



# INTERNATIONAL WASTE NEWS

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Number 6, December 2006

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The R98 Fund has allocated funds for the translation of the Danish newsletter "Internationalt AffaldsNyt".

Waste Centre Denmark, Tel.: +45 7021 8030  
[www.wasteinfo.dk](http://www.wasteinfo.dk) · [info@wasteinfo.dk](mailto:info@wasteinfo.dk)

## Status for European sustainability projects

### Danish companies concentrate on sustainable products and services

#### Which types of products are the worst for the environment?

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## Status for European sustainability projects

The Sustainable Europe Research Institute (SERI) is a think tank that investigates possible initiatives in the field of sustainability in the EU countries. The Institute - located in Austria and just now celebrating its 5<sup>th</sup> anniversary - is in its annual report summarising a long range of development projects on sustainability. The annual report gives a brief description of each individual project, for quick overviews of contents and scope. In addition, there are useful links to further information and contact persons.

There are overviews of 1) new projects, 2) ongoing projects, 3) finalised projects and 4) future projects. The report lists e.g. the status of these ongoing projects:

- MOSUS – a model that aims at quantifying the correlation between socio-economic driving forces and environmental conditions, and then evaluating the economic and social consequences of central elements in the EU environmental policy.
- EUSDS II – where a cornucopia of scientific approaches is used to establish a model. On the basis of this model, an alternative sustainability strategy was presented to the European Commission's strategy. The alternative strategy is expected to be published by end of 2006.
- NED – Material flow analysis for Vienna, Hamburg and Leipzig.

**Source:** *The Sustainable Europe Research Institute (SERI).*

*The annual report can be downloaded from <http://www.seri.at/>*

**Mere information:** MOSUS: [www.seri.at/mosus](http://www.seri.at/mosus)

EUSDS II: [www.sustainability-strategy.net](http://www.sustainability-strategy.net)

NED: [www.neds-projekt.de](http://www.neds-projekt.de)

(BIH)

## Danish companies concentrate on sustainable products and services

20 of the largest Danish companies are behind a new initiative that should bring sustainability and social responsibility from words to concrete action. The companies established in May 2006 the Council for Sustainable Business Development. On 14

December 2006 the Council held a conference with the title “Sustainable business development - from risk management to market development”. At the conference a new vision was presented for Danish companies’ social, ethical, sanitary and environmental considerations.

The initiative is an attempt to put sustainability on the political agenda and invites to cooperation between business, authorities and private organisations in order to create a basis for serious improvements.

For the conference the Council elaborated a discussion paper. One of the central messages in the paper was that sustainability pays off! But it requires that a series of obstacles are overcome. This applies e.g. to:

- **Exposing sustainability on the market**  
The companies must expose their sustainability level to clients and use it in their marketing of products and services. A Danish set of values for sustainable businesses shall be developed and used in branding Danish businesses internationally.
- **Supplier chains should follow suit**  
The weakest link sets the limitations to quality in the sustainability efforts - and right now the suppliers’ sustainability behaviour is the weakest link. Focus must be put on training suppliers both at home and abroad. At the same time there is a need for determining the extent of business responsibility.
- **Consumers shall be able to price sustainability**  
The companies should actively describe how sustainability enhances the quality of their product. Authorities and industries should pave the way and show the good example in their procurement of consumer goods, and criteria should be defined for sustainable goods, e.g. by further development of the basis of existing eco-labels.
- **Sound societal framework for the business efforts**  
It is the politically determined objectives that have spurred on the companies to take on social responsibility in this area. Therefore, it is necessary that these objectives are followed up by coherent and long-term political efforts towards a sustainable development in society.

Niels Due Jensen, Group Chairman of the Board in Grundfos and Chairman in the Council for Sustainable Business Development,

says that “Danish companies have really good possibilities on the international market, which to an increasing extent requires focus on sustainable development. Not only are Danish companies good at taking environmental considerations, they also have a long tradition for focusing on the work environment as well as social and ethical relations, beyond any legislative framework.”

The 20 founders of the Council are: Arla Foods amba, Bang & Olufsen a/s, Brdr. Hartmann A/S, COOP Danmark A/S, Danfoss A/S, Danisco A/S, Datagraf, ECCO Sko A/S, Grundfos Management, Hilton Scandic, ISS Management, Jysk A/S, Key2Green, Louis Poulsen El-teknik A/S, Matas A/S, NORDEA Bank Denmark A/S, Novozymes A/S, Post Danmark, Tanaco Danmark A/S, Tryg Vesta A/S

***Source:** Discussion paper (in Danish) elaborated by the Council for Sustainable Business Development on: [www.affaldsinfo.dk/5401](http://www.affaldsinfo.dk/5401)*

***More information:** Head of Secretariat: Susanne Backer, [sb@key2green.dk](mailto:sb@key2green.dk), or the homepage [www.rbenet.dk](http://www.rbenet.dk) (BIH)*

### **Which types of products are the worst for the environment?**

The American periodical “Journal of Industrial Ecology” has taken up the theme of priorities for environmental product policy. The special issue is based on extensive research made in environmental impacts of consumption, prepared by the EU-funded project “Environmental Impacts of Products”. The project is a valuable contribution to EU’s integrated product policy.

Results show that 70-80 % of environmental impacts from private consumption can be found within the same three product groups and activities: Foods (meat and dairy), private transport (cars and air) and buildings/heating. These products cover 60% of the households’ total expenses.

There exists a summarising report written in a non-technical language, but the full report from the project “Environmental Impact of Products – analysis of the life cycle environmental impact related to final consumption of the EU-25” can be downloaded by using the link below.

Phase 2 of the project has been launched under the title IMPRO (environmental IMProvement of PROducts).

This is one of several EU-financed projects that support the integrated product policy. Therefore, please also refer to INTERNATIONAL WASTENEWS, no. 4, 2006.

**Source:** *Journal of Industrial Ecology*

[http://www.mitpressjournals.org/page/special\\_103/jie](http://www.mitpressjournals.org/page/special_103/jie)

**More information:** *Identification of products with the highest potential for environmental improvement*

<http://ec.europa.eu/environment/ipp/identifying.htm>

(BIH)

## Waste minimisation in hotel management

Can modern consumption become sustainable and can sustainability become fashionable?

