# Energy from waste, one step further

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Task 36 Energy Recovery from Municipal Solid Waste
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In opdracht van

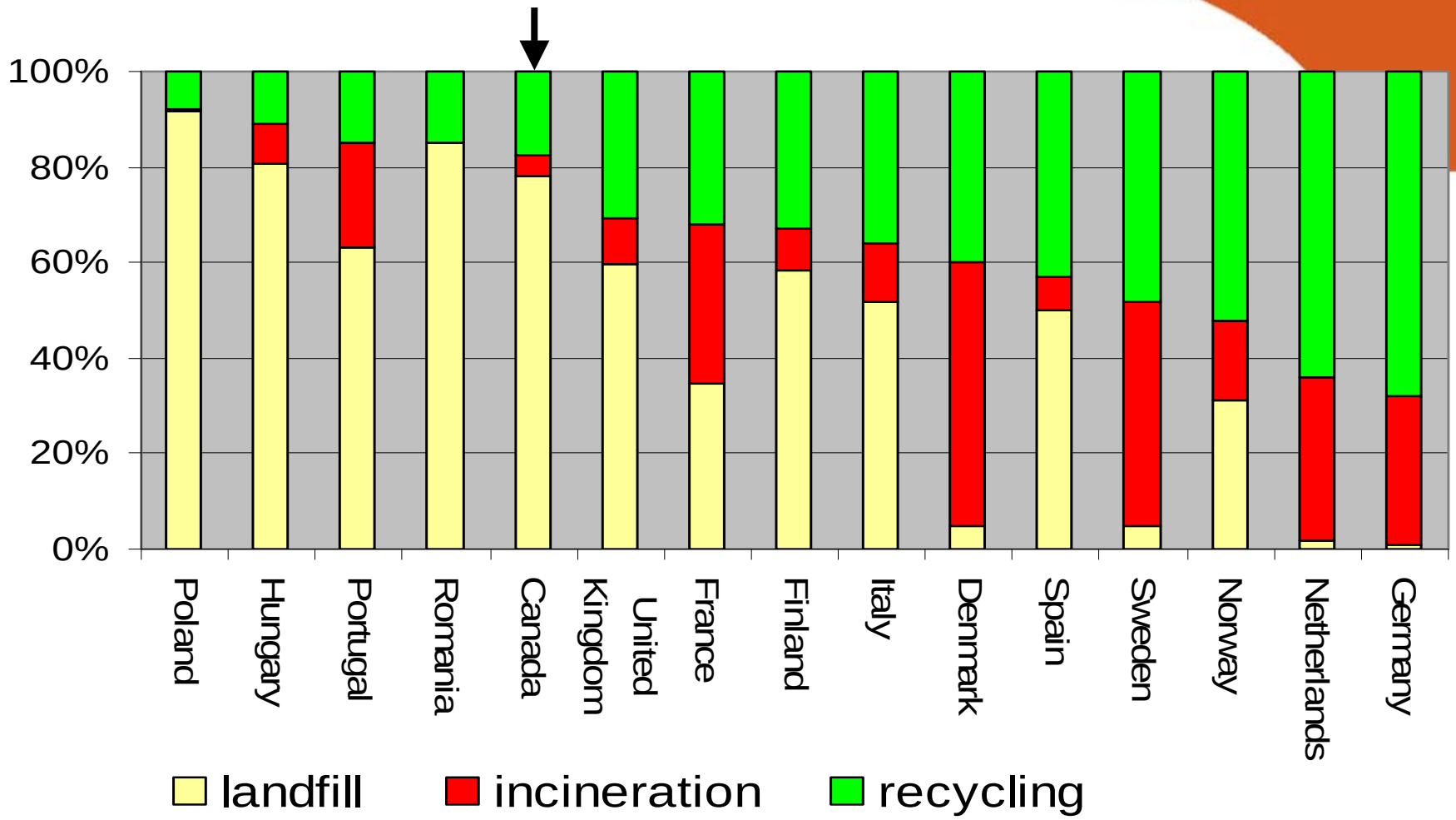
VROM

## 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)

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# 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

