

Energy from waste, one step further



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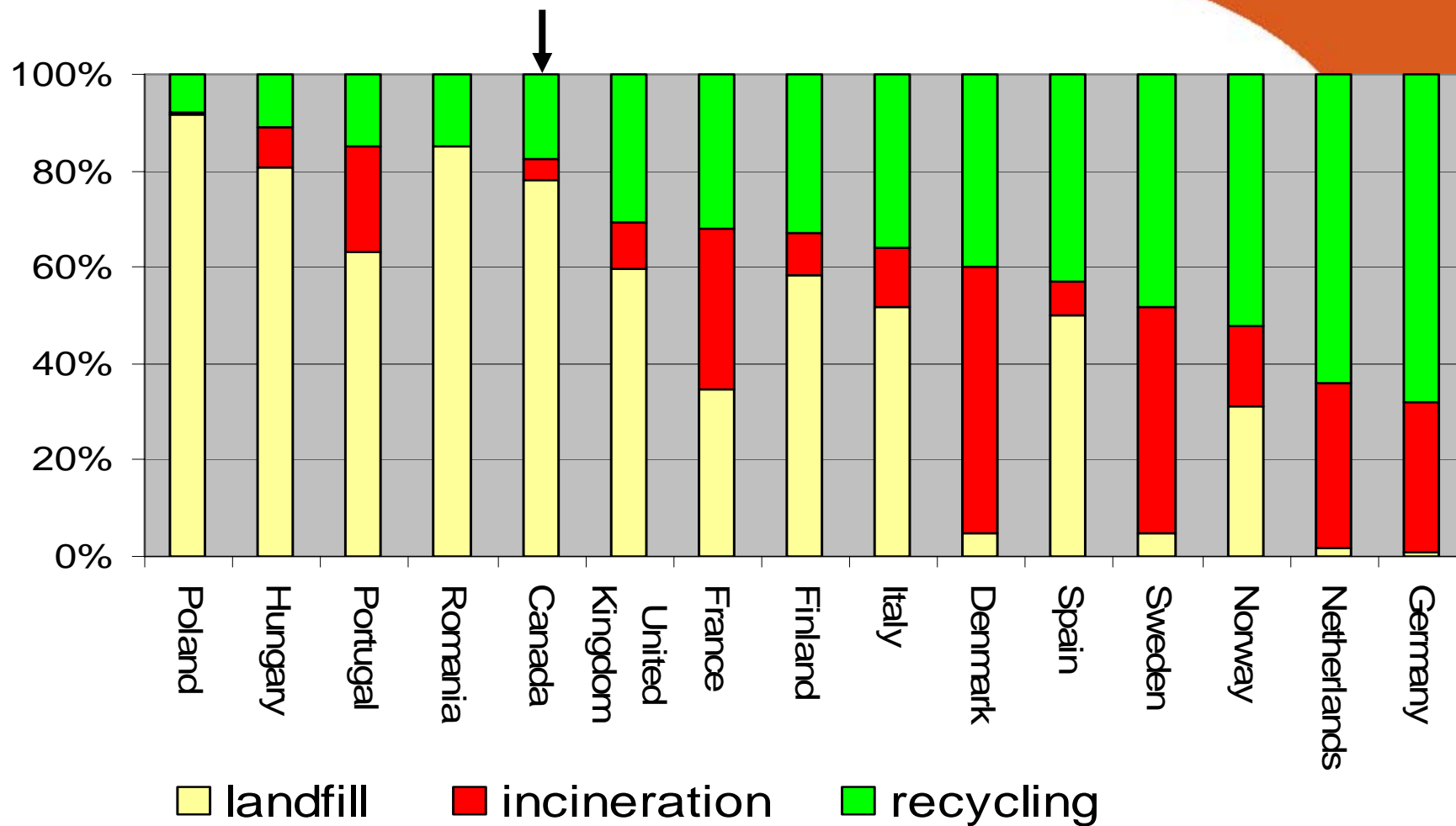
In opdracht van



Which waste-to-energy policy is effective?