The world's first standard for sustainable development

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### Waste minimisation in hotel management

The hotel business - in particular the major hotel chains - have in many countries spotted the possibility of minimising waste amounts and resources while reducing costs by consciously working with sustainable hotel management.

A series of international, regional and national interest groups have been established in order to communicate information on possible environmental initiatives in the hotel business. Typically, a hotel guest produces at least 1 kg of waste per night. However, there are also large waste amounts produced by the actual hotel operations, outdoor areas, common areas, offices and by frequent replacement of inventory and furniture, which causes e.g. large amounts of electronic waste and bulky waste.

The article contains various international examples of how to minimise waste amounts via increased requirements to suppliers and selecting less waste-producing products, including cases of composting of green waste and sorting of waste into many fractions. Finally, the article mentions examples of other initiatives for sustainable hotel management, such as using cars driven by petrol as well as bio-fuel, minimising water consumption and amounts of laundry, minimising energy consumption etc. The various international interest organisations have developed many and good guidelines for "green" hotel management.

**Source:** *Waste Management World July-August 2006, "A welcome sign. Hotels adopt reuse and recycling".* [http://www.waste-management-world.com/articles/article\\_display.cfm?Section=ARCHI&C=feat&ARTICLE\\_ID=271254&KEYWORDS=%7Bhotels%7D%26%7Badopt%7D](http://www.waste-management-world.com/articles/article_display.cfm?Section=ARCHI&C=feat&ARTICLE_ID=271254&KEYWORDS=%7Bhotels%7D%26%7Badopt%7D)

**More information:** *Green Hotelier:* <http://www.greenhotelier.org/>

*Green Hotels:* <http://www.greenhotels.com/>

*Svanemærket (Norwegian):* <http://www.svanen.nu/hotell/>

*Tourism Partnership:* <http://www.tourismpartnership.org/>

*Horesta (Danish branch organisation for tourism and hotel businesses) :*

<http://www.horesta.dk/Emner/Markedsforing/GronNogle.aspx>

*Den Grønne Nøgle (Danish):* <http://www.dengroennenoegle.dk/> (TOK)

## Can modern consumption become sustainable and can sustainability become fashionable?

These years witness a violent increase in the number of consumers with money to spend in the five largest growth markets - China, India, Brazil, Mexico and Russia - so that today there are around 650 million new wealthy consumers in these countries compared to only a few years ago. This figure is expected to increase to around 1,100 million in 2010. If another 15 growth economies in developing countries are counted in, there are today around 1,050 million new consumers with money to spend, and in 2010 around 1,600 million.

Naturally, these many new consumers are demanding electronic goods, white goods, cars and certain types of food, in particular meat. An increase of this scale will have global consequences for e.g. greenhouse gases, an increased consumption of fossil fuels, and an increased share of the earth's vegetable food will be used for animal feed, etc.

It is a common view that you cannot change the consumer's shopping habits and in particular it cannot be expected that the new economies shall hold back on consumption as long as the well-established economies are continuing their present high level of consumption. Perhaps there is, however, still hope that habits can be changed? For example, 55 million Americans have stopped smoking over the last 20 years. The big question is therefore: How can we make modern consumption sustainable and can sustainability get into fashion? In Great Britain the government has established a commission of sustainable development, and this commission has prepared a report that shows the population's willingness to change behaviour if they can see an effect from it, and if the government, industries and leading individuals pave the way. The report has been given the title "I will if you will" and it suggest a long range of initiatives for increased sustainability that could be introduced in Great Britain.

**Source:** Resource recovery Forum: RRF Email News Service. "World – The new consumers. Their affluence and sustainability". [www.resourcesnotwaste.org](http://www.resourcesnotwaste.org) and Warmer Bulletin 105, July 2006. "People are willing to change".

**More information:** Tidsskriftet Article 13, July 2006:

[http://www.article13.com/ViewfromtheField/Article%2013%20View%20from%20the%20Field\\_July%202006.pdf](http://www.article13.com/ViewfromtheField/Article%2013%20View%20from%20the%20Field_July%202006.pdf)

Sustainable Development Commission: <http://www.sd-commission.org.uk/> "I will if you will. Sustainable consumption". CSC Report: [http://www.sd-commission.org.uk/publications/downloads/I\\_Will-Summary.pdf](http://www.sd-commission.org.uk/publications/downloads/I_Will-Summary.pdf) (TOK)

## The world's first standard for sustainable development

British Standard has just released the world's first standard for sustainable development, namely BS 8900:2006. This standard establishes a method for continuous development towards more sustainability, so that business activities become environmentally and socially sustainable. In connection with the assessment of sustainability, a business would often ask:

1. How do we ensure that groups or individuals are not affected in any negative way?
2. How do we ensure our involvement of others in a respectful way?
3. Will the business decisions lead to irreversible changes of environment or society?
4. How do we ensure that relevant and trustworthy information about our activities are made accessible to others?
5. How are important interests and impacts communicated and managed?

One of the tools in the new standard is a sustainability matrix, which helps the business to answer e.g. the questions above, by establishing follow-up of activities in relation to criteria and objectives. Another tool is a matrix for measuring a business' position in relation to horizontal and vertical development steps for sustainability (the business' sustainability level).

**Source:** Resource Recovery Forum Email News Service: June 2006. "UK- BSI launches sustainable development standard as new business tool".

**More information:** British Standard. Press Release, June 22. 2006:

<http://www.bsi->

[global.com/News/Releases/2006/June/n449bb9689aceb.xalter](http://www.bsi-global.com/News/Releases/2006/June/n449bb9689aceb.xalter) (TOK)

## **EU accession of Bulgaria and Romania**

### **The United States increases recycling**

### **Vital Waste Graphics – new report**

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#### **EU accession of Bulgaria and Romania**

Bulgaria and Romania have had their deadlines extended when it comes to complying with e.g. waste legislation, after their accession from 1 January 2007. The two countries are far from compliance with the EU directives, and landfilling is by far the major waste disposal method in the two countries, especially for household waste.

