

Waste-to-Energy



Name: Dutch Innovation, Knowledge & Experiences in Waste Management

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Pioneers in international business

Waste hierarchy in the Netherlands

'Lansink's Ladder'

Prevention

Material recycling

Energy Recovery

Incineration

Land-filling

Ministry of Housing,
Spatial Planning and the
Environment

Waste Management

'Priority scale of Lansink'



- Prevention by the principle to avert from generation of waste
- Prevention by the design of products
- Re-use of products
- Recycling of materials
- Valorisation of waste as fuel
- Disposal by incineration (with energy-recovery)
- Disposal by land-filling

It's a Waste to waste Waste!

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Pioneers in international business

Waste disposal

Main waste generators

Construction: 24%

Industry: 17%

Domestic 9%

The Netherlands, Waste in Perspective:

- More than 61 million tonnes of waste produced annually
- 5.490.000 tonnes domestic waste. (approx. 337 kg. per inhabitant per year).
- Green waste, paper, glass, textile, batteries excluded, as being collected separately for recycling!
- Faith of domestic waste: **Incineration** producing energy, heat & distilled water; ashes qualify for road-construction.

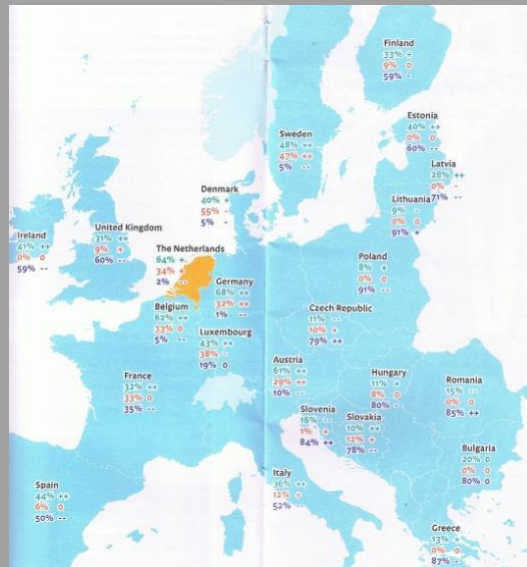


Waste disposal

Recycling: 64%

Incineration: 34%

Others 2%



Public Perception on Waste Incineration

International public concerns with release of Dioxines!

35 years ago Netherlands faced issues with dioxine-emissions.

Substantial investments and decades of experiences in flue gas cleaning!

Continuous monitoring by Dutch authorities contribute to public confidence.

As a result, one of the Dutch incinerators is actually situated directly South of the Centre of the City of Rotterdam.

The plant was even awarded a design price by local community!



State-of-the-Art Technologies:

- Grate Kiln
- Gasification
- Fermentation processes for waste disposal
- Pyrolysis: implementation of latest generation technology
- Collection of methane gas from landfill sites
- Smart Dutch separation methods
- Ongoing research into biomass and biofuels.
- International co-operation

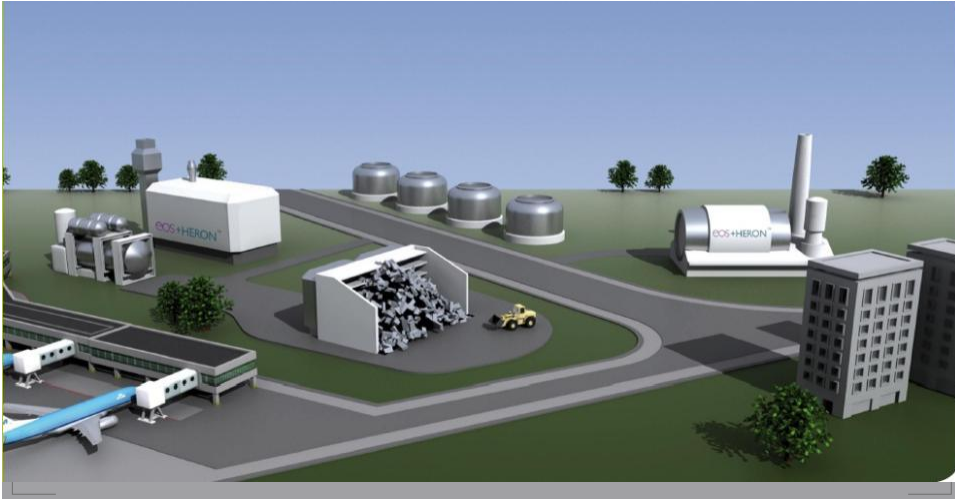


Examples waste options:

1. Bio-power plant, stand alone power plant using wood as a fuel.
Technology: fluidised bed system.
Capacity: - 300.000 tonnes
- 25 MW / 60.000 houses.
2. Electricity from cow manure.
Fermentation system
converts 3.000 m³ into Energy
3. Sugar Industry: potential of
3 to 4 MW from fermentation
systems.



DUTCH INNOVATIONS: CLEAN & EFFICIENT.



On-site waste processing & decentral production of electricity.

Small-scale, Efficient Energy Conversion

- 20 tonnes per day (6.000 tonnes per year).
- waste converted into liquid with caloric value.
- Liquid fuels advanced Gas-turbine producing up to 14.000.000 kWh.
- Whilst generating heat for climate control and 'clean' CO₂.
- Savings on waste-collection and energy-bill offices and selling energy to national grid.
- CLEAN CO₂: directed to Greenhouses for growth of vegetables.
- Slag from operation mixed with concrete and added to infrastrucuter.



Opportunities for further follow-up:

Netherlands Waste Management Partnership

VLM (Association Suppliers Environmental Technology

Cleantech Holland

Ministry for the Environment, VROM

Ministry of Economical Affairs: Senter Novem, EVD.

VNG International (Association Dutch Municipalities)

Large Dutch Consultant Firms: Haskoning, DHV, BGP

**Private enterprises: a.o. BAM; GtS; GGI; HoSt; Van der
Wiel; Waterland**



Conclusion:

Move away from waste as an issue of concern;
let's start considering waste as an opportunity!

- **Waste as Fuel;**
- **Waste as Construction Material (e.g.roads);**
- **Waste as Primary Material (Cradle-to-Cradle).**



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Global Green International BV

Managing Solid Waste by
Inventories, Transport, Consultancy and Handling



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