- Different policies leading to different outcomes?
- Barriers and drivers for energy from waste?
- Workshop April 2008
- Define different circumstances and how to come one step further.

Treatment of MSW in Canada and EU (2006)

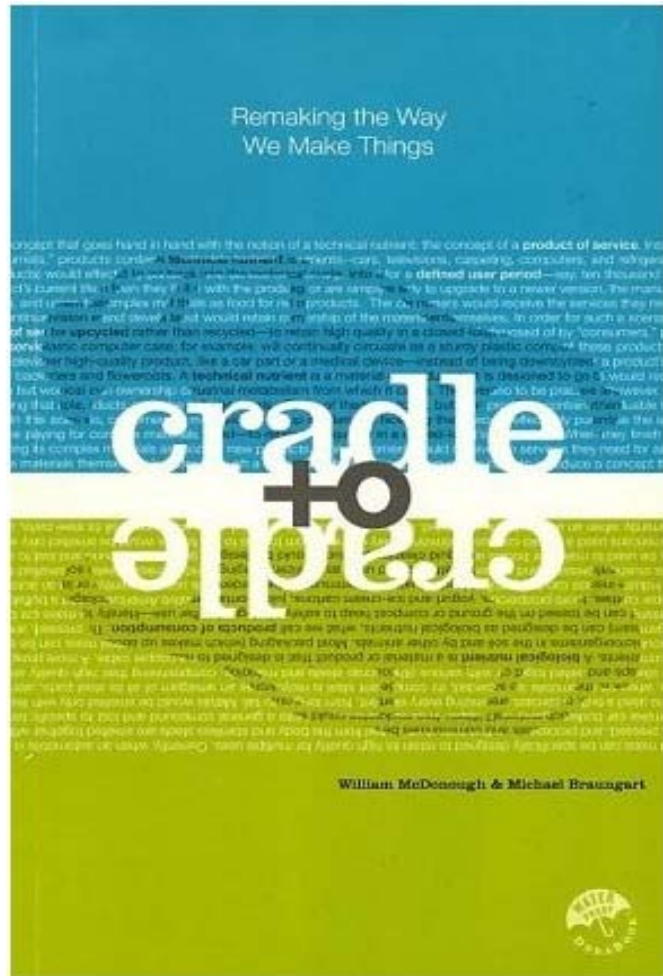




What does influence energy from waste?

- **Policies**
 - Environment, Landfill ban
 - Energy, Energy saving, Efficiency improvement, More renewables
 - Renewable Energy, recognition as renewable
 - Spatial Planning, heat distribution systems available
 - Innovation
- **Geographical situation**
 - Options for heat delivery
- **Cultural Aspects**
 - Centralised / decentralised
 - Social or individual orientated
- **NGO-position**

