



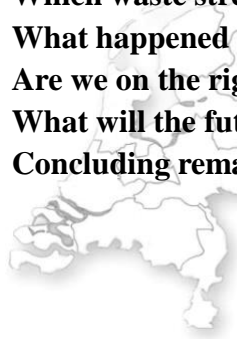
*Waste treatment and Waste to Energy
in the Netherland*

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- Which waste streams?**
- What happened in the past?**
- Are we on the right track?**
- What will the future brings us?**
- Concluding remarks**





Looking at the Netherlands

What are waste streams

General information on the Netherlands

What happened in the past?

Are we on the right track?

What will the future bring us?

Concluding remarks



The Netherlands

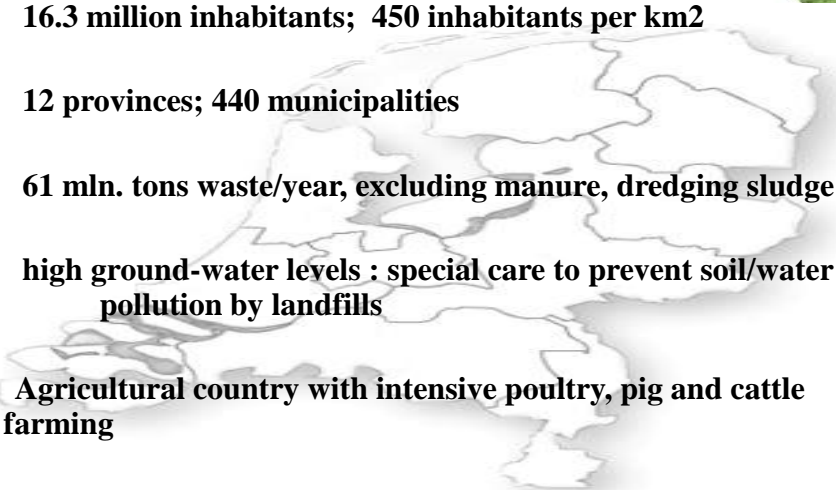
16.3 million inhabitants; 450 inhabitants per km²

12 provinces; 440 municipalities

61 mln. tons waste/year, excluding manure, dredging sludge

high ground-water levels : special care to prevent soil/water pollution by landfills

Agricultural country with intensive poultry, pig and cattle farming





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Waste streams

Main streams in the Netherlands

- Households
- Industry
- Agriculture

Two forms discussed here

- Solid
- liquid



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Little awareness of environmental issues (1)

Solid waste

- All (solid) waste (household and industry) was dumped in an uncontrolled manner
- Resulting in many landfills
- With subsequent pollution of soils and groundwater, also by hazardous industrial waste
- Resulting in a threat to the aquatic environment and indirectly to all plant, animal and human health

Liquid waste

- Was mainly disposed of in rivers (although there were already some early (aerobic) sewage treatment plants)

Little awareness of environmental issues (2)

Special case: Agriculture waste

- Main problem was manure which needed to be disposed of
- Nitrogen components,
 - one of the main causes of acid rain
 - Also polluted the water resulting in eutrophication

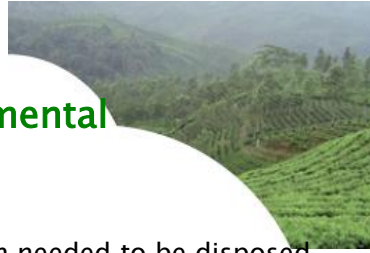
Stringent measures

To cope with the enormous environmental and infrastructural problems stringent measures were taken, and

Policies were drafted

- Waste
- Agriculture

Additionally, the measures and policies were strongly affected by climate change considerations, especially in the agriculture sector





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Today's Solid Waste policy in the Netherlands

Waste hierarchy: prevention, re-use, material recycling, energy-recovery, incineration, land filling

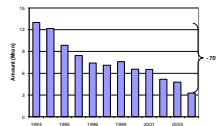
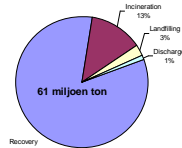
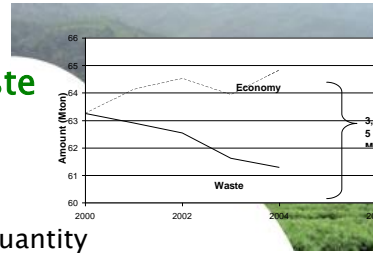
Stringent standards for disposal: decrees on landfill and incineration, standards for building materials, organic fertilizers, ban on landfill

Planning at National level: from separate planning systems for hazardous and non-hazardous waste towards one integral national waste plan