For both countries apply that before 31 December 2008 they must meet the recycling rates of 60 % for paper, and that the target of collecting 4 kg waste from electric and electronic equipment (WEEE) per resident per year must be reached.

Regarding the landfill directive, until 31 December 2014 Bulgaria can continue to landfill limited amounts of waste at 14 landfills that are not complying with the regulations. Romania, however, are permitted until 16 July 2017 to landfill waste at 101 landfills that are non-compliant. Still, both countries must present annual reports in which they document the progress on implementing the landfill directive.

*Source: RW no. 21, 18 October 2006. "Bulgaria and Romania to join European Union on 1 January 2007."*

*More information: Warmer Bulletin 106, September 2006, p. 10. "Bulgaria" (JTK)*

#### **The United States increases recycling**

A new report from the American EPA documents that in 2005 less waste was generated while the waste recycling rate went up. In 2005, 32 % of the waste was recycled, a 2 % increase compared to 2004 and a 16 % increase in relation to 1990. In total, 246 million tonnes of waste were produced in 2005 in the U.S. - a drop of 2 million tonnes compared to 2004. The majority of this decrease is ascribed to a decrease in waste production in private households.

The following results have been obtained:

- Recycling of packaging waste is increased to 40 %
- Almost 62 % of gardening waste is composted and
- Paper recycling is approximately 50 %

The American EPA administrator gives President Bush and the EPA credit for the change in society, from a “throw-away” society to a recycling society.

**Source:** U.S. Environmental Protection Agency, 10.23.2006. “Recycling Up and Trash Down.”

**More information:** EPA Newsroom:

<http://yosemite.epa.gov/opa/admpress.nsf/7c02ca8c86062a0f85257018004118a6/cca59419762da86785257210004e4de7!OpenDocument> (JTK)

### **Vital Waste Graphics – new report**

The Secretariat for the Basel Convention has released a new report that summarises global tendencies in waste landfilling. This is the second issue of the report which in particular looks at the life cycle of the product and those waste streams that are apparently invisible to the consumer.

The purpose of the report is to enhance public attention on the necessity of environment-friendly waste management. The report targets manufacturers in order to bring their attention to product disposal and those invisible waste streams that arise in production, distribution and use of the product.

The report reviews waste management at a European level and the costs at a global level. Furthermore, a series of examples are given on optimisation of waste management for visible and invisible waste streams.

**Source:** Norsas, [www.norsas.no](http://www.norsas.no)

**More information:** <http://www.vitalgraphics.net/waste2> (JTK)



**Germany cheapest at managing EE waste**  
**Glow lamps are collected together with batteries**  
**Receive tips on waste as SMS**

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**Germany cheapest at managing EE waste**

Hewlett-Packard has investigated the European market for treatment of electronic waste and found that Germany is by far cheapest. HP for instance only pays 0.01 EUR for collection and transportation of each sold mobile phone or digital camera. Fees for computers are 0.38 EUR. In comparison, fees in Belgium are 0.41 EUR for mobile phones and digital cameras, and 2.48 EUR for computers. One of the most important differences between Germany and Belgium is the number of collection systems available. Belgium has one system, while Germany has several.

According to HP's investigation, there is a clear correlation between the number of collection systems and the price of collection and treatment of electronic waste. The more systems, the cheaper it gets.

HP's spokesman, Klaus Hieronymi, says that manufacturer responsibility does not have the wanted effect in its present form. As an example he mentions that HP's R&D department developed a new screen that was much easier to use but at the same time also more expensive to produce. The screen production was stopped on the grounds that HP was forced into a common scheme where all other manufacturers would benefit from lower costs by recycling HP's screen.

In a not so distant future (i.e. 2015) all electronics will most likely be equipped with a chip that e.g. determines the manufacturer. Such a chip will make it possible to determine the individual manufacturer's impact on the system and hereby set the fee accordingly.

*Source: RW No. 22, 2 November 2006, p. 3. "Managing waste IT-equipment is cheapest in Germany, says HP exec." (SIMA)*

**Glow lamps are collected together with batteries**

In Kiruna in northern Sweden they are presently making tests on collecting glow lamps and low-energy bulbs in small boxes together with batteries. The boxes are mounted on a stand and set up around town, just like we know it from "classic" battery



collection points. After a sorting analysis it was calculated that glow lamps each year contribute with app. 60 kg lead at the local incineration plant. On this basis, Kiruna has started rethinking its method of collecting glow lamps and low-energy bulbs.

Under the motto “no hazardous waste in rubbish bags” the municipality has launched an information campaign and installed the above-mentioned boxes. So far, the citizens of Kiruna have been positive towards the campaign.

*Source: RVF-NYTT 3/06 p. 10. ”Holk för glödelampor en succé.” (SIMA)*

### **Receive tips on waste as SMS**

In more than a few Danish municipalities, the citizens are responsible themselves for putting out their rubbish bins at the plot boundary before collection day. If you forget it is tough luck and you have to wait another week or fortnight before next collection. Same problem exists in parts of Norway, and therefore the Norwegian waste company Reno-Vest has taken the consequence and offer their customers a reminder via SMS the night before collection day. The SMS service has been developed together with the company NorNet that hopes other municipalities or waste companies will also launch this service in future.

*Source: Via Norsas nyhedstjeneste. [www.vol.no/nyhet.asp?F=F&N=15992](http://www.vol.no/nyhet.asp?F=F&N=15992). ”Få SMS-tips om søppeltømninga.”*

*More information: Marketing manager for Reno-Vest, Laila Torsteinsen  
Director of NorNet, Ben-Tommy Eriksen (SIMA)*

## **New declaration targets 66 % paper recycling rate**

### **Recyclable carpets**

### **Recycling of waste from solar cell production**

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## **New declaration targets 66 % paper recycling rate**

Today app. 55 % of all paper is recycled in the EU, but a wide range of industries and organisations have joint forces in making a new declaration that targets a 66 % paper recycling rate by 2010. The new target covers all of 29 European countries: the 25 EU countries, the two new accession countries Romania and Bulgaria, as well as Norway and Switzerland. The objective is to increase the recycling rate by identifying an optimal collection system.

