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Energy from Waste

-Results from Workshop Exco 71 in

-May 2013 in Cape Town, SA

Content

1. Waste Management and potential of EfW
2. Present Situation in World, EU, NL
3. Technologies
4. Policy Suggestions

Definitions

- ***Waste Management:***
  - ***Treatment of waste to achieve good conditions***
- ***Waste: Something a person has to get rid off***
    - ***Municipal Solid Waste***
    - ***Industrial Wastes***
    - ***Waste Water (Sewage systems)***
- ***Residues: Left overs from Agriculture/Forestry***

- ***Energy from Waste: Conversion to Energy from Waste***

- ***Bioenergy: Energy from Biomass (Renewable Energy)***
  - ***About 50% of the Municipal waste is Biomass (Renewable)***

Energy from Waste could grow

- ***World Bank (2012) What a Waste, and own estimates***

Urban Waste	2000	2010	2025
Waste/capita (kg/day)	0,64	1,2	1,4
Population (billion)	2,9	3,0	4.3
Total Waste (Billion Tonnes)	0.68	1,3	2,2
Energy Content (GJ/ton)	10	10	10
Potential Energy [EJ]	6,8	13	22

Why Waste Management?

- *Health Risks/*
  - *Factor 2 more diarrhoea*
  - *Factor 6 acute respiratory infections*
  - *Flooding -> Drinking Water*
- *Environment*
  - *Water pollution*
  - *Green House gas emissions*
- *Availability of Land*
- *Safety*
  - *Landfill gas can lead to burning*

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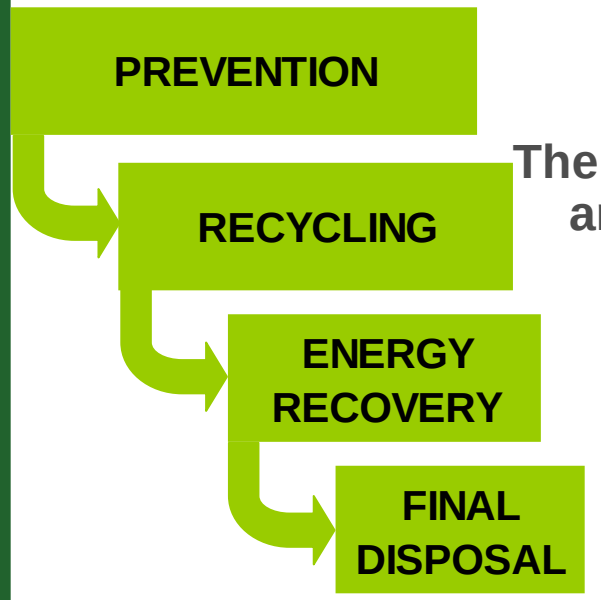
Waste Hierarchy Approach

the integrated solid waste management approach



There are enormous differences in the World and EU WID directive implementation

Which policy measures are the most effective in a country in order to improve the energy production from non-recyclable waste?

2. Waste Collection

High Income:

Good Collection

Sometimes Energy from Waste

Low Income:

No collection, no reuse, EfW

Improvements possible:

-Involve waste producer (awareness)

