Policy focused on decreasing landfilling ➔ regulatory interventions:

- Stringent waste treatment standards (landfill bans)
- Various (economic) instruments to stimulate prevention of waste and stimulate recycling: local municipal waste taxes (fixed and variable part), differentiated taxes on municipal waste (‘pay as you throw away’), landfill tax, tax on incineration waste
- Producer responsibility (WEEE, batteries, car wrecks, car tyres, packaging)
- Order of preference waste management hierarchy
Operational landfills in the Netherlands

1970: over 1,600
1980: 200
1992: 80
2019: 19


………….. 2% landfilling, 81% recycling, 17% waste to energy
Landfills in the Netherlands

Two types of landfills

1. Former landfills (4.000-6.000): of operation before 01-09-1996

2. Sanitary landfills (80): have to comply with the Dutch Environmental Management Act
Former landfills (non-sanitary landfills)

NAVOS (national overview of potential risks)

Results:
- in 90% an insufficient thickness of top-covering, but in most cases posed no risks (many already in use as nature, agricultural, leisure or redeveloped)
- at 60-80 sites (remediation) measures were taken to prevent spread of contamination and to mitigate human and/or ecological risks → remediation measures executed under the Soil Protection Act

Implementation and enforcement of policy around former landfills is decentralized to provinces (and a number of municipalities) on the basis of the remediation section of the Soil Protection Act
Developments:

1. New legislation (Environment and Planning Act) under construction:
   - Municipalities become (sole) authority for soil protection: responsible for risk management leaching and monitoring
   - At present investigation how to manage efficiently former landfills

2. Competent authorities Soil Protection Act investigate possibilities to reduce/optimize aftercare for contaminated sites (including former landfill sites)
Sanitary landfills (80)

-Landfills in operation after 1980: have to meet stringent regulations and reconstructed as a sanitary landfill

-Aftercare mandatory for landfills in operation after 01-09-1996:
  • Site operator responsible (during operation) → compliance regulations listed in Environmental Management Act
  • Province responsible for aftercare
  • Currently 19 operational sanitary landfills
  • Dedicated fund needed to finance the aftercare (established and managed by province, funded by landfill operator)
Policy landfill management

1. Investigation financial situation landfill operators (reservations for aftercare):
   - Report and recommendations in 2017

2. ‘Everlasting’ aftercare is expensive and drops ‘duty of care’ to next generations:
   - Sustainable Landfill Management: stimulating biodegradation processes → adding water and air to landfill
   - Green Deal (2015): at 3 landfills experiments during 10 year
Green Deal Sustainable Landfill Management
Green Deal Sustainable Landfill Management

Expected benefits:

- No transfer of problems to future generations
- Active aftercare ended within 30 years after end of operation
- Stabilize the waste body so that its undisturbed contents no longer create a risk to human health and the environment
- Enable high value development of the stabilized site
- Risks to human health and the environment assessed for any threatened object in soil, groundwater or surface water
To prove that long term emission behavior will no longer be a problem, TU Delft will be taken measurements inside the waste body.

Positive results? 15 other landfills to be preserved.

Expected benefit: saving 66 mln aftercare costs.
Examples interim use landfills

Leisure/recreation

‘VAM’ mountain:
Transformation of a sanitary landfill towards a cycling paradise
Amsterdam Volgermeer polder (100 ha)

Heavily contaminated, remediated and transformed to nature
Dordrecht Derde Merwedehaven

- Landfill operational between 1993-2013
- After closure measurements: transition to a playground Merwedeheuvel
Renewable energy

Breda Bavelse Berg:

Exploitation of over 80,000 solar panels (electricity for 10,000 households). Starting in 2019, operational in 2020

Dordrecht Transberg: 25,000 solar panels. Initiated in 2017. First panels 2018
Renewable energy

Ambt Delden ‘Rikkerink:

30,000 solar panels (electricity for 3000 households). Start exploitation 2020
Mining

Veenendaal:

Complete removal of two landfills (54,000 m³) for urban planning. Waste and excavated soil largely reused. Project partly financed by the increase in land prices.
Mining

Amersfoort: Vathorst area (2006-2007)

- Two former landfill sites (461,000 m³ of household waste, industrial waste and sludge) completely excavated in order to develop the Vathorst area
- Where possible the construction waste was excavated separately
- Majority of the waste (including 160,000 m³ excavated soil) was transported to a sanitary landfill.
- Top cover could be reused almost completely

Stakeholders:
• Municipality of Amersfoort
• Province of Utrecht
• Smink Afvalverwerking BV (contracting firm, now part of Renewi)
• Vathorst C.V. (development company/customer; cooperation between municipality and several contractors)

Project funded by Vathorst C.V.
Future values: share costs and generate extra yields!

COllective REgeneration of former Landfills (COREL):
A method for governments and financiers to take responsibility for the multifunctional regeneration of former landfills

The challenge: creating a business model for a former landfill when various functions (e.g. developing clean energy, a park, agriculture, housing, industry) share the costs and enhance one another.
Future value ladder: Green roof

- Better roof covering, lasts longer
- Insulation from noise and energy
- Water storage
- Disconnection from sewer
- Growing food
- Solar-PV