Furthermore there should be increased focus on waste minimisation and better quality in waste paper. Behind the declaration are a range of manufacturers and organisations covering all of Europe which have committed themselves to increasing their research in production processes and support higher public awareness in terms of paper recycling.

*Source: Euwid 20, 4 October 2006 no. 12: "New European declaration on Paper Recycling launched by industry."*

*More information: Recycling International, November 2006, s. 27. "New declaration targets 66 % paper recycling rate." (JTK)*

## **Recyclable carpets**

Great Britain's largest supplier of carpets for exhibitions, Reeds Carpeting, has developed a carpet that is 100 % recyclable. The carpets are developed for exhibitions and special events and are therefore disposable carpets.

Previously, the biggest problem in recycling was the underlining that consists of foam material, keeping together the threads. The new carpet does not need this lining.

Concurrently, the company has developed a method for producing polypropylene pellets of the worn out disposable carpets. The newly established recycling company, Reeds Carpet Recycling, expects that app. 2 million square metres will be recycled next year in their facility, giving around 800 tonnes of plastic pellets for resale. The objective is, over time, to avoid the annual landfilling of around 12 million square metres of carpets from exhibitions and special events.

**Source:** *Plastic and Rubber Weekly magazines:*

[http://www.prw.com/homePBP\\_NADetail\\_UP.aspx?ID\\_Site=818&ID\\_Article=15482&mode=1&curpage=20&m\\_pid=0&m\\_nid=9343](http://www.prw.com/homePBP_NADetail_UP.aspx?ID_Site=818&ID_Article=15482&mode=1&curpage=20&m_pid=0&m_nid=9343) . "Carpet recycling firm sets up in UK."

**More information:**

<http://www.polymercluster.co.uk/news.php?page=news&eventList=show&id=133>. "Green" carpet system launched.

Reeds Carpeting's homepage: <http://www.reeds-carpets.co.uk/> (JTK)

## Recycling of waste from solar cell production

A Norwegian company, Metalkraft, has initiated an extraction process of silicon carbonate and glycol from waste generated from production of solar cells. The method for extraction is developed recently and the company has applied for a patent on the technology. The ambition is to build two factories before end of 2008. Every year, around 90,000 tonnes of this type of waste is produced, and in principle everything can be recycled. The solar cell industry is witnessing rapid growth and therefore it is expected that these waste amounts will increase to app. 600,000 tonnes by 2010.

The idea is to extract silicon and glycol from sludge generated by thinly slicing the silicon. In this process, around half of the silicon is wasted. The extraction will reduce greenhouse gas emissions as well as energy consumption, and the extracted material can be resold to the solar cell manufacturers.

**Source:** *Dagens nyheter, www.dn.no. "Vil tjene millioner på solcelle-avfall."*

**More information:** *Miljøjournalen no. 10, 2006, p. 15. "Vil resirkulere solcelleavfall."*

(JTK)

**Waste incineration. A low-hanging fruit in reducing global warming**  
**Norway incinerates its pressure-treated wood**  
**Dioxins in solid residues from municipal solid waste incineration**  
**Maximum energy exploitation in waste-to-energy (WtE) plants**

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**Waste incineration. A low-hanging fruit in reducing global warming**

In an extended article the author strikes a blow for waste incineration. Although waste belongs to the lower middle class on the “social ladder of fuels”, where hydrogen is at the top followed by methane, fuel oil, coal and wood chips, while food waste is at the bottom, and although modern waste-to-energy plants are the most expensive power generators in the world, the incineration of waste can still bring in substantial environmental revenues. By incinerating waste and not landfilling it, the author concludes that waste incineration is one of the low-hanging fruits in reducing global warming

The article gives various overviews. In total 143 mill tonnes of waste are combusted per year, of which in tonnes/year: 49 in EU-25, 40 in Japan, 26 in the US, 7 in Taiwan, 4 in Singapore, 3 in China, 3.8 in Switzerland and Norway and 1 in South Korea. All other countries in total contribute with 9 million tonnes/year.

In the US 7.4 % of the waste is incinerated, while 64.1 % is landfilled. Only 28.5 % is recycled. Although eight times as much waste is landfilled as incinerated, the energy extracted from landfill gas only constitutes half of the energy produced in the 88 waste-to-energy plants around the country.

The article in particular emphasises Denmark as an example where common sense (“conventional wisdom”) has been allowed to reign. The plants are relatively small and well integrated in the district heating systems, and therefore they allow citizens to pay considerably lower disposal fees to the waste-to-energy facilities compared with the US.

In a special paragraph the advantages of combining a gas turbine and a WTE facility with a common steam turbine are emphasised.

**Source:** *Nickolas Themelis: Better together – Gas turbine cogeneration improves energy recovery from WTE plants. Waste Management World, July-August 2006, pp. 97-105*

**More information:** *The article can be obtained from the Waste Centre Denmark library, or from the author: [njt@columbia.edu](mailto:njt@columbia.edu)*

(SAD)

## Norway incinerates its pressure-treated wood

At the end of June 2006, the Norwegian Minister of Energy cut the first turf of what will become a facility for production of electricity and heat from contaminated residue wood. The facility is constructed by Solør Bioenergi Gruppen. It will be placed in Kirkenær (app. 100 km northeast of Oslo, ed.) and should be able to incinerate 25,000 tonnes/year. This will produce steam (450 °C/61 bar) that in a 2 MW steam turbine is transformed into 17 GWh/year electricity which will be transferred to the network, and 34 GWh/year heat that will partly be used for drying of wood chips and partly will be sold to nearby industrial clients.

Construction costs are estimated at 110 mill. NOK, of which 25 mill. NOK are set aside for flue gas treatment. The reception charge is estimated to be at the high side of 1000 NOK per tonne.