-Integrate Informal sector to improve recycling and create business and jobs

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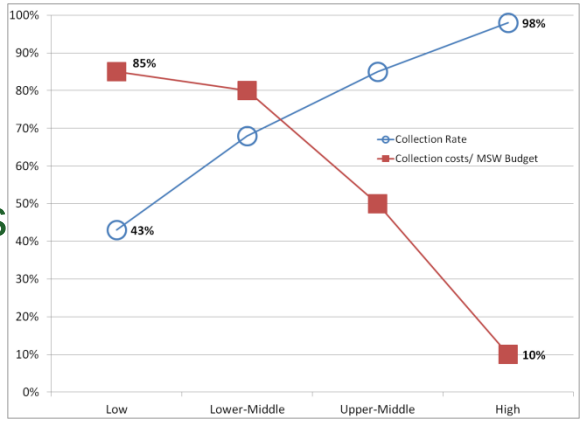
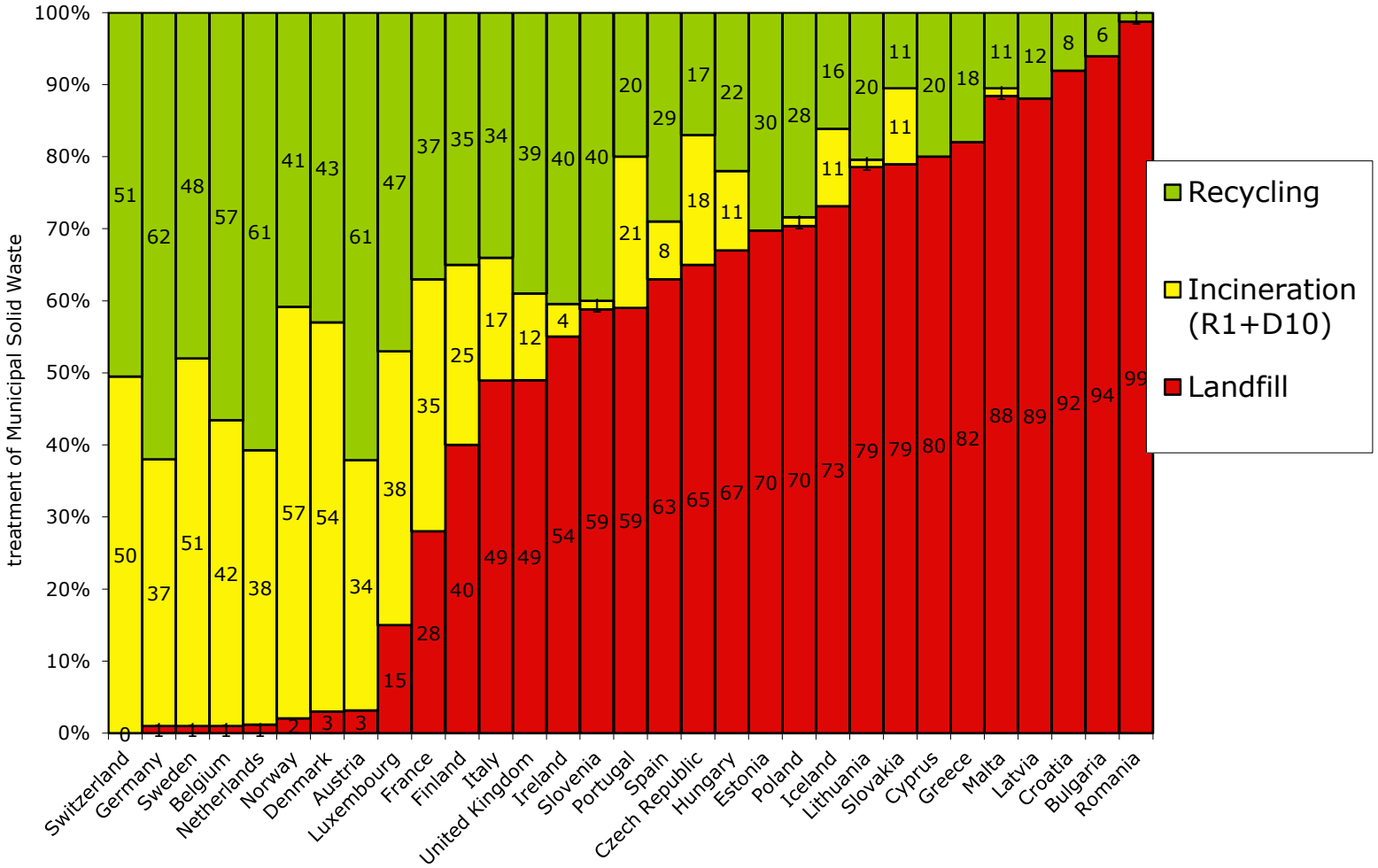


Waste Treatment in Europe (2011)



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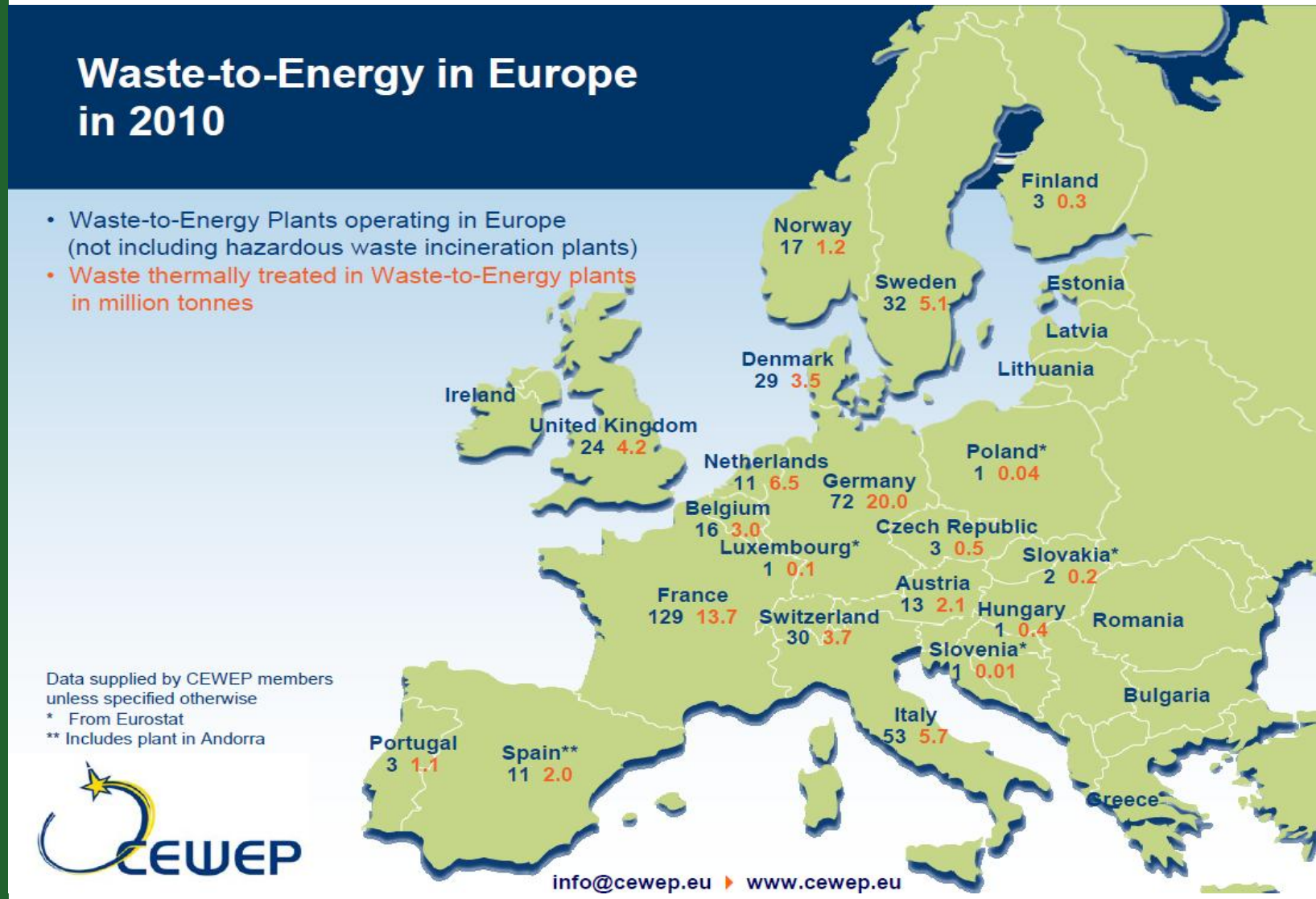
Energy from Waste in Europe



