

IEA BIOENERGY

## **Task 36**

# **Integrating energy recovery into solid waste management: Trends in IEA countries**

Vancouver 24<sup>th</sup> August 2009

# Task 36

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**Participating nations: Canada, EU, Germany, France, Italy, Netherlands, Norway, Sweden, UK**

**Aim of Task period – Report on integrating energy recovery into solid waste management systems for **policy makers****

## **Presentations:**

- Pat Howes – Current waste management and future trends
- Timo Gerlagh – Effective policy measures to improve energy generation from non-recyclable waste.
- Judith Bates – Life cycle analysis of options for waste management

# **This presentation**

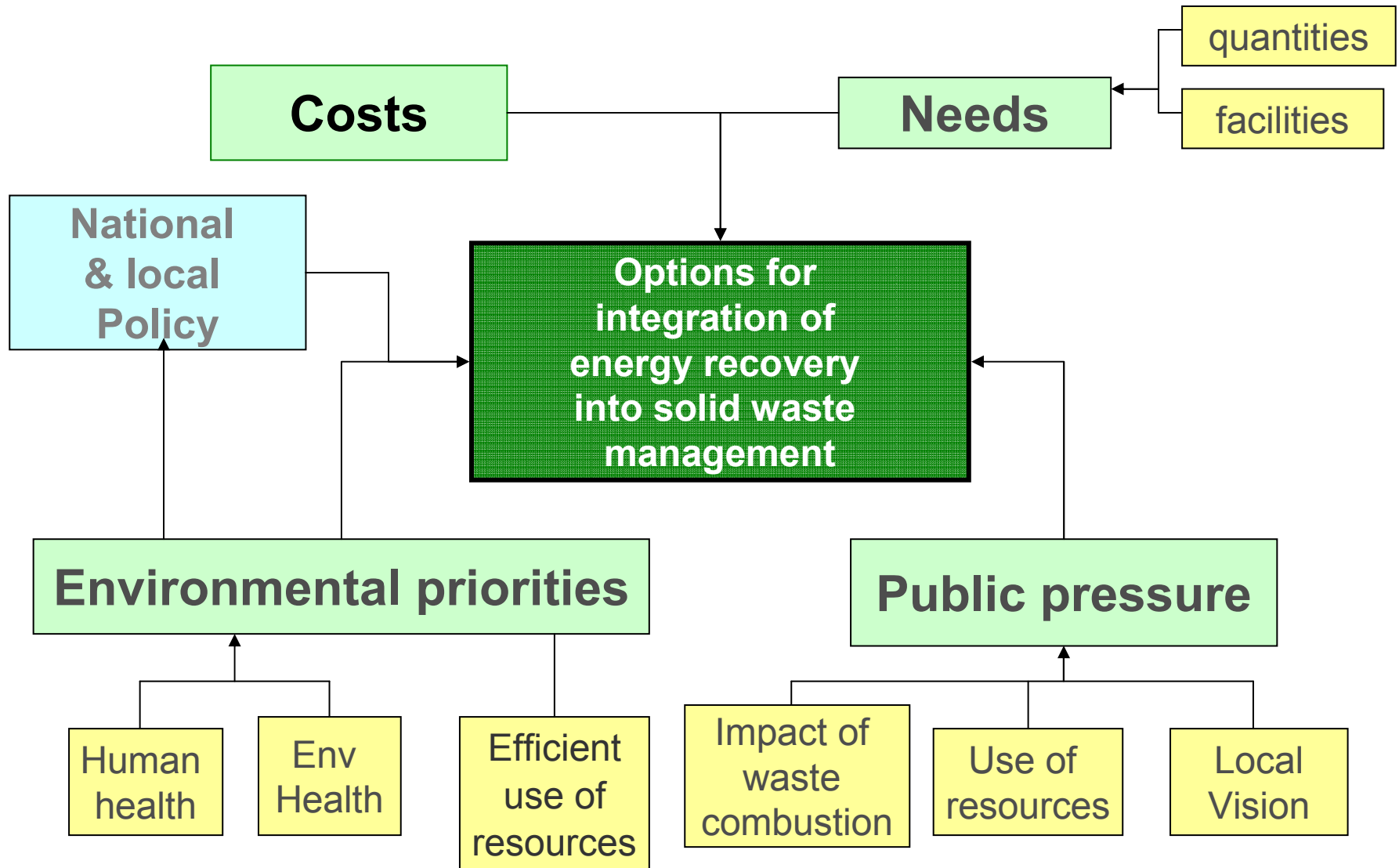
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**Background on integration of energy from waste in the participating nations**