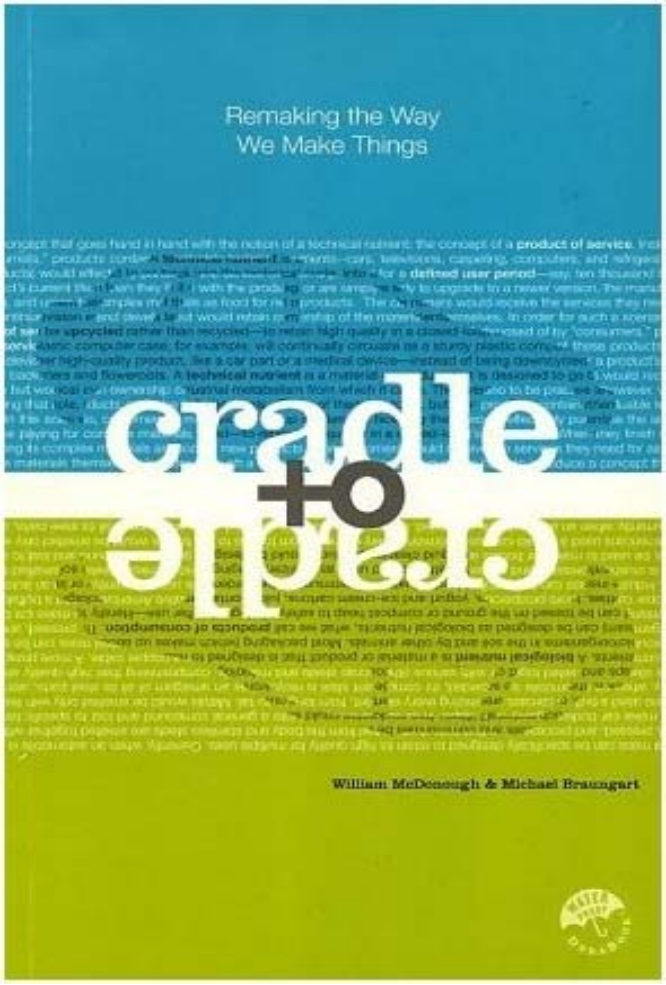
- Geographical situation

  -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% |

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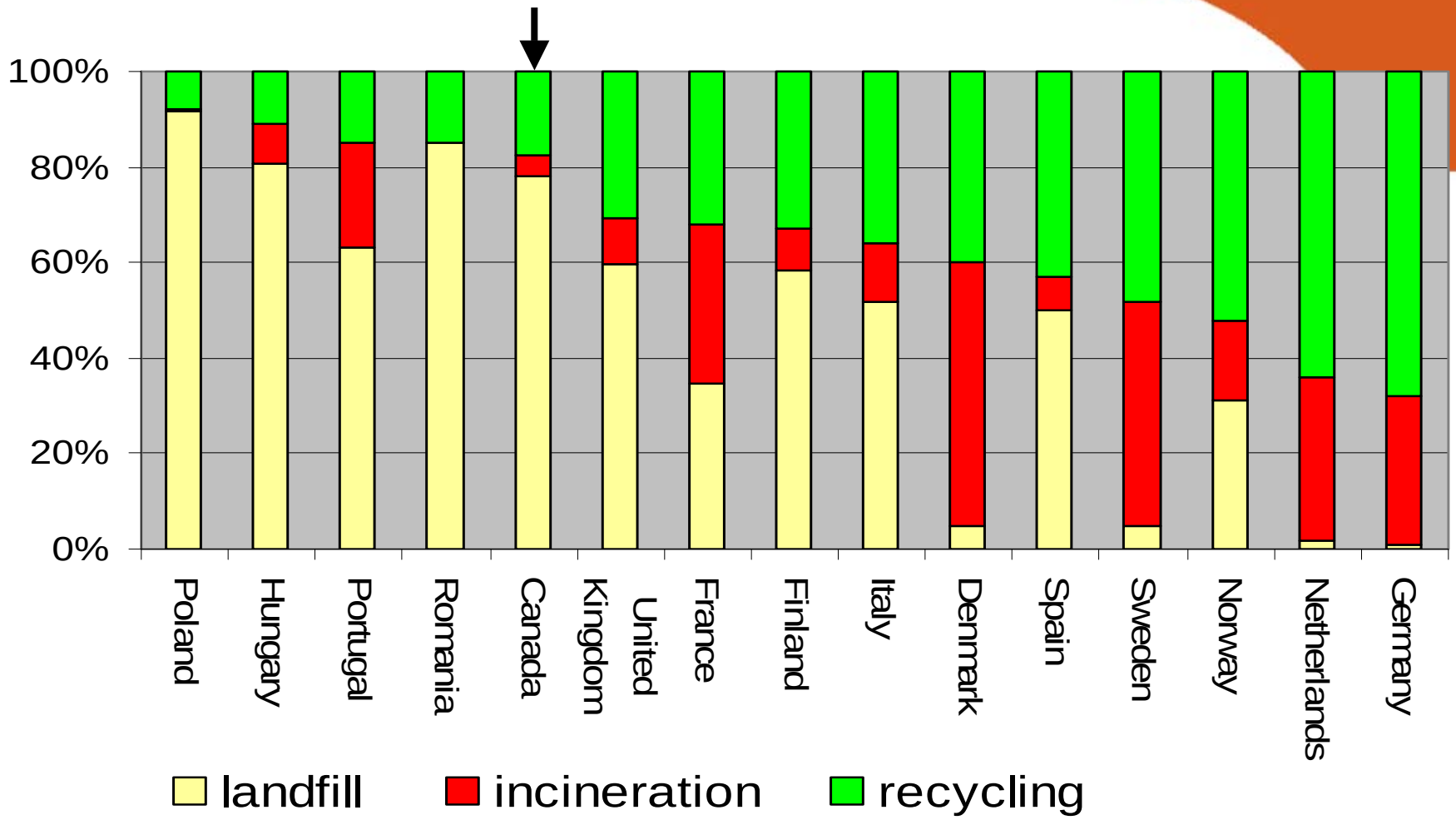


