this year.

KEEP IT IN THE COMMUNITY

While the community has not yet reaped all the benefits of the project, the project has already provided a significant boost to the local economy. The CSRD made it a priority to avoid outsourcing the work involved with project

development and instead took on the role of a general contractor in order to provide as many opportunities as possible to unemployed or underemployed locals.

"Over 80% of the project money remained in the community," comments Mooney.

This small community is winning accolades for its readiness to positively impact climate change by taking action at home. Their early commitment to reducing landfill gases has won the CSRD the recognition of its peers in the form of two awards: the Federation of Canadian Municipalities Sustainable Community Award, and the Union of BC Municipalities Community Excellence award in the Climate Action category.

CONCLUSIONS

Looking ahead, the CSRD hopes to expand the uses for its converted landfill gas. Mooney points to ongoing discussions about the feasibility of using the captured gas to run municipal vehicles. He also notes that the CSRD has been in contact with other municipalities across Canada to share their experiences.

"For us, it goes back to the philosophy we've developed in our overall management plan of looking at all waste as a potential resource," Mooney sums up.

April Boehm is an environmental writer and former Wall Street Journal reporter.

This article is on-line.

Please visit www.waste-management-world.com

ISWA INFORMATION

VISIT WWW.ISWA.ORG FOR MORE INFORMATION

GPWM BIENNIUM CONFERENCE IN OSAKA, JAPAN



ISWA managing director, Hermann Koller, and the chair of the ISWA Working Group on Waste and Climate Change, Gary Crawford, participated in the Global Partnership on Waste Management (GPWM) Biennium Conference which took place on November 5 – 6 in Osaka, Japan, hosted by UNEP. The GPWM is an open-ended, voluntary and collaborative relationship

between various international stakeholders, in which all participants agree to work together to coordinate activities on waste management in a systematic way.

The conference brought together 180 waste experts from over 40 countries to find answers to the global challenge of waste management and reap the economic and environmental benefits through better coordination. The first session of the conference was dedicated to charting the future course of waste management, the second one to strategic issues in waste management for governments and business.

Hermann Koller was invited to co-chair the conference. The lively discussions and inspiring exchange of experiences made this conference a great success.

For more detailed information please have a look at the report provided in the info section at www.iswa.org.

ISWA EUROPEAN GROUP MEETING, BRUSSELS, BELGIUM

The 2nd ISWA European Group Meeting for 2012 was held on December 5 – 6 in Brussels, Belgium, and attracted 48 delegates. In three sessions the topics of energy recovery, EU waste hierarchy, recycling and waste to energy were covered.

With presentations from members of DG Environment such as the head of the Waste Management Unit, Julio Garcia Burgues, and Keir MacAndrew as well as ISWA representatives from academia and industry, the relationship between energy recovery from waste and the recycling of waste was highlighted.

The sessions were complemented by a workshop where speakers from Scandinavian

organisations Waste2Recycle and Profu elaborated on how the potential of waste recovery for fuel and energy is maximised, after as much as possible has been recycled.



ISWA AT COP 18 IN DOHA, QATAR



After Cancun 2010 and Durban 2011 ISWA was represented for the third time with a delegation at the United Nations Framework Convention on Climate Change (UNFCCC) Summit. The 18th Conference of the Parties (COP 18) took place in Doha from November 26 to December 8, 2012.

Members of the ISWA delegation - president David Newman, managing director Hermann Koller and former president Atilio Savino - endeavoured to make sustainable waste management and its positive impact on our climate, an issue at the summit and in the UNFCCC process.

The delegation talked to many people including Richard Kinley, the deputy executive general of the UNFCCC, but also UNEP, CCAP, banks and various government officials. With CCAP, ISWA will work on activities in Latin America and with the Mozambique government on a landfill project.