**Trends – past and future**

**Example – MBT integrated with energy recovery**

# Background – factors influencing EfW options at local level



# Background – Policy

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## **Waste policy** – dictates priorities for waste treatment and disposal

- EU – Waste hierarchy (EU Waste Framework Directive) requires prevention, re-use and recovery before treatment and disposal. Norway has adopted similar hierarchy.
- Canada – Policies set at Province, territory and national level; some regions emphasise recycling and prevention; others emphasise cost-effective waste treatment and disposal. National targets set by Canadian Council of Ministers of the Environment. Emphasis is on diversion and reduction, reuse, recycling and recovery.
- EU – concern is lead by unintended consequences of land filling e.g. leachate pollution of ground water and methane production.
- Canada and Norway – remote, less populated areas need different solutions to cities and highly populated regions.

## **Energy from waste policy** – dictates emissions limits

## **Renewable energy policy** – support emphasises biodegradable fraction of waste

# Waste management practice in EU - 2006

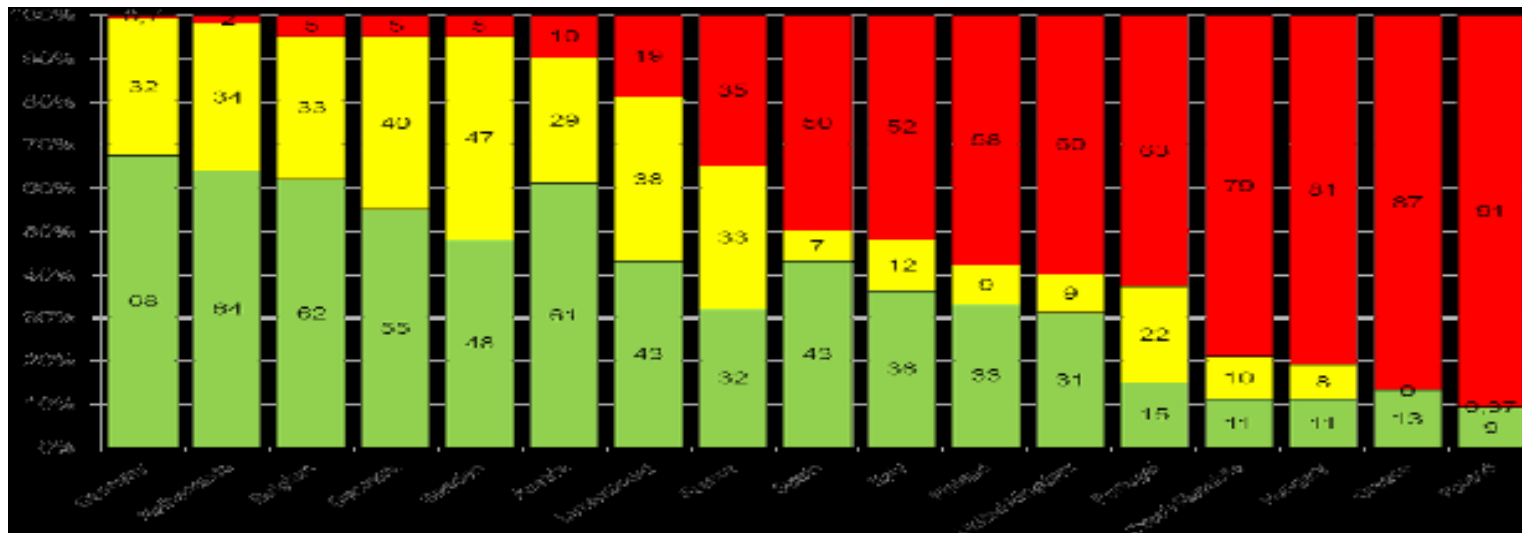


Figure courtesy CEWEP.