NGO's and public acceptance

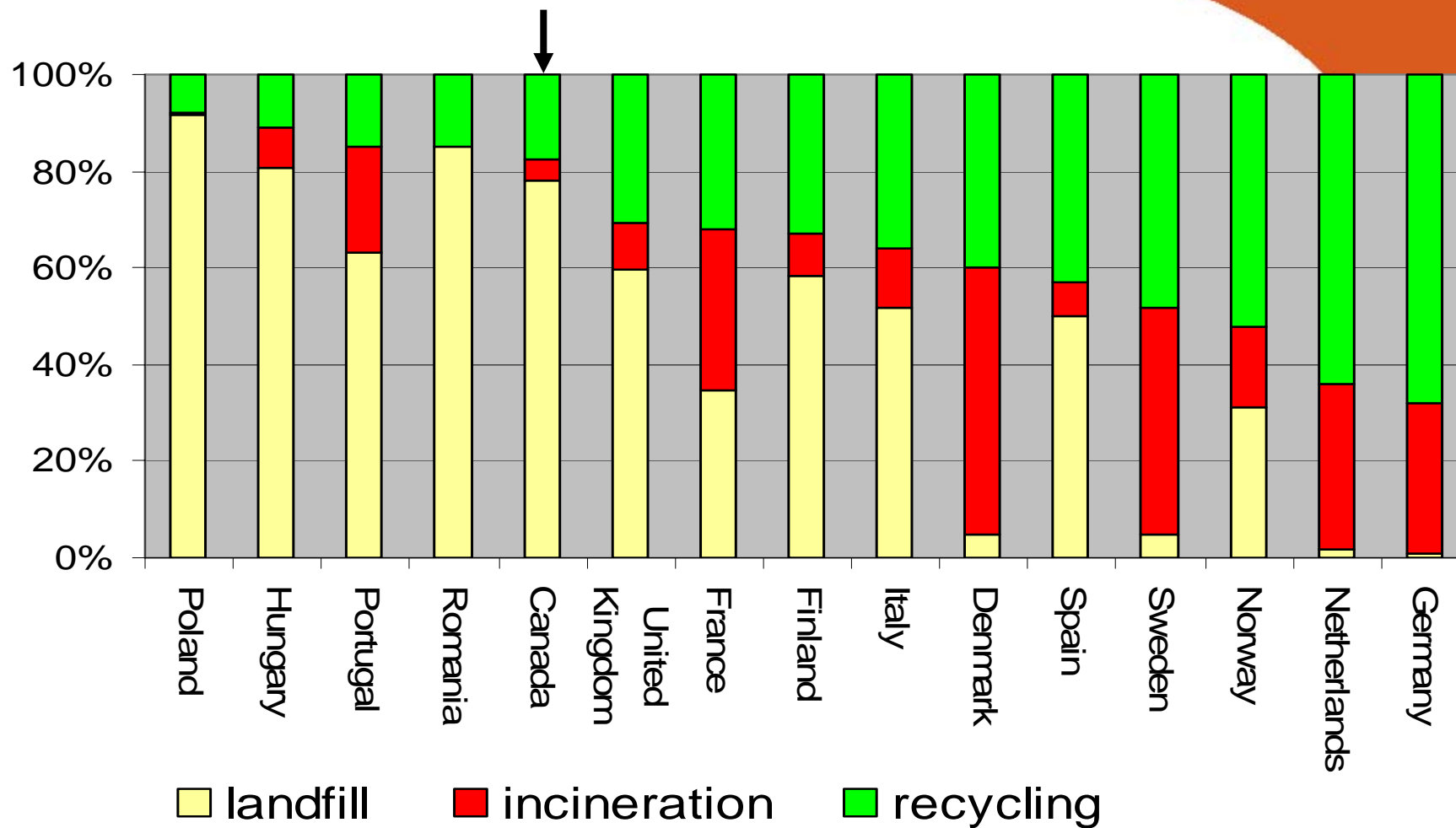


- The ideal world has no waste (incineration)
- Keep the debate open
- Show WtE does not obscure the ultimate goal of a sustainable society

Results country comparison

Country	Combustible, non-recyclable MSW		Energy recovery	
	Mt/year	Incineration	Electricity	Heat
Germany	15.1	98%	11%	33%
France	20.3	55%	6%	16%
Netherlands	5.9	93%	14%	13%
Sweden	4.3	95%	10%	86%
United Kingdom	20	17%	13%	4%
Norway	1.7	35%	7%	92%
Canada	9.2	6%	7%	28%

Treatment of MSW in Canada and EU (2006)





Comparing country data

- | | |
|---|--|
| <ul style="list-style-type: none">• non-recyclable combustible waste currently incinerated (%) <hr/> <ul style="list-style-type: none">• Is all landfilled MSW available for waste incineration?• Does landfilled MSW include inert ?• Which waste is included in the landfill statistics?• => high estimate | <ul style="list-style-type: none">• Energy recovery (%) <hr/> <ul style="list-style-type: none">• Energy content waste not known• Heat not always measured• Steam is considered as heat• Own use for electricity is not considered |
|---|--|



4 Stages in development energy from waste

- 1: Proper landfilling and material recycling
 - Low % incineration, almost no energy recovery
- 2: Electricity production
 - Increasing incineration, low energy recovery
- 3: CHP development
 - High incineration, increasing energy recovery
- 4: Innovation
 - Use innovative technology for the optimising energy production
 -

Development stage 1:



- Main driver: waste policy, climate policy
 - away from landfilling and landfillgas emissions, landfill ban
- Planning required, obey waste hierarchy
 - Prevention, recycling, energy from waste, incineration, landfill
- consider the arguments against incineration
 - Provide open information!
 - Consider other solutions and their benefits to the environment
 - Use Best Available Technology



Example of technology information [WRATE]

• Technology	Potential energy recovery
• Incineration (electricity)	25%
• Incineration (CHP)	40%-95%
• MBT biodrying/separation	15%-60%
• MBT anaerobic digestion/separation	15%-30%
• MBT stabilisation for landfill (lim. SRF-production)	8%-15%
• Landfill	6%

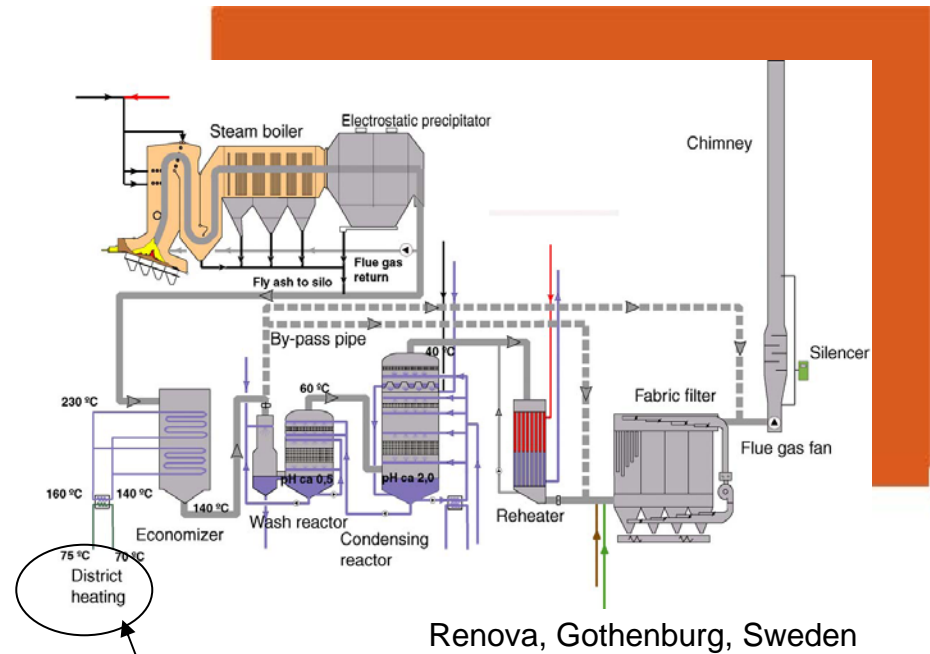
Stage 2: Electricity production

- Emphasis on improving the energy efficiency
 - Energy policy is increasingly important
 - Focus on electricity
 - Landfill ban and good recycling systems are established
- Energy production of limited interest
 - Energy income only 20% of the benefits
- Overall: limited energy production



Amsterdam WtE-plant

Stage 3: CHP



- Energy production part of MSW-I policy
 - Energy policy focused on maximisation energy production
 - Spatial Planning important for heat delivery
- Barrier: Remote locations
 - Waste policy could lead to locations without heat demand