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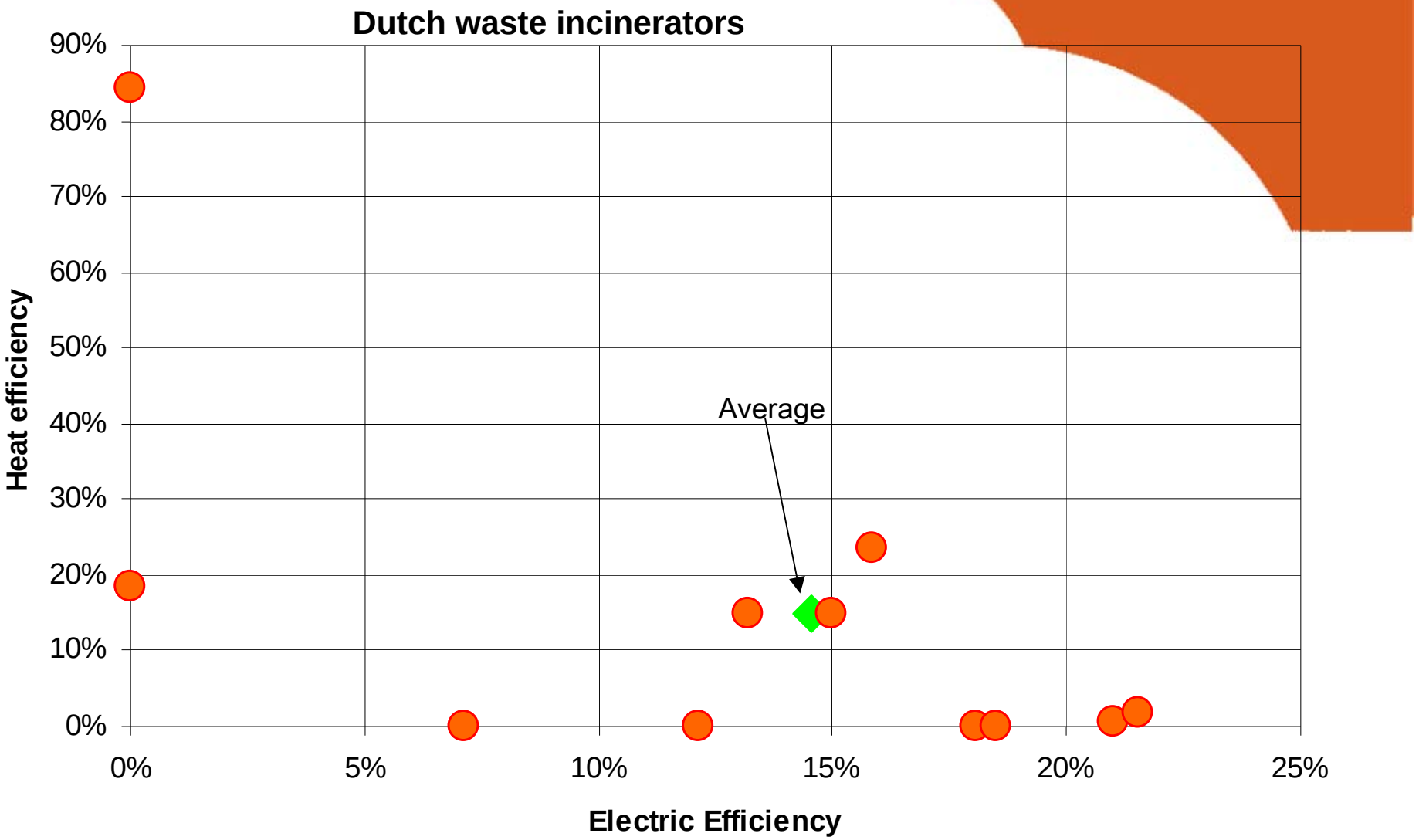
# Comparing country data