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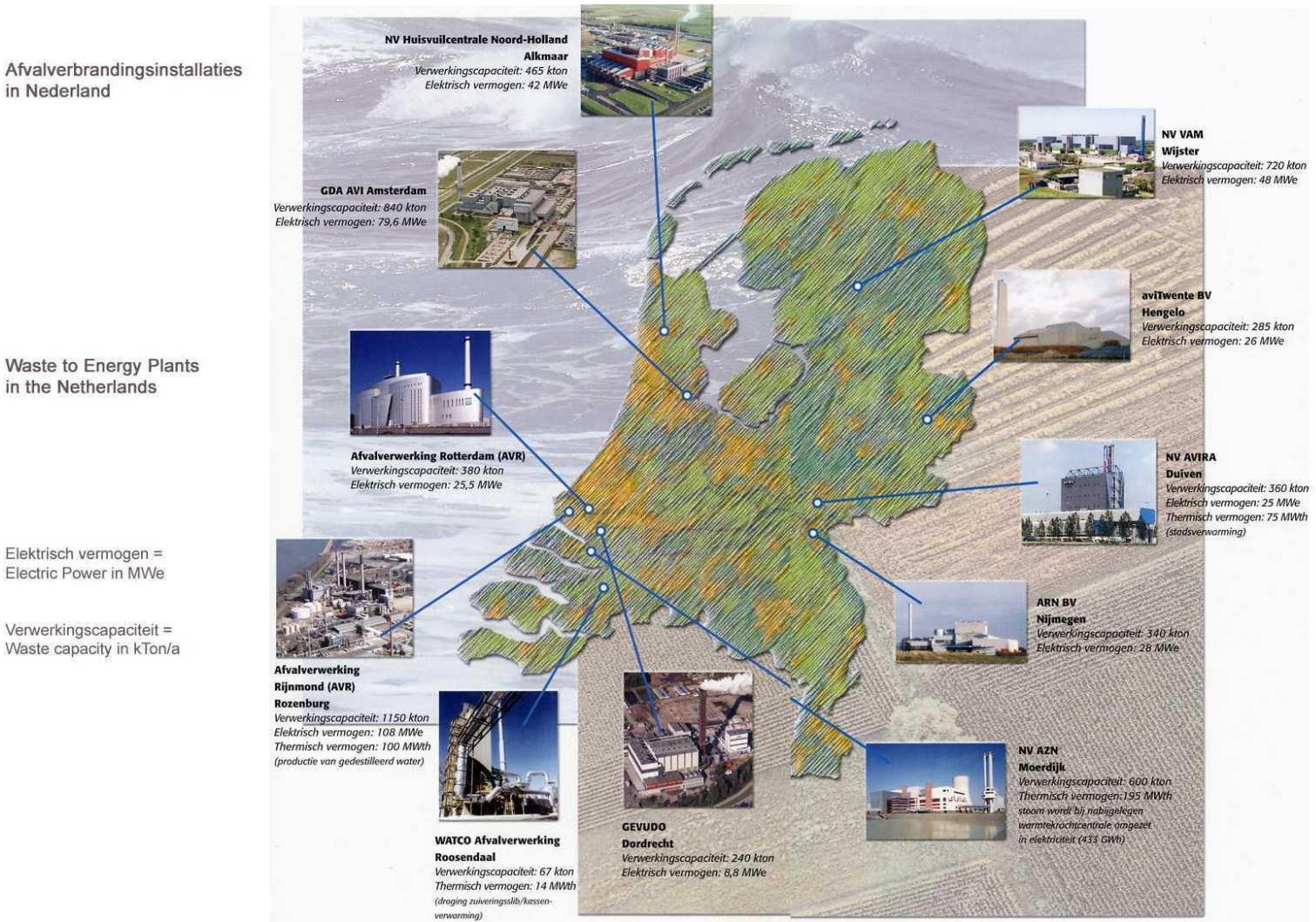
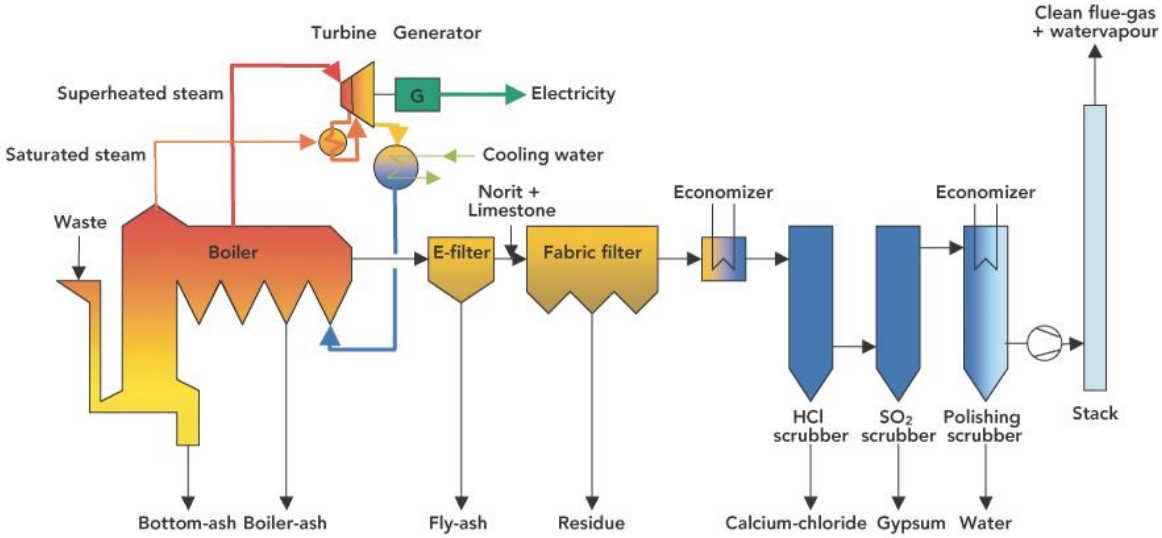
Example: The Netherlands