- Recycling is high in some countries – and frequently EfW is also high in these countries.
- Landfilling dominates others
- Recycling is increasing across the EU.

# Background – Current Practice

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## North America

Landfill dominates; low level of EfW in most areas – driven by cost of waste disposal.

USA: National emphasis on integration of waste with biofuels production. State level policy differs widely.

Canada: first demonstration of biofuels from waste

# EfW – Technical options

Option	Commercial status	Conversion efficiency	Cost	Size kt/y
Incineration	Commercial	★ ★	★ ★	40-800
MBT+ incineration	Commercial	★ ★	★ ★	
Advanced Thermal treatment	Demonstration /commercial development	★ ★	★ ★	50-125
Landfill	Commercial	★	★	
AD	Demonstration /commercial development	★	★ ★	



# Estimated costs of EfW

Size	Defra (2007) £M	Defra £/t	EU Topic centre on waste (2002) €M	Eu €/t
25,000t/y	9	360	(8)-15	(320)-600
50,000t/y	12 (40,000t/y)	300	35	700
80,000t/y	19	238	60	750
100,000t/y	17	170		
200,000t/y	50 (600,000t/y)	83.3	90-100	450-500

EU topic centre data includes integration of waste management and energy plants.

# Trends in waste production and management

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**Waste production:** F, D and UK report decreased or stabilised production.

**Separate collection:** F, NO and SE report increased levels; NL and Germany report stabilised levels. A4

**Energy from Waste:** F, D, UK, NO and SE report increased levels

**Landfill:** All nations report decreases in LF of biodegradable waste; NL reports decrease in combustible waste to LF as well.

## Slide 10

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**A4**

NL say recycling has remained stable over the past 10 years.

Add Germany into recycling, do on per capita basis and say separately collected for recycling rather than recycling.

AEA-Technology, 03/07/2009

## Future Trends - EfW in 2020?

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From National representatives by 2020:

1. Less biodegradable (and combustible?) waste to landfill
2. Most countries will continue to produce waste at current or greater levels.
3. EfW will expand, but the level is not clear, as there is much public opposition.
4. Heat is likely to play a greater role, but there are barriers in most countries.
5. AD is likely to play a greater role in Europe

# Results - Future trends

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## European targets

- EU data – want decoupling of MSW growth from GDP growth.
- Across EU high targets for recycling (50% by 2020 for UK)
- Diversion of waste from landfill will continue
- WFD will encourage carbon efficient resource recovery.

## Canadian targets

- Diversion of waste from landfill

# **MBT: Example of issues facing policy and decision makers**

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## **MBT: Mechanical Biological treatment**

**Option allows for maximum separation of recyclables in association with source separation, followed by biological treatment of organic residue**

**Provides recycling and, if anaerobic digestion is used, energy from biogas**

**Residue from recovery plant can be used as a fuel**

**Best of all options.....**

**But**

# MBT - issues for policy makers

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## What happens to the residue from the biological treatment plant?

This rarely has a market and often has to be land filled at increasing cost.

## Second residue from MBT plant: 'solid recovered fuel' (SRF).

Options for SRF (depending on market price):

- Co-combustion (e.g. in cement kilns)
- Co-firing (e.g. at power stations).
- Stand alone combustion

### Composition of SRF

- Typically mixture of paper, wood and plastics
- CV: 11-18MJ/kg
- Important trace components: Cl, Br, Pb, Zn, Al and metal particles and glass. (Cl can be 1-2%wt)
- Lower bulk density than conventional fuel.