- **non-recyclable combustible waste currently incinerated (%)**
  - Is all landfilled MSW available for waste incineration?
  - Does landfilled MSW include inert ?
  - Which waste is included in the landfill statistics?
  - => high estimate
- **Energy recovery (%)**
  - Energy content waste not known
  - Heat not always measured
  - Steam is considered as heat
  - Own use for electricity is not considered

# How representative is the average efficiency?

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# 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]

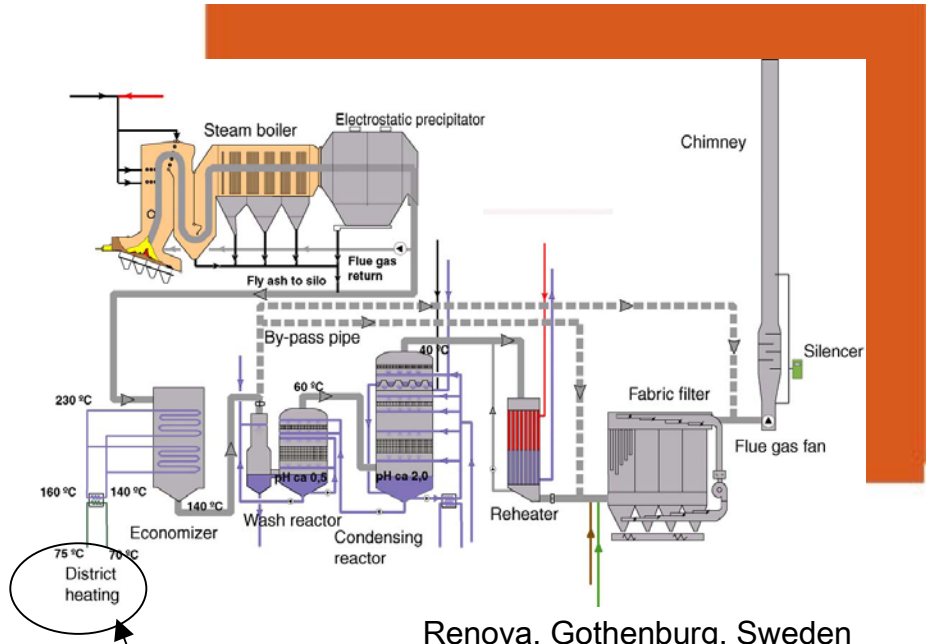
| Technology | Potential energy recovery |
|---|---|
| Incineration (electricity) | 25% |
| Incineration (CHP) | 40%-95% |
| MBT biodrying/separation | 15%-60% |
| MBT anaerobic digestion/separation | 15%-30% |
| MBT stabilisation for landfill (lim. SRF-production) | 8%-15% |
| Landfill | 6% |