*Source: Johs. Bjørndal: Impregneret virke skal bli strøm og damp. Kretsløpet 4-2006, p. 12-13.*

*More information:* <http://www.sbgruppen.no/no/>

<http://www.gronnvarme.no/artikler/BGSol%F8r%E5pning280606.html> og

<http://www.enova.no/?itemid=4187>

(SAD)

## Dioxins in solid residues from municipal solid waste incineration

In an extensive article, the authors summarise existing knowledge on contents of dioxins and related compounds in the solid residues from municipal waste incineration plants. They conclude that there is a linear correlation between TOC and dioxin contents in the solid residues. But since modern incineration plants produce solid residue with TOC < 1 %, the dioxin contents is not much higher than in soil, and the residues can be immediately recycled without prior treatment.

Boiler and fly ashes contain considerably more dioxin and here post-combustion treatment processes could be relevant, unless the ashes are used, like in Germany, as filling material in salt mines.

In addition, the article contains data on the occurrence of PCB, chlorinated benzenes and phenols as well as PAH in the various residue products.

*Source: Vehlow, J., Bergfeldt, B. and Hunsinger, H.: PCDD/F and related compounds in solid residues from municipal solid waste incineration – a literature review. Waste Management & Research, 24 (2006) pp. 404-420.*

**More information:** From the article (found in the Waste Centre Denmark library) or from [vehlow@itc-tab.fzk.de](mailto:vehlow@itc-tab.fzk.de) (SAD)

### Maximum energy exploitation in waste-to-energy (WtE) plants

Where it was previously a matter of waste disposal, it is today just as important to exploit the energy inherent in the waste. How this happens depends on local conditions.

This article presents two examples of plants, Napoli and Rüdersdorf, which alone produce electricity and one, Århus Nord line 4, which produces both electricity and heat.

In Napoli they obtain a gross conversion efficiency rate of 31 % by using the steam parameters 500 °C/90 bar, while the facility in Rüdersdorf obtains the whole of 32.2 %. Here the fresh steam data is 420 °C/90 bar, but after being in the turbine's high pressure boiler the steam is transferred, now with the data 269 °C/25.4 bar, to a reheater where it is again heated to 420 °C before sent back to the turbine. The boiler efficiency rate is given as 85.7 and 88.3 %, respectively.

In Århus the boiler efficiency rate is as high as 92.2 %. The steam data is 400 °C/42 bar, and the gross conversion efficiency rate is therefore down to 23-24 %. On the other hand, the residue energy in the steam is used for production of district heating.

In addition, the article points to the fact that flue gas treatment and district heating pumps are in themselves consuming a significant amount of the produced electricity.

**Source:** Schäfers, W.: *MVA-Wirkungsgrade und das lokale Umfeld. UmweltMagazin, October-November 2006, pp. 53-55*

**More information:** From the author: [walter.schaefers@fisia-babcock.com](mailto:walter.schaefers@fisia-babcock.com) (SAD)

## Tracing leakages in synthetic landfill membranes Treatment of leachate in root zone systems

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### Tracing leakages in synthetic landfill membranes

Leakages in landfill membranes usually arise during the installation process. They can be split into leakages that relate to joining of membrane sections on location – welded joints etc. – and leakages that are actual perforations. The article briefly refers to commonly used techniques for identifying and locating leakages in joints, e.g. compressed air, ultrasound and thermography, but apart from that focuses on locating leakages in the membrane surface using geo-electric techniques.

The article refers to two different techniques that can be applied, partly to the uncovered membrane surface and partly after establishing a covering-/drainage surface over the membrane.

On the uncovered membrane the article describes a technique based on the occurrence of an electric potential difference between the ground under the membrane and a local, mobile “puddle” on the membrane. If water seeps through the membrane, a short-circuiting will take place and the leakage can be registered. It is mentioned that this method can identify leakages  $\geq 1 \text{ mm}^2$ .

On the covered membrane it is possible to apply a dipolar technique, where a potential difference is created between a measuring car on the surface and the ground under the membrane. Leakages are detected by electricity, flowing through the leakage, created by the potential difference. It is stated that the method can detect leakages  $\geq 6 \text{ mm}^2$ .

The article also refers to practical experiences in applying the method:

- By control directly on a 2 mm HDPE membrane, where quality control is carried out in connection with the installation, 3.2 leakages were identified per hectare; on a 1 mm membrane, 20.5 leakages were found per hectare by quality control during installation, and 31.5 leakages per hectare without such a quality control.
- By control of the covering layer for a 2 mm HDPE membrane, 15.6 leakages were found per hectare in case of quality control during installation, but only 0.2 leakages per hectare with such a quality control.

*Source: Waste Management World, March-April 2006. By Benoît Forget and Thierry Jacquelin (JKT)*

### **Treatment of leachate in root zone systems**

From a 22 ha landfill at Kalmar in eastern Sweden leachate was until 1997 discharged to the municipal wastewater treatment plant. The amount was app. 100,000 m<sup>3</sup>/year. In 1997 the landfill was uncovered and a new section of 7 ha taken into operation. From this section, leachate was treated in an on-site system consisting of three consecutive aeration dams with a total area of 6.8 ha, and then a root zone system of 10 ha planted with *Salix*. In the first aeration dam, the leachate is subjected to active aeration. Part of the treated leachate (no figure given) is sprinkled over three ha of the covered landfill. The annual amount is app. 150,000 m<sup>3</sup>. The root zone system is in operation from mid-April to mid-October.

In 2001 a test site of 400 m<sup>2</sup> was established within the root zone system to investigate the treatment efficiency on a site with full water balance control.

Test results from 2002 and 2003 show that

- The concentration of suspended matter, BOD<sub>7</sub> and total-P is reduced by 90 % or more in the root zone system;
- The concentration of total-N is reduced by more than 95 %, and practically all NH<sub>4</sub>-N is transformed into NO<sub>x</sub>-N; as a consequence of the latter, the NO<sub>x</sub>-N concentration in the system increases from 0.2 mg/l in the untreated leachate to 3-8 mg/l in the treated leachate.
- The heavy metal concentration in leachate is reduced already in the aeration dams, and the root zone system has no significant impact on this, except from iron and manganese. On the contrary, a concentration increase is found for some metals in the root zone system, but the authors ascribe this release of heavy metals to the construction phase; this is supported by the fact that concentrations decreased over time.
- pH, conductivity and concentration of chloride, sodium and potassium are only slightly altered in the system;
- The concentration of most organic substances is reduced by 85-100 % in the system; most substances are reduced by 99 %; for most substances a major part of the reduction is taking place in the aeration dams.
- Only exceptions to the above are - of the investigated organic substances - benzoquinon by 22 % and phthalates by 42 %.