11 Waste incinerators with Energy Recovery for 5.5 Mton/year Municipal Solid Waste



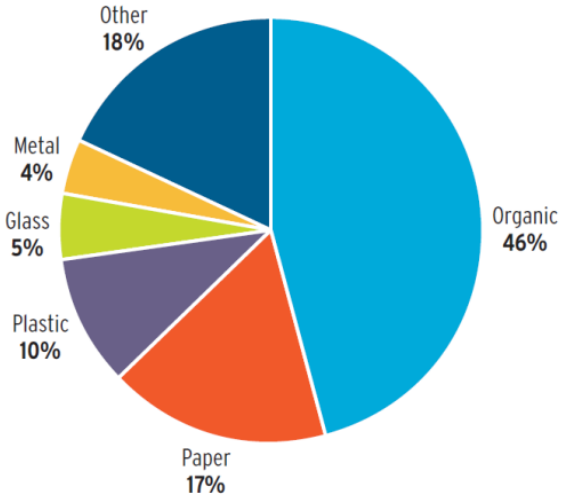
3. Waste Incineration Amsterdam

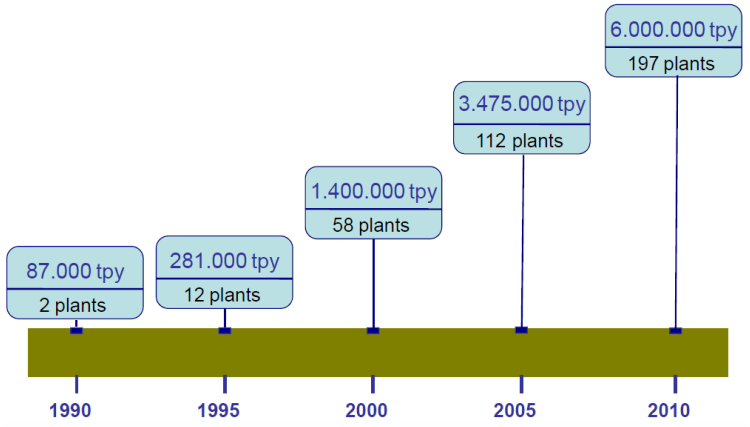
- ***High electric efficiency***
- ***Utilisation of heat in Waste waster purification plant***
- ***Low emissions, no dioxins***



Anaerobic Digestion

- *Organic Fraction about 50%*
- *Waste separation*
  - *At Source (house, NL)*
  - *Treatment plant (MBT)*
- *In NL Source separation prefered because better quality of compost*
- *Wet digestion*
  - *Continuous*
- *Dry Digestion*
  - *Batches (Orgaworld)*





MSW Digestion in EU

4. Waste policy
Example: Netherlands

- **Waste hierarchy**: prevention, re-use, material recycling, energy-recovery, incineration, land filling
- **Stringent standards** for disposal: decrees on landfill and incineration, standards for building materials, organic fertilizers, ban on landfill
- **Planning at National level**: from separate panning systems for hazardous and non-hazardous waste towards one integral national waste plan
- **Producers responsibility**: legal as well as non legal systems for car tyres, batteries, Weee, ELV, packaging, plastic window frames and pvc-pipings
- **Notification and registration** of waste transports: from separate to one integral system of registration and notification of waste transports