# Stage 2: Electricity production

Amsterdam WtE-plant

- 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

# Stage 3: CHP




Renova, Gothenburg, Sweden

- 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

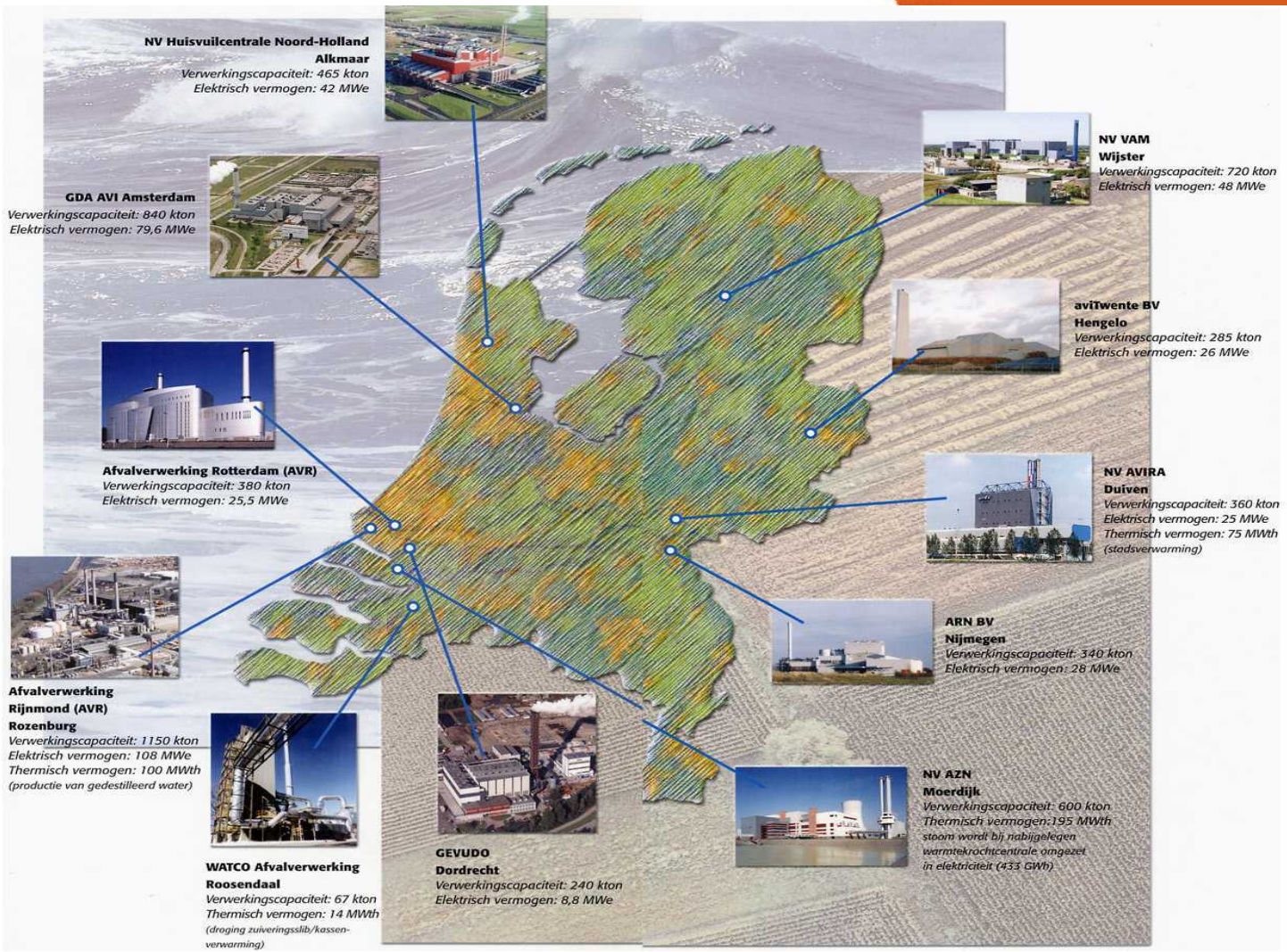
# Chosen locations could be a problem for CHP