ISWA also got the opportunity to hold a press conference titled 'Small outlay, large impact: Substantial Greenhouse Gas emission reductions through sustainable waste management' at the conference centre. Attendees were mainly developing country delegates wanting to know what can be done for their waste.

The good message is, money is going into waste projects from the Climate Change process ISWA has to keep pushing this message and will make itself available to help the process.

ISWA CALENDAR 2013

JANUARY

STC Meeting

January 28
Vienna, Austria
rwilliams@iswa.org

Board Meeting

January 29
Vienna, Austria
hkoller@iswa.org

FEBRUARY-MARCH

Working Group Meeting on Communication

February 28 - March 1
Lisbon, Portugal
ghabenicht@iswa.org

Working Group Meeting on Collection and Transportation Technology

March 6
Jaipur, India
aholzschuster@iswa.org

APRIL

Working Group Meeting on Energy Recovery

April 11-12
Copenhagen, Denmark
aholzschuster@iswa.org

MAY

Working Group Meeting on Legal Issues

May 2-3
Brussels, Belgium
ghabenicht@iswa.org

STC Meeting

May 14
Finland
rwilliams@iswa.org

Board Meeting

May 15
Finland
hkoller@iswa.org

ISWA Beacon Conference "The 2nd International Conference on Final Sinks - Sinks a Vital Element of Modern Waste Management"

May 16-18
Espoo, Finland
jukka.heiskanen@aalto.fi

ISWA Study Tour on Source Separation of Bio Waste and Biogas Production

May 20-24
Sweden
kwinternitz@iswa.org

MSW: Management Systems and Technical Solutions

May 28-29
Moscow, Russia
konovalova@sibico.com

South-East European Forum on Waste Management, Recycling & Environment "Save the Planet"

May 29-31
Sofia, Bulgaria
office@viaexpo.com

JUNE

ISWA Study Tour Waste-to-Energy

June 24-28
Vienna, Austria
jschoenherr@iswa.org

AUGUST

ISWA cooperation conference: Landfill and Transfer Stations

August 7-9
Gold Coast, Australia
kwinternitz@iswa.org

2nd ISWA Summer School

August 12-23
Kuala Lumpur, Malaysia
kwinternitz@iswa.org

SEPTEMBER

Working Group Meeting on Communication

September 5-6
Vienna, Austria
ghabenicht@iswa.org

Working Group Meeting on Energy Recovery

September 12-13
Turin, Italy
aholzschuster@iswa.org

OCTOBER

Board Meeting

October 5
Vienna, Austria
hkoller@iswa.org

STC Meeting

October 5
Vienna, Austria
rwilliams@iswa.org

General Assembly

October 6
Vienna, Austria
hkoller@iswa.org

ISWA World Congress 2013

October 7-11
Vienna, Austria
office@iswa2013.org

Working Group Meeting on Legal Issues

October 10-11
Vienna, Austria
ghabenicht@iswa.org

NOVEMBER

ISWA Beacon Conference on Waste-to-Energy

November 27-28
Malmö, Sweden
jakob.sahlen@avfallsverige.se

DIARY

DIARY OF
EVENTS

WASTE TO ENERGY+RECYCLING

Bremen, Germany
19-20 February 2013
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

WASTE TO ENERGY+RECYCLING

Bremen, Germany
19-20 March 2013
T: +49 2802 9484 840
E: info@wte-expo.de
W: www.wte-expo.de

ISRI CONVENTION AND EXPO 2013

Orlando, U.S.
9-13 April 2013
T: +1 202 662 8500
W: www.isri.org

WASTE MANAGEMENT AND
RECYCLING INDIA 2013
CONFERENCE

Delhi, India
8-10 April 2013
W: www.wmrindia.com

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

Sao Paulo, Brazil
03-04 June 2013
W: www.greenworldconferences.com

END OF LIFE PLASTICS 2013

Cologne, Germany
4-6 June 2013
T: +44 117 924 9442
E: rmm@amiplastics.com
W: www.amiconferences.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