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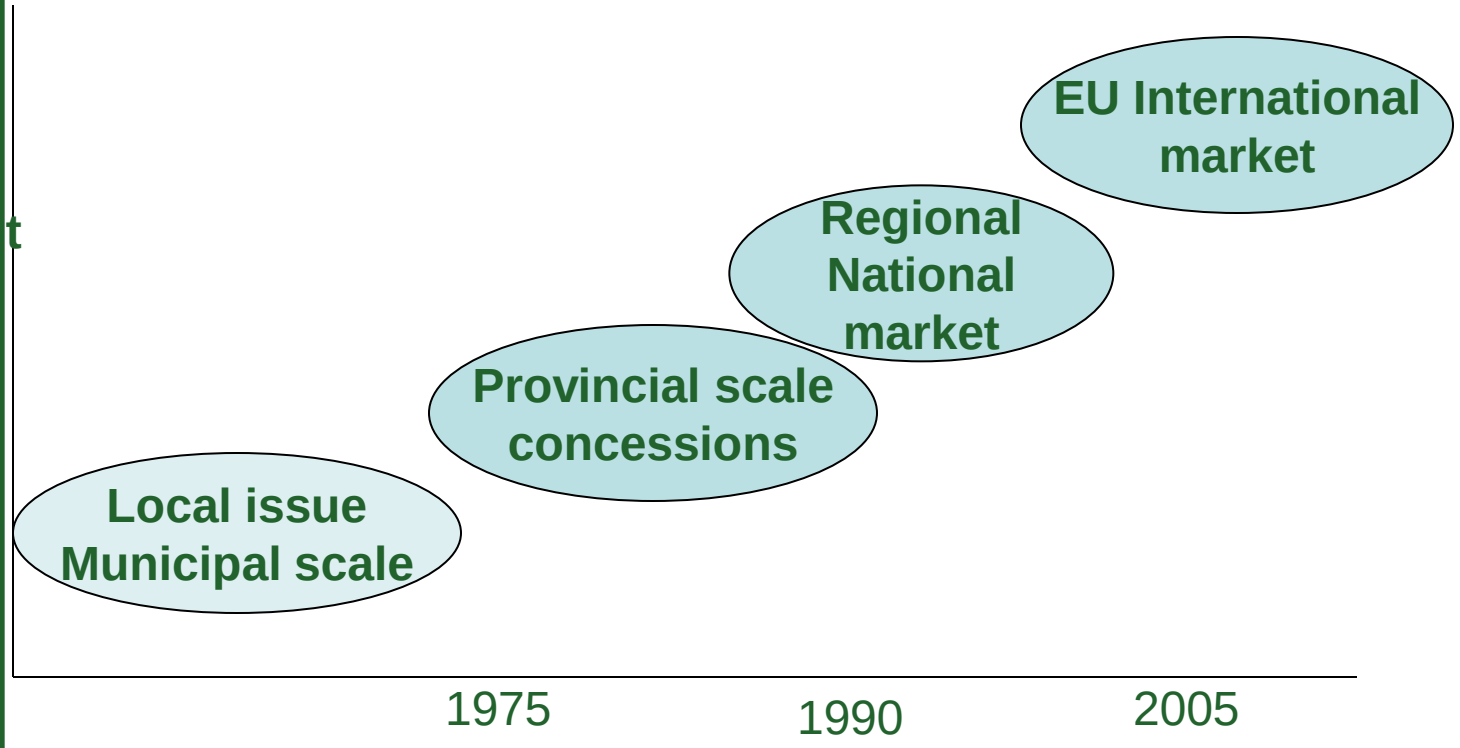
Waste management development stages and scale of government