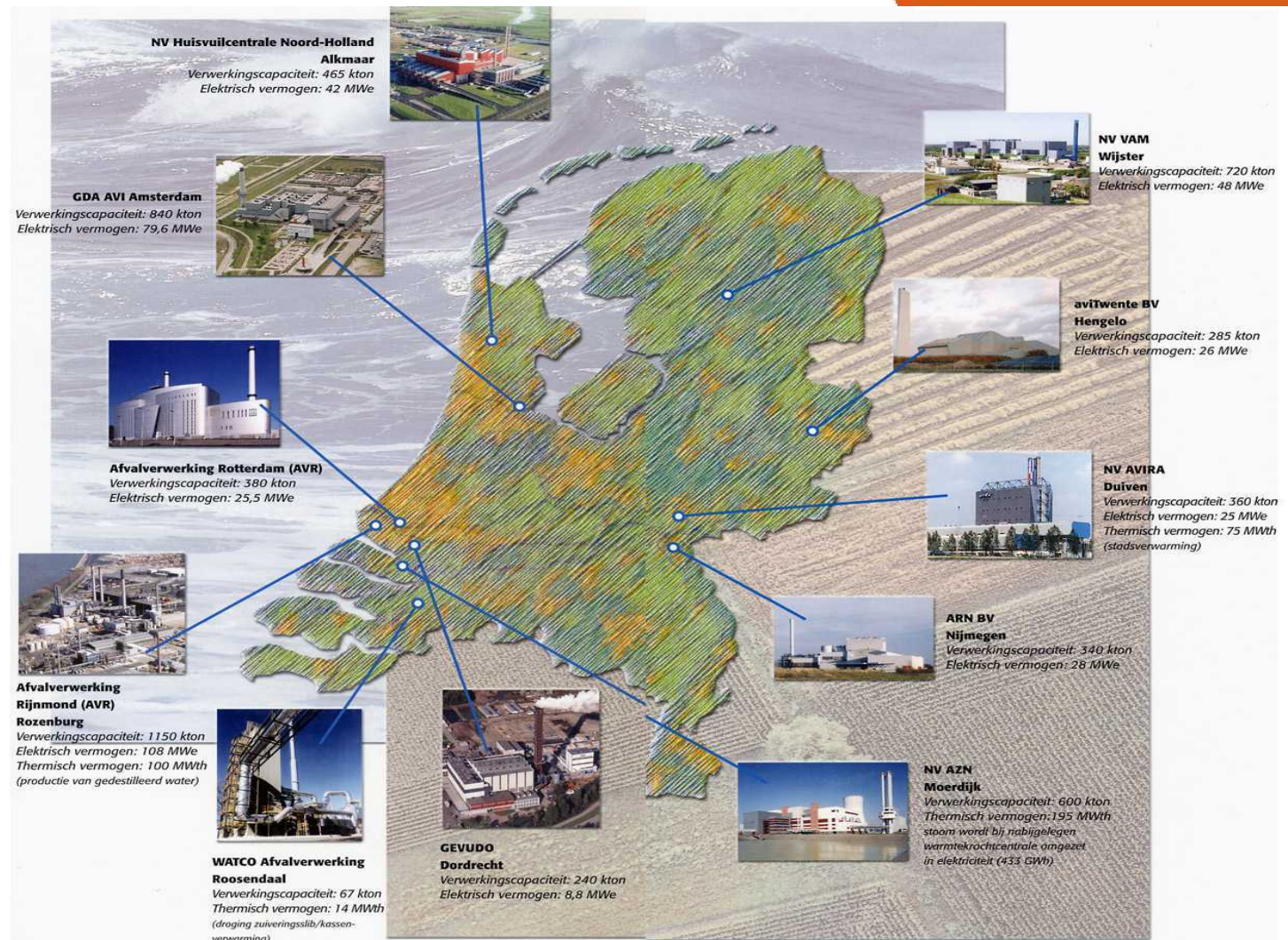
Chosen locations could be a problem for CHP

Afvalverbrandingsinstallaties
in Nederland

Waste to Energy Plants
in the Netherlands

Elektrisch vermogen =
Electric Power in MWe

Verwerkingscapaciteit =
Waste capacity in kTon/a



Waste Management Administration

Stage 4: Innovate



Heat pump for energy recovery, Umea Sweden

- Waste management established (no landfill, high recycling),
- focus on energy efficiency and recovery
- Innovation and energy policy are drivers
- Trendsetters in energy from waste
 - Decrease internal energy consumption
 - Increase electricity production by high steam parameters
 - Flue gas condensation for energy recovery
 - High efficient SRF applications



Lessons Learned

- Landfill directive is driving force towards WtE and recycling
- Show you obey the waste hierarchy
- Take time for creating trust between NGO's and proponent of EfW
- Policies change quicker than waste treatment => stability is needed
- Address tension between MBT, SRF and Incineration
- Spatial Planning is the underestimated policy field

Questions ?



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Waste Management Administration