Afvalverbrandingsinstallaties
in Nederland

Waste to Energy Plants
in the Netherlands

Elektrisch vermogen =
Electric Power in MWe

Verwerkingscapaciteit =
Waste capacity in kTon/a

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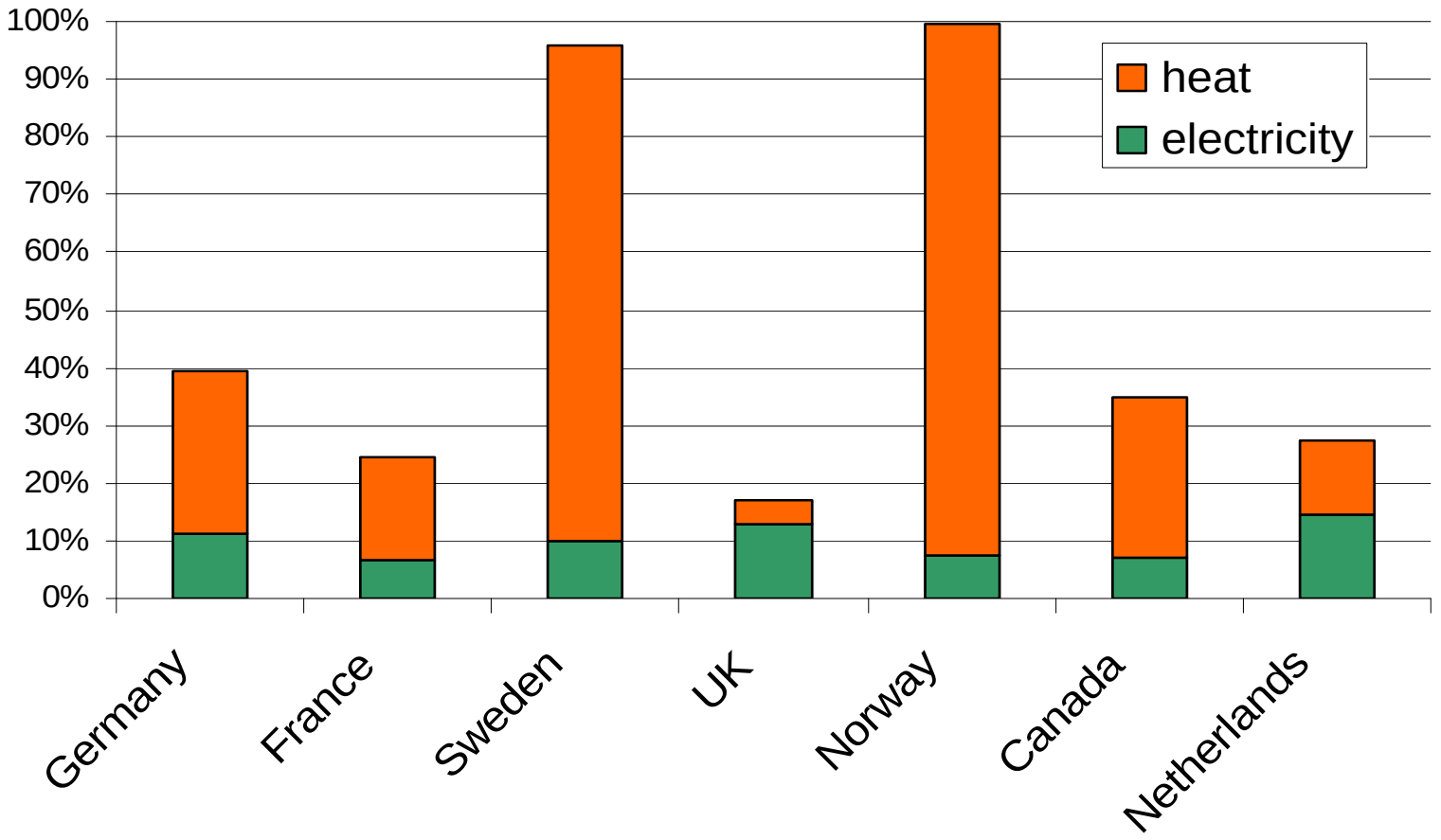
# Stage 4: Innovate