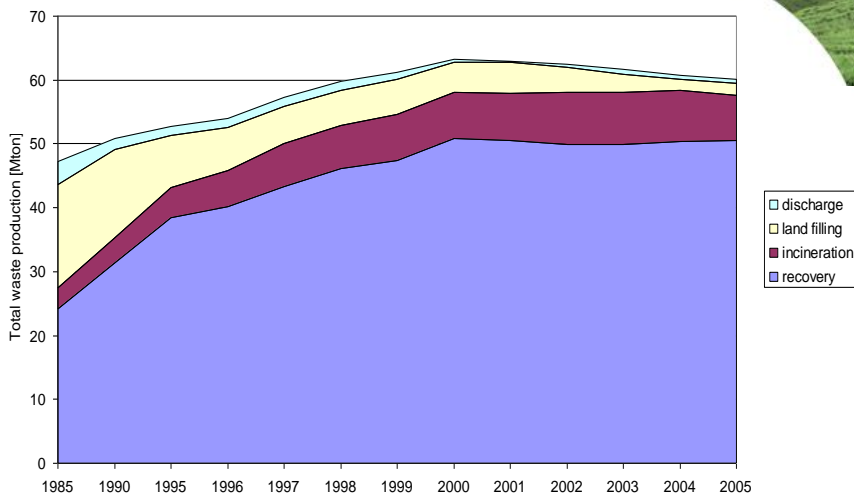
Producers responsibility: legal as well as non legal systems for all kinds of products

Goals of present National Waste Management plan (2005 – 2012)

- Decoupling between GDP and waste quantity
- Waste recycling/recovery (about 85% in 2012)
- Promote/improve energy recovery from non-re-useable recyclable waste
- Limit quantity of waste to be disposed in 2012
- Achieving Level Playing Field in EU (open borders for incineration), promoting market forces, encouraging innovation



Results: Total waste production and treatment

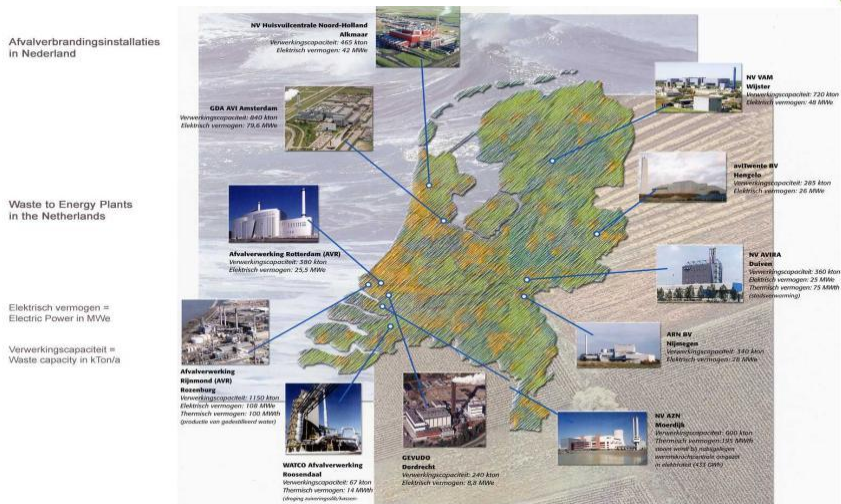


Economic and financial instruments in waste policy

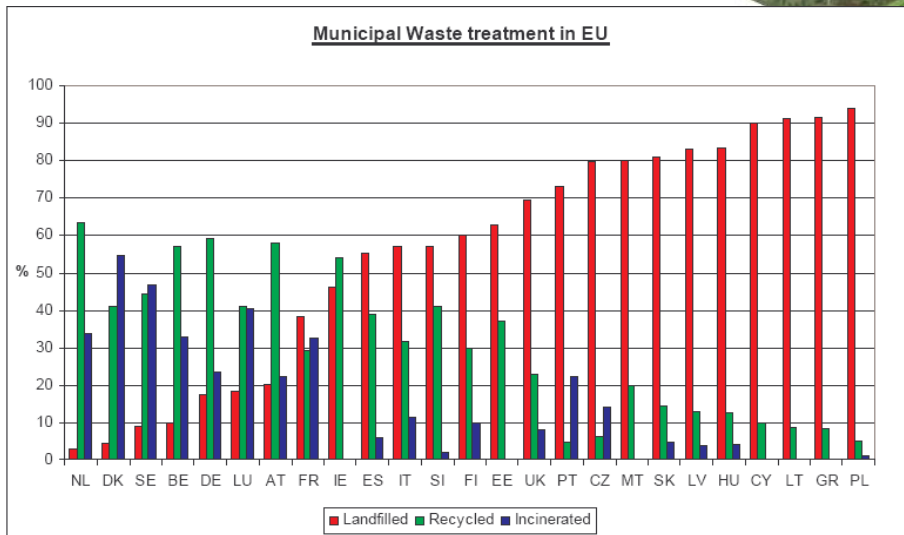
- Instruments to restrict and discourage land filling
 - Landfill decree (technical requirements and standards; financial covering of post-closure costs)
 - Landfill ban: (35 waste streams)
 - Landfill tax (85 euro/ton): land filling more expensive than recycling and incineration
- Environmental taxes: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