# SRF

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## German and UK experience

- **Cl can cause corrosion – often blends of SRF are kept to less than 10% to minimise this issue**
- **Increased fly ash production**
- **Increased cleaning.**
- **German co-firing on power stations burning suitable coal. UK power stations cannot burn SRF without considerable modification.**
- **Cement industry has had good experience of SRF**



# German experience

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2006 – 64 MBT plants: capacity – 6.1Mt

2006 – 52 MBT plants in operation

2006 production of SRF: 2.4Mt from MSW and 4.2Mt from commercial and light industrial waste

Use of SRF:

	SRT throughput in mill. Mg
power plants	0.5
cement kilns	2.0
paper industry	1.4
steel industry	0.1
lime kilns	0.2
total	4.2

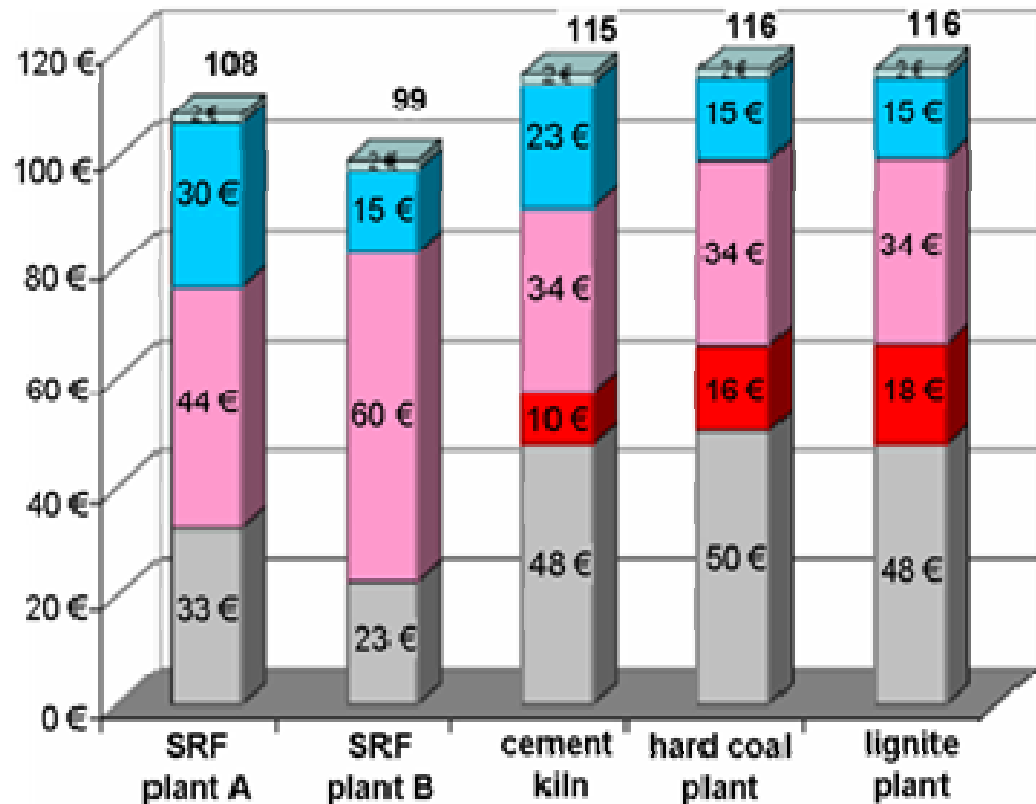
2006 - 0.47Mt capacity in dedicated SRF combustion and a further 2.9Mt capacity in planning.

A number of the planned plants have since been cancelled.

# SRF – barriers to use

Trace components that cause issues in combustion

Cost (main barrier)



production

payment low calorific SRF

landfilling of residues

payment high calorific SRF

residue treatment in MSWI

# What will task do in future?

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**Examine how EfW fits into more sustainable waste management – including policies to encourage the use of heat and the determination of the biogenic content of waste.**

**Examine how EfW plants can be managed to ensure that there are fewer issues with emissions/residues.**

**Emerging small scale EfW plants**

**Life cycle assessment of options for waste management**



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**Pat Howes**

**Pat.howes@aeat.co.uk**

**Tel: +44(0) 870 190 6151**