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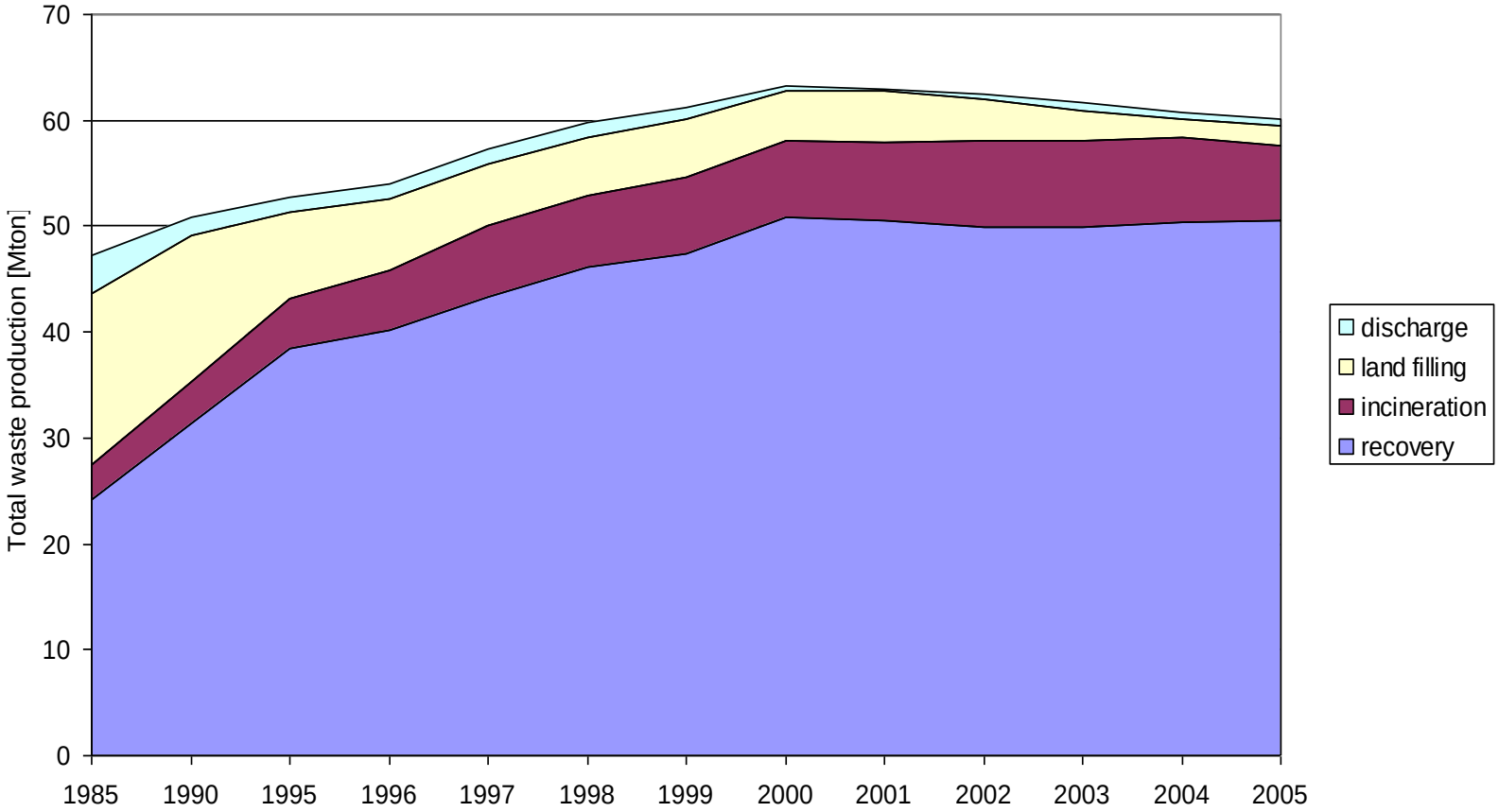