ADVERTISERS' INDEX

NAME	PAGE
ARJES GMBH.....	4
AUT ANLAGEN-UND UMWELTTECHNOLOGIE GMBH.....	41
BABCOCK & WILCOX VOLUND.....	BC
BMH TECHNOLOGY OY.....	38
DOPPSTADT CALBE GMBH.....	IFC
EGGERSMAN ANLAGENBAU BACKHUS GMBH.....	15
ERG - METHANE EXPO 2013.....	16
FAVERSHAM HOUSE GROUP - EFW EXPO.....	22
GICOM BV.....	17
HAMMEL RECYCLINGTECHNIK GMBH.....	44
ISWA.....	6
LINDNER RECYCLINGTECH.....	43
MACK BROOKS EXHIBITIONS LTD - WMR INDIA.....	1
MACPRESSE EUROPA SRL.....	42
MESSE MUNCHEN GMBH - IE EXPO 2013.....	28
NTM AB.....	31
PTF HAEUSSER GMBH.....	45
UMICORE PRECIOUS METALS REFINING.....	40
WASTECONSULT INTERNATIONAL - WASTE-TO-RESOURCES 2013.....	3
ZENROBOTICS LTD.....	IBC

ADVERTISING

For information on advertising, Please contact:

Terry Ash
International
E: terrya@pennwell.com
T: +44 1992 656 600
F: +44 1992 656 700

Roy Morris
International
E: rmorris@pennwell.com
T: +44 1992 656 613
F: +44 1992 656 700

Dottie LaFerney
Regional Manager, Southeast
E: dottiel@pennwell.com
T: (512) 858-7927
F: (512) 858-1910

Craig Wiggins
Regional Manager, East
E: craigw@pennwell.com
T: (610) 430-8181
F: (610) 430-0910

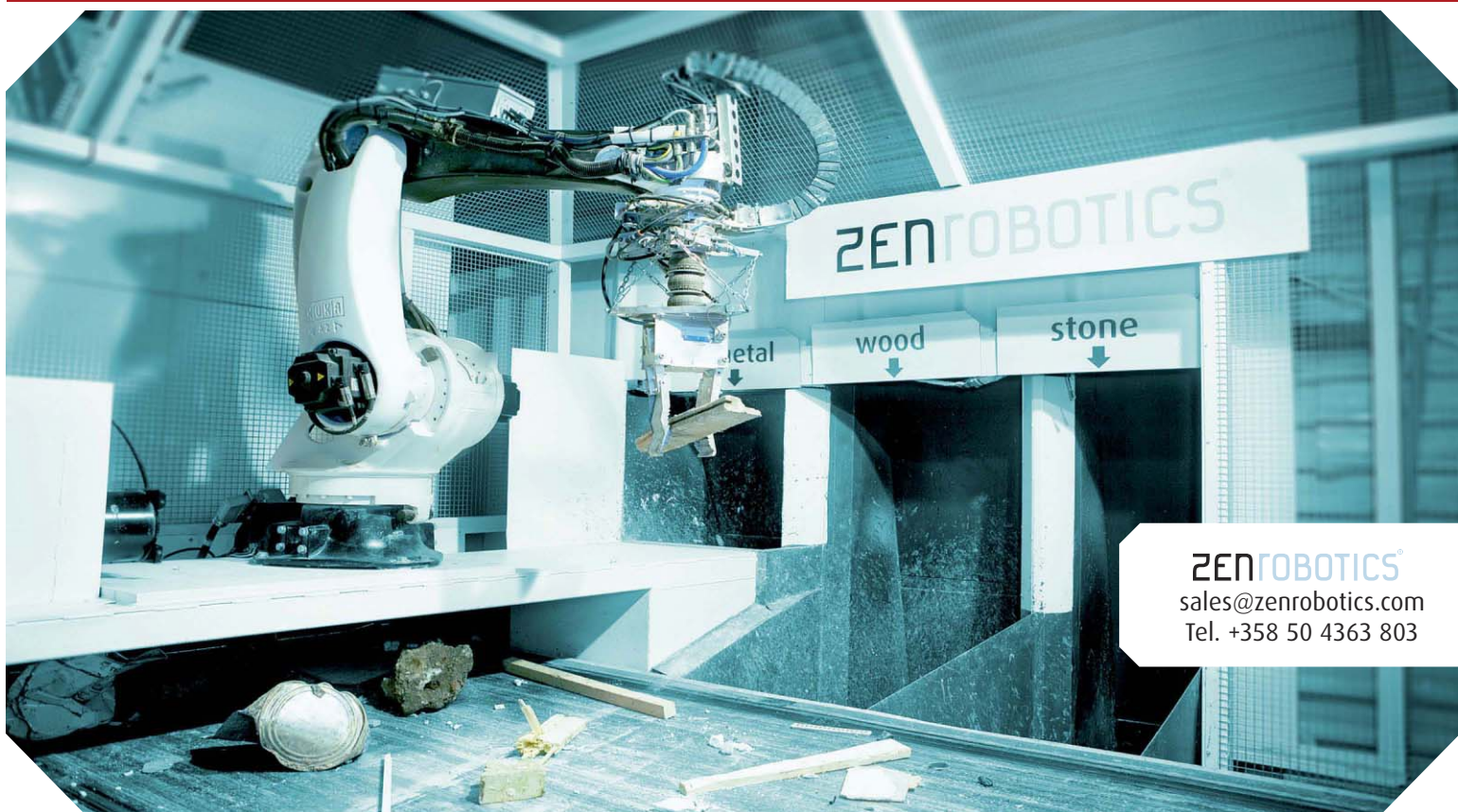
Amy Bailie
Regional Manager, Central/West
E: amyb@pennwell.com
T: (918) 832-9241