The authors conclude that the aeration system plays the major role in the treatment system, and that the root zone system could be placed already after the second aeration dam, while the third could be a safety buffer that furthermore could serve as a quality “polishing” of the discharged leachate.

**Source:** *Waste Management & Research* 2006, vol. 24, no. 2, pages 183-194  
By Lars Thörneby, Lennart Mathiesson, Lennart Mårtensson and William Hogland (JKT)

## **In-vessel composting of food wastes**

### **Expected increase in global amount of food wastes**

### **How much does a biogas plant smell?**

### **Danish bio-ethanol plant inaugurated**

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## **In-vessel composting of food wastes**

University of Plymouth, UK has recently published a project on in-vessel composting of food wastes in South England. Two facilities have tested this way of composting: Somerset, where food and mixed green/cardboard wastes formed the feedstock, and Devon, where a single co-mingled food/green/cardboard mix was used.

The composted waste is filled into a sealed vessel where it is kept until a temperature of 60° C is reached for a period of 48 hours. Ventilation in this period happens through canals in the bottom of the vessel. Then the feedstock is moved to another vessel where the process is repeated. Finally, the material is placed in windrows and turned regularly for a period, and then screened and used. Oversized material is returned to the composting cycle.

Composted food wastes met all requirements in the British certification system (PAS 100) and the adoption of the animal bi-product regulation. The tests showed that a careful management of composts after the in-vessel stages is necessary to ensure safe control of *E. Coli* contents.

Food wastes feedstock contained higher concentrations of nitrogen and phosphor than waste consisting of mixed green waste and cardboard.

Cardboard was the most dominant physical impurity in the composted food waste, and the cardboard was not decomposed sufficiently during the three-month composting cycle to meet the PAS 100 requirements. In addition, it seems that large amounts of cardboard have a nutrient-diluting effect in the composting. The combination of these two qualities means that cardboard mixed with food waste or green waste cannot be recommended for composting. Cardboard must be collected and recycled separately. Likewise, it is recommended that plastic is sorted from the food wastes before composting.

Market surveys etc were carried out in the region. 500 businesses were contacted regarding their views on either using or selling compost. 33 % of the issued questionnaires were returned. 71 %

would consider selling or using composted food wastes (e.g. all golf courses would use compost). In addition, 77 % of arable enterprises, 61 % of livestock enterprises and 63 % of vegetable growers would consider using these composts. The majority of respondents were aware that food wastes should be composted, but were at the same time concerned over contents of potentially harmful and toxic elements in the wastes.

**Source:** "In-vessel composting of food waste", *Warmer Bulletin*, 106, September 2006.

**More information:** The report "Organic waste treatment using novel composting technologies" can be found on [www.science.plym.ac.uk](http://www.science.plym.ac.uk). For further information, please contact Mr. Richard Shepherd, University of Plymouth, E-mail: [RAShepherd@plymouth.ac.uk](mailto:RAShepherd@plymouth.ac.uk) (SOLUM/LJT)

### **Expected increase in global amount of food wastes**

The amount of food wastes ending at landfills will increase dramatically over the next 20 years unless global practices are changed. This increase is due to increased welfare and migrations from rural to urban areas.

The development will lead to increased methane emission *per year* in various countries of 1-4 % and cause many other negative impacts. Two alternative scenarios are outlined: That populations are motivated to stay in the country and compost organic waste, and that urban organic waste is at the same time bio-digested.

In scenario 1, methane emission from landfills can be maintained at the same level as today in Europe, while an increase will take place in Africa, Asia and America. This means that the emission of methane from landfills will be maintained at the present 8 % of total methane emissions.

In scenario 2, the emission from landfill can be reduced so that the landfill share of total methane emission is reduced to 6 %. The scenarios will also reduce the emission of leachate from landfills considerably and scenario 2 furthermore brings energy from the waste.

The article is based on specific growth prognoses for GNP and population growth in a wide range of countries across the globe, as well as experiences with side effects from migrations and welfare increase. On this basis the article discusses mechanisms and tendencies in Africa, Asia, America and Europe. The article does not go into detail with many other effects from source sorting

and increased recycling, but illustrates the correlation between waste, economic growth and developments in society.

*Source: Adhikari, B.K. and Barrington, S. and Martinez, J. Waste management & Research 2006: 421-433 (SOLUM/MB)*

### How much does a biogas plant smell?

Obnoxious smells from biogas plants under normal operations can be avoided, and odour emissions from accidents can be minimised. This is presented in a new report from PlanEnergi, prepared by the Danish EPA.

11 common biogas plants have been visited. 10 of these plants treated the extraction air from the buffer tank and sometimes also from the reception area through varying types of bio-filters. A well-functioning bio-filter removes 90-99 % of the odour.

Odour can be prevented by constant low pressure in the reception area, buffer tank and other places with odour potential.

Industrial waste should be received at the plant in liquid form in a closed system in order to reduce the risk of obnoxious odours.

*Source: FiB – Forskning i Bioenergi, 3<sup>rd</sup> Year, October 2006, p. 4-5, Torben Skøtt. "Hvor meget lugter et biogasanlæg?" (SOLUM/LJT)*

### Danish bio-ethanol plant inaugurated

The so-called Maxifuel plant at the Technical University of Denmark was inaugurated on 13 September 2006. The pilot plant is the result of a close cooperation between public research and industry.

Maxifuel is a 2<sup>nd</sup> generation plant, using complicated processes to decompose fibrous residue products such as straw. In the plant the biomass is subjected to pre-treatment, after which enzymes are added and two fermentation processes take place, producing ethanol and hydrogen. Wastewater is treated in a biogas plant and the fibre mass is converted to fuel pellets.