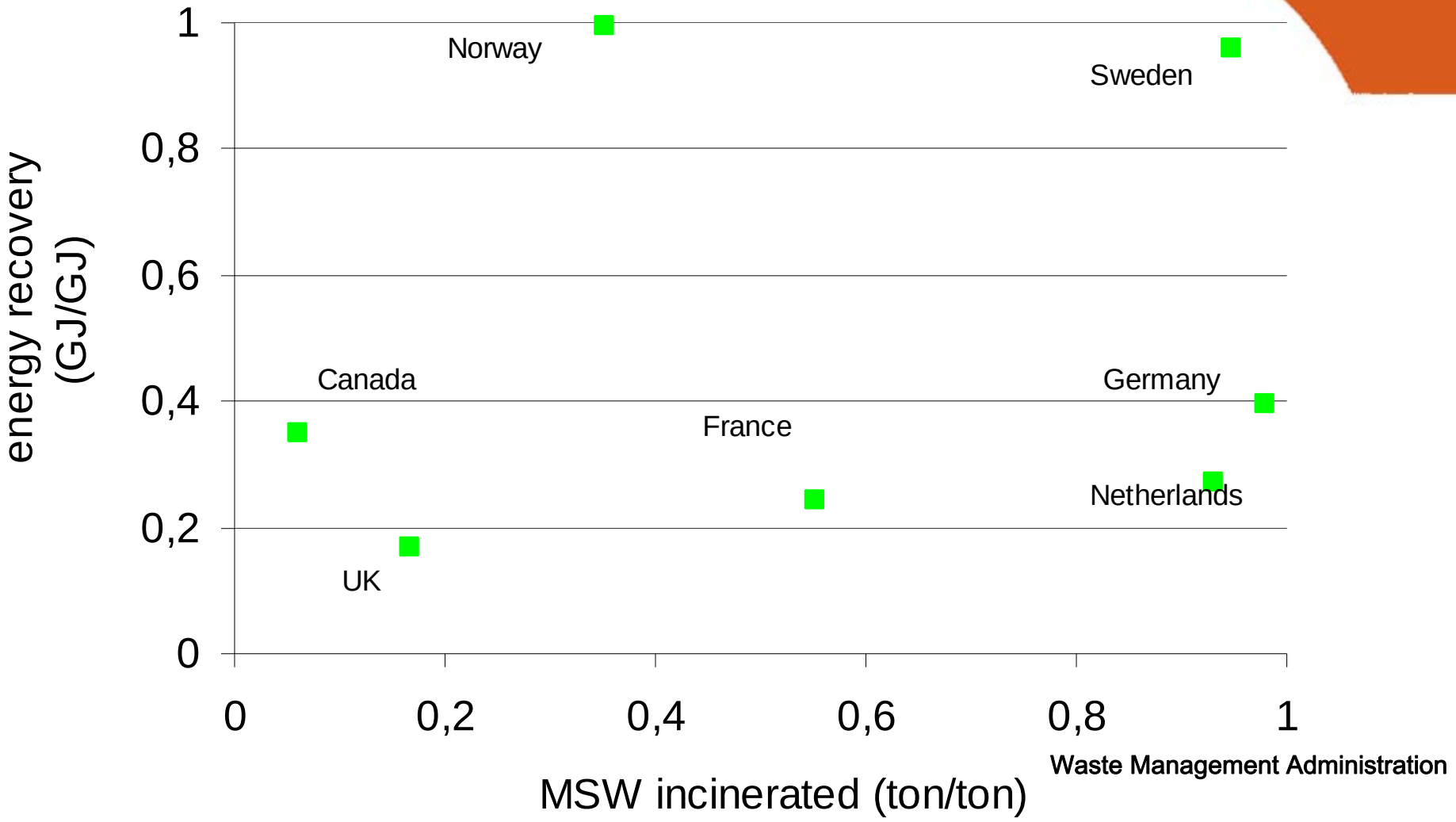
Heat pump for energy recovery, Umea Sweden

- 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

# Energy Efficiency IEA task 36 countries



# Energy recovery vs. Incineration



## 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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