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



Europe: Waste Treatment



Source: Eurostat

Today's Agriculture Waste policy Netherlands

Aim

- Is to reduce the environmental impact of the use of manure and fertilizers in agriculture
- to support the transition of agriculture into a sustainable one that meets with the international agreements.
- Comply with international directives (Nitrate directives, Water Framework Directive, NEC-Directive, IPPC-Directives, Air Quality Framework Directive)

Today's agriculture Waste policy Netherlands (2)



Challenge

- With increasing production also increasing amount of manure
- But amount of manure to be disposed on agricultural land should be reduced and used more efficient
- Solution among others is reducing of the amount of manure produced
- Also process manure to reduce amount by anaerobic digestion to a smaller fraction to be used as fertilizer

Anaerobic digestion



Anaerobic digestion results in biogas converted into energy
Direct use of electricity in farm
Or feed into the grid



Domestic Kyoto Protocol actions in agricultural sector

- Although GHGs from industry and transport are increasing there is an overall decrease in GHG emissions
- The decrease is attributable to the strong decrease in non-CO₂ GHGs, like methane, nitrous oxide, etc
- Percentage-wise the decrease of these gases was in the period 1990– 2007 about 36%.
- Large contribution by reduction emission of CH₄ as result of use of biodigesters combined with energy conversion

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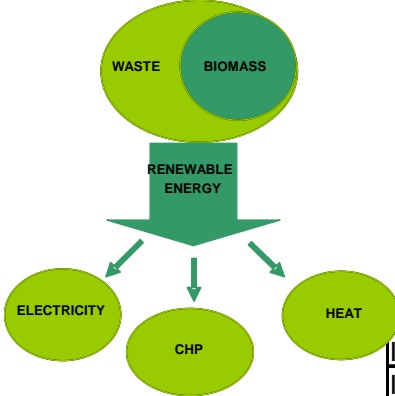


Waste policy

- More stringent waste policy
- Increase in recycling and reuse;
 - more towards chain approach;
 - Cradle to cradle principle
- Increase energy recovery

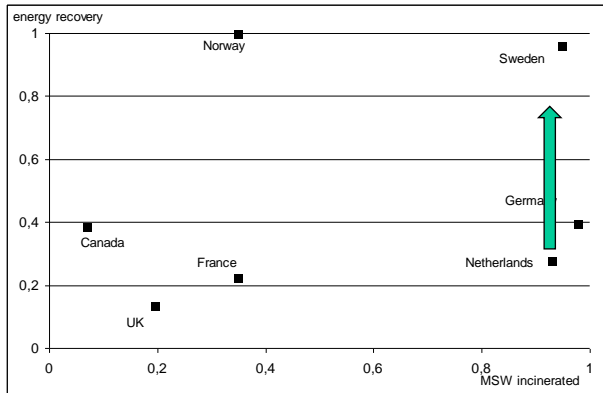


Energy potential



Technology	Pot.ener. recov
Incineration (electricity)	25%
Incineration (CHP)	40%-95%
MBT biodrying/separation	15%-60%
MBT Anaerobic digest.sep.	15%-30%
Landfill	6%

Energy from waste development stage in EU countries



In the EU where a common waste management policy exists, the development stages are still different.

This figure shows that for high recovery rates the key factor is heat.

Climate change and renewable energy policy

NL policies

- 30% reduction GHG emissions in 2020 (EU 20%)
- 20% renewable energy in 2020
- 2% energy reduction

10% biofuel in 2020 (produced from sustainable biomass chain) (EU directive)

Consequences:

- more opportunities for biomass/waste to energy
- E.g fermentation, / gasification (not only for electricity but also for fuel)
- waste water treatment change from aerobic to anaerobic systems



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Netherlands Long Term Experience on Renewable Energy from Waste

- Energy from Landfill gas from landfill sites
- Anaerobic digestion of organic wastes
- Combustion of wood or agricultural waste
- Incineration with energy recovery from Municipal Solid waste



Thank you for listening!
Any Questions?



**Many thanks to Herman
Huisman and Kees Kwant**
www.senternovem.nl