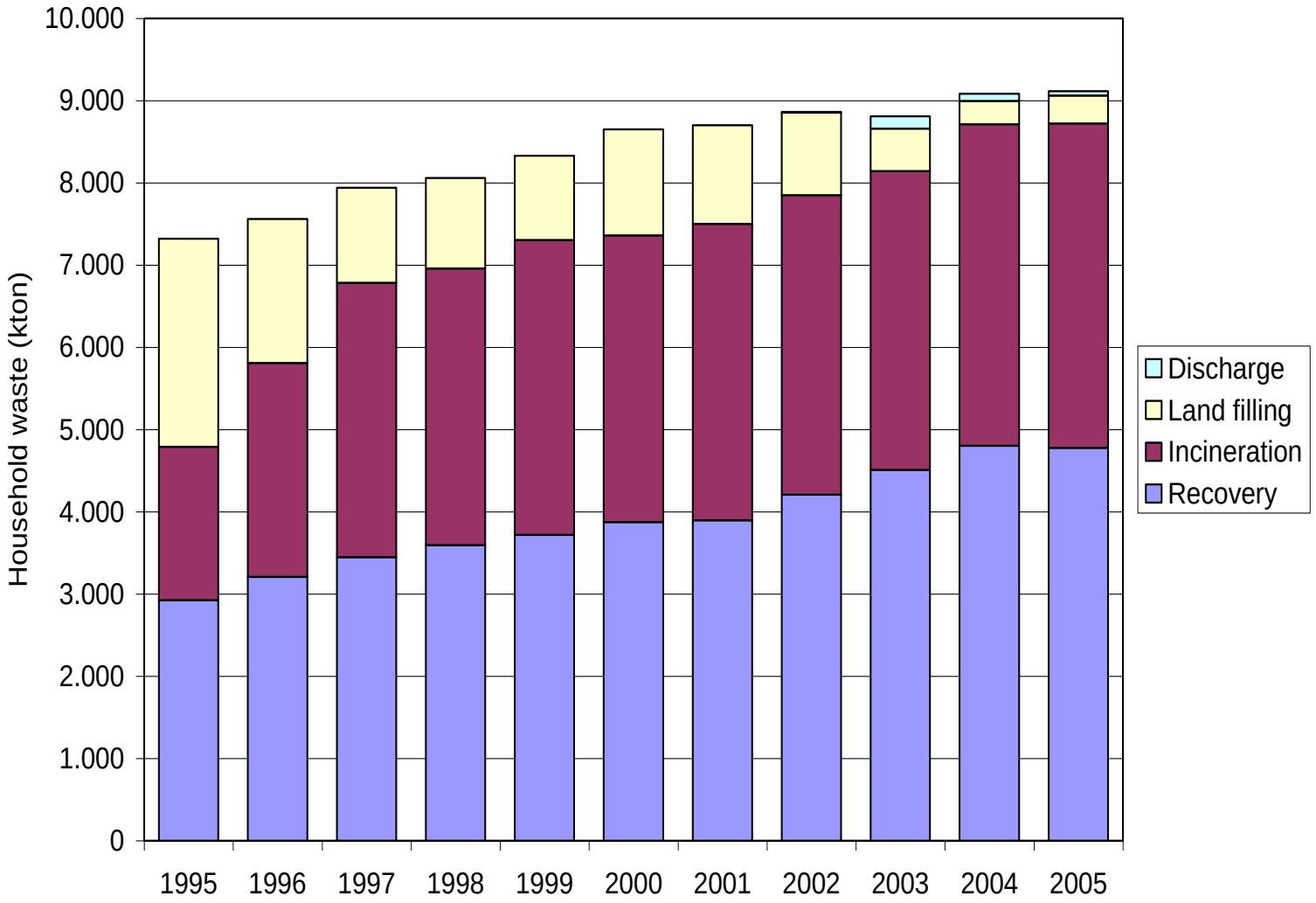
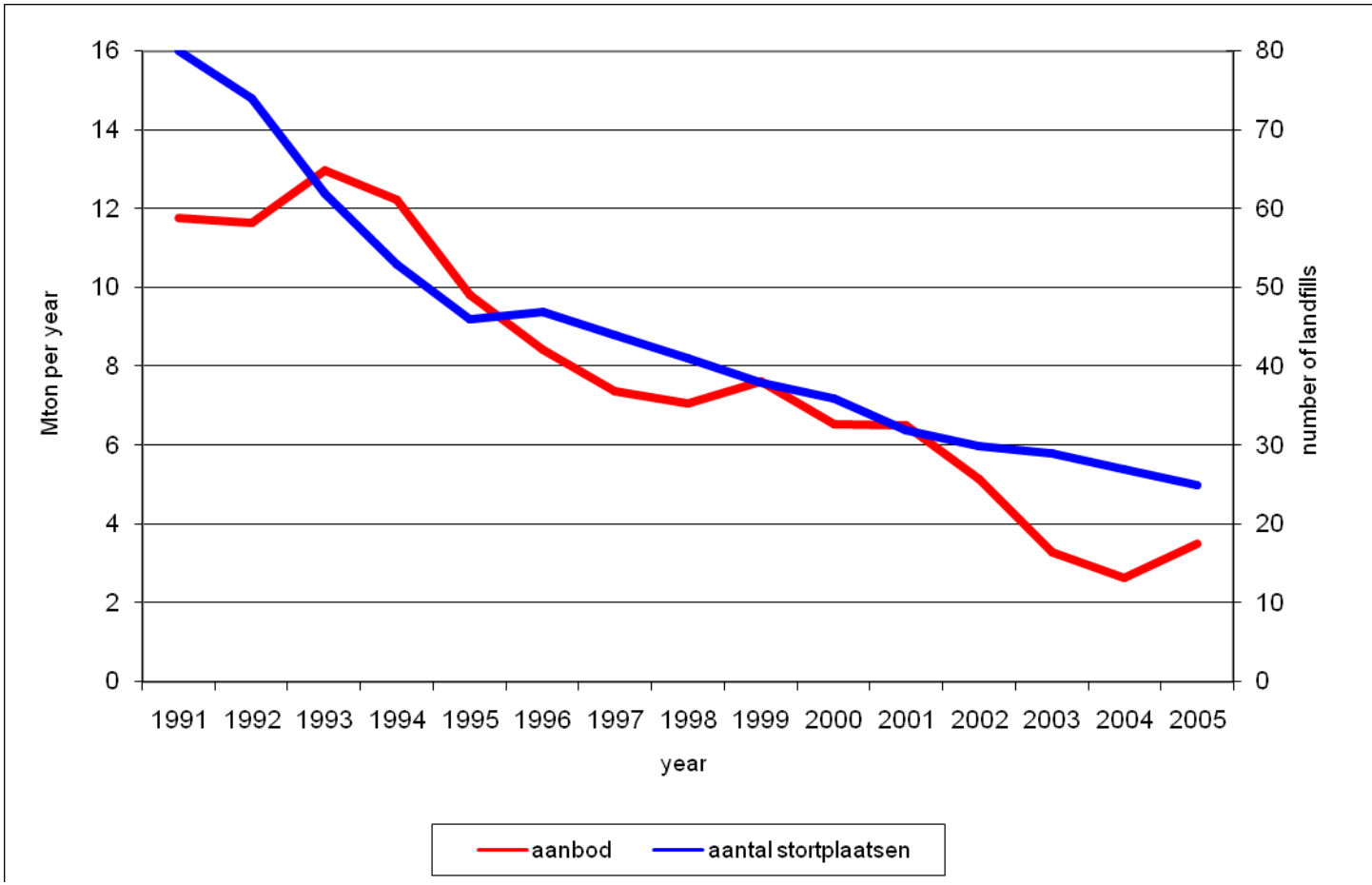
Results:
Total waste production and treatment