The plant can convert 1000 kg of straw into 310 litres of ethanol, 70 m<sup>3</sup> of methane gas, 20 m<sup>3</sup> of hydrogen and 230 kg fuel pellets. In a full scale plant, the production price for 1 litre of ethanol will be around 2.35 DKK (~ 0.32 EUR)

*Source: FiB – Forskning i Bioenergi, 3<sup>rd</sup> Year, October 2006, Torben Skøtt.*

*More information: BioGasol is a Danish technology industry within sustainable energy. [http://www.biogasol.dk/4m1\\_20060913.htm](http://www.biogasol.dk/4m1_20060913.htm)*

*(SOLUM/LJT)*

## **Research results from the US show that scrap car tyres can be used for wastewater filtering**

**Hand in your old car and receive a 500 EUR gift voucher!**

**The responsibility for treatment of end-of-life-vehicles for dismantling in Norway belongs to the car industry from 1 January 2007**

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## **Research results from the US show that scrap car tyres can be used for wastewater filtering**

Every year the United States produces millions of scrap tyres that clog landfills and become breeding areas for pests, and it is therefore a continuing challenge to find adequate use for cast-off tyres and illegal dumping has become a serious problem throughout the country.

After years of research, Professor Dr. Yuefeng Xie at Penn State University, Harrisburg, has found a method where crumb rubber from waste tyres can be used as filter material in the treatment of wastewater, ship ballast water and storm water. One of the problems of traditional wastewater filtering by using sand or anthracite as a medium is the clogging from particles in the filter. Several studies show that filtering with crumb rubber is far more efficient. With a considerably higher filtration rate and lighter weight in comparison to sand or anthracite, there are also good possibilities for using the filter in mobile treatment units, for instance for treatment of water in disaster relief operations. Professor Xie holds a U.S. patent on the technology.

**Source:** *Solid Waste.com*, 17.11.2006. "Scrap tires can be used to filter wastewater".

<http://www.solidwaste.com/content/news/article.asp?docid={ff0c2faf-4357-4aeb-bd28-6e3da5747ae5}>

**More information:** *Penn State University:*

<http://www.psu.edu/ur/2006/crumbtire.html>

(EMD)

## **Hand in your old car and receive a 500 EUR gift voucher!**

In Finland, 100,000 - 140,000 scrap cars are dismantled every year. Only 20 % of these pass through the official ELV (End-of-life-vehicle) recovery system at official ELV collection points. Finnish car dealers have therefore launched a new campaign in order to encourage delivery of end-of-life-vehicles to be recycled in licensed scrap yards for safe dismantling. By delivering old cars for dismantling through official collection points, an 85 %

recycling rate of car material is guaranteed.

To encourage car owners to join this scheme, the last owner of the car will receive a 500 EUR voucher that can be used when buying a new car. If you buy a used car, the voucher is for 200 EUR.

The average age of private cars that are dismantled is 18.3 years, and there are still some 700,000 cars in Finland without catalytic converters. Although these cars constitute less than 30 % of all cars, they are responsible for 74 % of the NO<sub>x</sub> emissions.

**Source:** *EEP Newsletter, no. 6, November, 2006. "FI: Campaign for recovery of End-Of-Life-Vehicles."*

**More information:** *Uusiouutiset, Finnish Recycling News:*

*<http://www.uusiouutiset.fi/english.htm>*

(EMD)

### **The responsibility for treatment of end-of-life-vehicles for dismantling in Norway belongs to the car industry from 1 January 2007**

With 110,000 collected cars annually, Norway today has one of the world's best collection systems for end-of-life-vehicles. The responsibility for collections is from New Year passed on from the State to the actual car industry. This means that all importers or car manufacturers are responsible for the collection and environmentally safe treatment of end-of-life-vehicles. The Norwegian State Contamination Inspection (SFT) is responsible for supervising the scheme.

The car industry has established two recycling companies, both approved by SFT. Most importers and car manufacturers have joined forces in the establishment of one company, Autoretur. Norway's Car Collection Association ("Biloppsamleres Forening") has established the company Bilretur. The old system with a state paid scrap premium will still apply.

However, the continuation of the scrap premium scheme has led to some critique from the car business. They believe that a continuation of this scheme will lead to obstacles for the two branch-related recycling companies in entering agreements with car collectors- and dismantlers. This again will threaten the quality in car dismantling, when the operators can still operate independently and receive end-of-life-vehicles.

**Source:** *Statens ForurensningsTilsyn (SFT): "Overfører ansvaret til bilbransjen". [http://www.sft.no/artikkel\\_\\_\\_\\_39769.aspx?cid=10617](http://www.sft.no/artikkel____39769.aspx?cid=10617) Kretsløpet no. 5, 2006, p. 12-13. "Forlengelse av statslig vrakpant hindrer produsentansvar for biler."*

**More information:** *Statens ForurensningsTilsyn (SFT):*

*[http://www.sft.no/artikkel\\_\\_\\_\\_39826.aspx?cid=10617](http://www.sft.no/artikkel____39826.aspx?cid=10617)*

(EMD)

## **New green Norwegian technology for impregnation of timber**

### **Implementation of the battery directive is well under way in many countries**

### **Swedish deregulation of hazardous waste from industries**

### **Increased export of hazardous waste from Germany due to landfill ban**

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## **New green Norwegian technology for impregnation of timber**

Norway has developed new technology for treatment of timber. The technology is based on natural products extracted from sugar canes and corncobs and is developed by the company Wood Polymer Technologies. They can produce two kinds of Swan Label tree: VisorWood and Kebony, where one is impregnated pine and one is impregnated hardwood. Traditionally, the timber is treated with CCA (chrome, copper, arsenic) which causes severe negative impacts on the environment and human health.

Apart from VisorWood and Kebony, there are other new and more environment-friendly alternatives to CCA treatment, such as the special “ore pine” that has a natural impregnation due to its naturally high content of resin. Also, the product Polywood has been on the market for a number of years. Polywood consists of a mix of 60 % recycled plastic and 40 % wood fibres. The product is made by Polyfiber AS. VisorWood and Kebony have the same qualities as traditional CCA-treated wood, whereas Polywood does not have the same durability because of the plastic’s tendency to deform over time.