For more information, enter 19 at WMW.hotims.com

DECLARATION OF WAR!

Be it enacted by the Esteemed Board of ZenRobotics Ltd. That War be and is hereby declared to exist between the TRADITIONAL, OLD FASHIONED WAYS OF PROCESSING CONSTRUCTION AND DEMOLITION WASTE, and ZenRobotics Ltd. The President of ZenRobotics is hereby authorized to use the whole Robotic Recycling force of ZenRobotics to carry the same into effect, and to distribute ZENROBOTICS RECYCLERS TO CUSTOMERS, in such form as he shall think proper. Under the seal of ZenRobotics, he shall have the right to fight against any such situation where a Construction and Demolition waste processing company is using old fashioned technology and thus losing money in disposal costs, losing profits due to less than pure fractions etc.

ZenRobotics Recycler is out now and sorts C&D waste efficiently, with robots. Buy yours: www.zenrobotics.com



ZENROBOTICS
sales@zenrobotics.com
Tel. +358 50 4363 803

OPTIMIZE INVISIBLE PROCESSES? WE DO IT EVERY DAY!



Our advanced CFD analysis helps trim waste-to-energy plants for greater efficiency and lower emissions

Throughout the EU, emissions regulations are getting stricter and stricter. But can anything be done to help an older plant meet these new demands? Absolutely!

Using Computational Fluid Dynamics, CFD, we create sophisticated computerized models that show us exactly what is happening within any plant. We can accurately predict the results

for different plant configurations, evaluate air-injection systems, optimize flue-gas recycling, and diagnose a wide range of process and combustion problems so your plant can be trimmed for maximum efficiency. In short, we can help improve your performance and increase your availability.

Find out how at www.volund.dk

For more information, enter 20 at WMW.hotims.com



babcock & wilcox volund

Falkevej 2
DK-6705 Esbjerg Ø

Tel: +45 7614 3400
Fax: +45 7614 3600

bwv@volund.dk
www.volund.dk