Treatment household waste



Number of land fills and yearly amount land filled in the Netherlands



Waste management department

Economic and financial instruments for steering waste

- Instruments to restrict and discourage land filling
  - Landfill decree (technical requirements and standards; financial covering of post-closure costs)
  - Landfill ban: (35 waste streams)
  - Landfill tax (85 euro/ton): land filling more expensive than recycling and incineration
- Environmental taxes: tariffs in accordance with waste hierarchy
- Economic incentives: Power from MSW as a Renewable Energy Resourc

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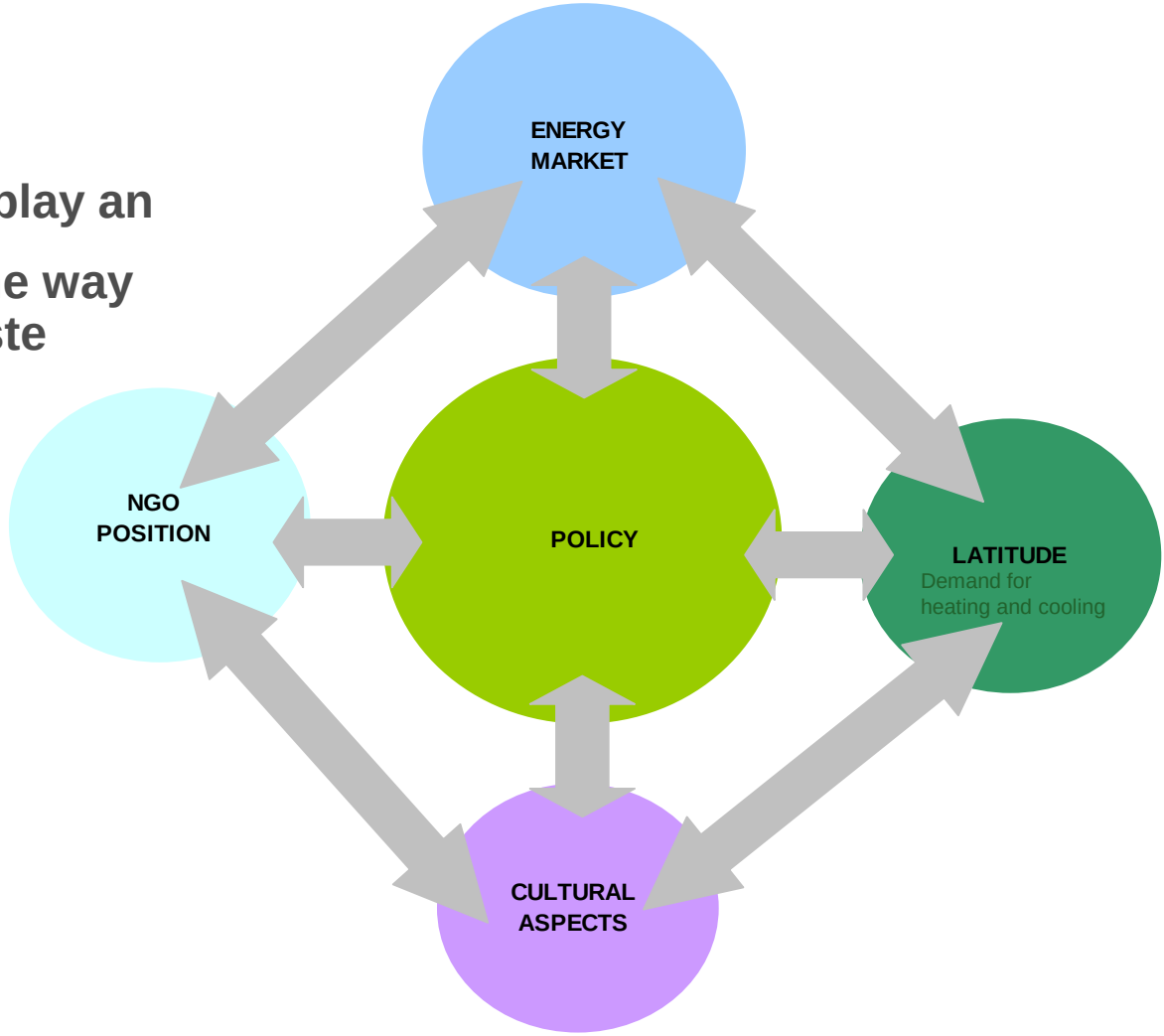
Policy Options depend on local situation:

Other factors may play an important role in the way energy from waste develops:

- **Energy market**
- **Latitude**
- **Cultural aspects**
- **NGO position**



Energy potential

The energy recovery of the waste management system =

Energy produced : (electricity and/or heat)

as percentage of the energy content of the input.

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 (limited RDF-production)	8%-15%
Landfill	6%

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Energy from Waste, a stepwise approach

Stage 0 – No Dumping but Collection for Recycing and Sanitary Landfill

Stage 1 - Use of biogas from landfills

Stage 2 - Production of electricity by means of combustion or digestion

Stage 3 - Integrated CHP approach

Stage 4 - Innovations, towards higher energy utilization rates

Regional addaptive approach

- ***Stepwise Approach, Start Small and Effective***

1. ***Awareness (Public Health, Environment etc.)***
2. ***Governmental responsibility to collect waste***
3. ***Treatment of Waste***
   - Involve informal sector in recycling/reuse
   - Remainders into Sanitary Landfills
   -> The Polluter Pays -> Realise a Budget to pay this
4. ***Energy from Waste***
   - ***Landfill Gas from Landfill sites for power/upgrading***
   - ***Anaerobic Digestion or Incineration***
   - ***Efficiency improvement***

   -> Financed by the Renewable Energy Component

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Thank you for listening!
Any Questions?

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