*Source: Teknisk Ukeblad: <http://www.tu.no/energi/article61927.ece>  
<http://www.tu.no/nyheter/bygg/article55214.ece>*

*More information: Wood Polymer Technologies:*

*<http://www.wpt.no/index.cfm?cat=miljo&CatID=96&MCatID=96>*

*Skog og landskap:*

*<http://www.skogforsk.no/news/default.cfm?act=displaynews&news=112>*

*Aftenposten: <http://forbruker.no/bolig/article412705.ece>*

*Ingeniøren: <http://ing.dk/article/20061101/BYGGERI/111030024>*

*Svanemærket: <http://www.ecolabel.no/cgi-bin/svanen/imaker?id=5250>*

*Polywood: <http://www.polywood.com/> (TOK)*

## **Implementation of the battery directive is well under way in many countries**

In September 2006 the long waited EU battery directive was finally passed, which means that the member states must before September 2008 implement their collection schemes etc.

Germany has established a nationwide company for battery collection (GRS - Stiftung Gemeinsames Rücknahmesystem Batterien), which has already obtained a collection rate of 37 %, above the 25 % required by the directive by 2012. However, there is still a way to go before the 45 % requirement for 2016 is reached. In Europe the treatment capacity for battery recycling is mainly found in France (43 %), Germany (25 %) and to a lesser extent Belgium, Switzerland, Austria, Sweden and Spain. Sweden also has a well established battery collection system that is quite advanced in relation to the EU directive requirements. Among other things Sweden has established a central homepage where citizens can search in 10 different languages for local information on handling of batteries.

**Source:** *Umweltmagazin 2006-10-11. „Deutschland gut gerüstet für neue Batterierichtlinie.“*

[http://www.technikwissen.de/umwelt/news.php?data\[article\\_id\]=32156&kep\\_alive=yes&pos=](http://www.technikwissen.de/umwelt/news.php?data[article_id]=32156&kep_alive=yes&pos=)

**More information:** GRS Batterien: <http://www.grs-batterien.de/> &

<http://www.segmenta.de/forum2006/content.htm>

*RVF-nyheterna nr 14/06 – 9. oktober:*

[http://www.rvf.se/m4n?oid=1556&\\_locale=1](http://www.rvf.se/m4n?oid=1556&_locale=1)

*Svensk batteriindsamling:* <http://www.batteriinsamlingen.se/>

(TOK)

## Swedish deregulation of hazardous waste from industries

In Sweden, the municipal monopoly on hazardous waste from industries disappears. Already in 1994 the general municipal responsibility for industrial hazardous waste was abandoned, although still with the possibility for the municipality to create a monopoly through special regulations. This possibility is abandoned on 1 July 2007 by a revision of the waste order. About one third of Swedish municipalities have established such a control with hazardous waste and have thus controlled around 40 % of industrial hazardous waste. The Swedish waste association Renholdningsverksforeningen (RVF) is worried about possible environmental impacts from this deregulation and believes that the Swedish EPA (Naturvårdsverket) should establish a national system for control of hazardous waste streams from industries. RVF estimates that in 2004 approximately 180 companies treated or landfilled 1.1 million tonnes of hazardous waste from industries.

**Source:** *RVF-nyheterna nr 16/06 – 10. november:*

[http://www.rvf.se/m4n?oid=1594&\\_locale=1](http://www.rvf.se/m4n?oid=1594&_locale=1)

**More information:** *Pressemeddelelse fra regeringen:*

<http://www.regeringen.se/sb/d/7929/a/72165;jsessionid=aM5hlyZy1e6g>  
Naturvårdsverket:

[http://www.naturvardsverket.se/index.php3?main=/dokument/teknik/avf\\_s  
tistik/sifavfdok/farligt.htm](http://www.naturvardsverket.se/index.php3?main=/dokument/teknik/avf_s<br/>tistik/sifavfdok/farligt.htm) (TOK)

### **Increased export of hazardous waste from Germany due to landfill ban**

After more than 10 years of increase in import of waste liable for notification to Germany, the curve has been broken so that the import of hazardous waste is decreasing, while export increases. It is assessed that this change is caused by the introduction of a landfill ban in Germany for untreated waste. Among other, the import of industrial waste from Holland has been reduced as a consequence of changes in the landfill act. A large part of the export increase in waste for treatment goes to Holland, Belgium and Switzerland. However, there is also a large export of waste for treatment in Polish concrete incinerators and cable waste for China.

**Source:** *Umweltmagazin 2006-10-06:*

[http://www.technikwissen.de/umwelt/news.php?data\[article\\_id\]=32108&kep\\_alive=yes&pos=](http://www.technikwissen.de/umwelt/news.php?data[article_id]=32108&kep_alive=yes&pos=)

**More information:** *Statistics from Umweltbundesamt:*

<http://www.umweltbundesamt.de/abfallwirtschaft/abfallstatistik/index.htm> (TOK)

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*Colophon:*

International WasteNews No. 6/2006  
Technology screening of the international waste management and  
product sector. (Translation of the Danish newsletter  
"Internationalt AffaldsNyt" ISSN: 1601-2852)

*Produced and published by:*

Waste Centre Denmark · Teknikerbyen 35 · DK-2830 Virum  
Tel.: +45 70 21 80 30 · Fax: +45 70 21 80 31  
Mail: [info@wasteinfo.dk](mailto:info@wasteinfo.dk) · Web: [www.wasteinfo.dk](http://www.wasteinfo.dk)

*Editor-in-chief:* Birgit Holmboe

*Editor:* Eva Himmelstrup Dahl

*Articles for this issue have been prepared by:* Birgit Holmboe  
(BIH), Torben Kristiansen (TOK), Janus Torsten Kirkeby (JTK),  
Simon Graasbøll (SIMA), Søren A Dalager (SAD), Jens Kjems Toudal  
(JKT), Lis J. Thodberg (SOLUM/LJT), Morten Brøgger (Solum/MB) og  
Eva Himmelstrup Dahl (EMD).

*Translation:* Nanna Malene Schultz, Rambøll

International WasteNews is published in electronic form only.

Acknowledgement must be made for any article reproduced.

*ISSN: 1603-855X*