Material (re)use, (sustainable) landfill and the European landfill directive

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Content

- Material use and reuse
- Problems with the European landfill directive
- Priorities of the European Commission
- Required changes for more sustainable landfill management
Material cycle of the NW European
Current economic process

Input → Economy → Output

Reuse & recycling
Desired economic process

Reuse & recycling

Input

Output
Or is this what we will get?
The overall objective of the LFD:

‘.. by way of stringent operational and technical requirements on the waste and landfills, to provide for measures, procedures and guidance to prevent or reduce as far as possible negative effects on the environment, …, as well as any resulting risk to human health, from landfilling of waste, during the whole life-cycle of the landfill.’
European landfill directive: problems

- Closure and conditioning of non-compliant landfill sites
- Incorrect implementation and failure to enforce LFD in the member states: infringement cases
- Failure to meet the biodegradable municipal waste reduction targets
- Lack of clarity on technical requirements such as geological barrier, gas control and surface sealing
- Inconsistency between surface sealing and ending aftercare
European Commission landfill priorities

- Compliance with European Court of Justice rulings
- Infringement cases (follow-up)
- Investigations on individual cases
- More stringent measures for treatment of mercury waste
- Screening for:
  - Illegal landfills in EU-27
  - Biodegradable waste reduction targets in EU-27
  - WAC Decision in EU-15
  - WAC Decision in EU-12

Source: DG Environment, Waste Unit, personal communication 2011
At least 619 illegal landfills in the EU

Source: DG Environment, Waste Unit, personal communication 2011
177 waste infringement cases

Source: DG Environment, Waste Unit, personal communication 2011
Biodegradable waste reduction targets

Source: EEA 2010 - Trends and outlook for management of municipal waste in the EU-27, baseline scenario
Biodegradable waste reduction targets

Target 2006 (2010)
Target 2009 (2013)
Target 2016 (2020)

BMW treatment in 2009 (source: EUROSTAT 2011)
EC landfill technical discussions

- Curbing methane emissions in landfills: TAC WG1
  - Proposal: limit operational period and combine with efficient gas extraction
  - Opposition of MS => EC feared blocking minority
  - Instead the EC intends to aim for a total BMW ban around 2020-2025
  - WG1 will limit its work to non-committal technical guidance

- Setting criteria for monolithic waste: TAC WG2

- Unfortunately no work on geological barrier, surface sealing and (end of) aftercare

Source: DG Environment, Waste Unit, personal communication 2011
Surface sealing and aftercare

- EU Landfill Directive Art.10: ‘Member States shall take measures to ensure that all of the costs involved in the setting up and operation of a landfill site, including as far as possible the cost of the financial security or its equivalent referred to in Article 8(a)(iv), and the estimated costs of the closure and after-care of the site for a period of at least 30 years shall be covered by the price to be charged by the operator for the disposal of any type of waste in that site.’
Surface sealing and aftercare

- EU Landfill Directive Art.13(c): ‘after a landfill has been definitely closed, the operator shall be responsible for its maintenance, monitoring and control in the aftercare phase for as long as may be required by the competent authority, taking into account the time during which the landfill could present hazards.’

- EU Landfill Directive Art.13(d): ‘..for as long as the competent authority considers that a landfill is likely to cause a hazard to the environment .., the operator of the site shall be responsible. (for monitoring and analysing landfill gas and leachate.’
Surface sealing and aftercare

- Annex 1 Prov. 3.3: ‘If the competent authority after a consideration of the potential hazards to the environment finds that the prevention of leachate formation is necessary, a surface sealing may be prescribed.’

- In practice most EU member states require:
  - construction of an impermeable sealing and;
  - execution of 30-60 years aftercare

- Despite the finite aftercare, no EU member state has clear guidance for a procedure and criteria on ending aftercare.
Surface sealing and aftercare

- Assumption: regulations require a combination surface sealing on a landfill for non-hazardous waste (gas extraction in place)

- Combination surface sealing: support layer, gas drainage, mineral liner, hdpe membrane, rainwater drainage, top soil cover

- Costs: €40 - 50 per m²: on a 10 m high landfill → €4 - 5 per m³

  on a 20 m high landfill → €2 – 2.5 per m³

- NB: highly indicative, costs can vary per landfill and country
Surface sealing and aftercare

- Assumption: aftercare is carried out for 30 years
  - Leachate treatment: € 1,40 - 2,10 per m³
  - Landfill gas control: € 0,40 - 0,50 per m³
  - Monitoring: € 0,40 - 0,80 per m³
  - Maintenance: € 0,50 - 0,90 per m³
  - Management: € 0,30 - 0,70 per m³
- Total for capping and aftercare € 5,00 – 10,00 per m³
- NB: highly indicative, costs can vary per landfill and country
How much money is involved

€ / m³ (net present value at the start of aftercare including replacement)
European level playing field

- Assumption: 15 ha landfill with average height 10 m

- Financial security: $1.5\text{ million m}^3 \times 7 \text{ per m}^3 = 10.5 \text{ million €}

- MS proposal: financial security is 5% of initial investment

- Initial investment could be: land, one cell of 3 ha, a weighbridge, a shed and a leachate discharge pipe to a WWTP

- Investment < 3 million €: 5% financial security is < 150,000 €
European level playing field

- Some member states exclude public companies
- Without exactly knowing the different approaches in different EU member states, it can be stated there is no level playing field
- The cost difference can induce (inter)national waste transport
- Demanding financial security below €3 per m$^3$, whereas the cost for capping and aftercare are likely to be €5 – 10 per m$^3$, involves a risk of not being able to protect the environment
Performance-Based Aftercare and Functional Stability

- **Active Aftercare**
- **Partially Active Aftercare**
- **Passive, Self Sustaining Aftercare**

Aftercare Completion, end of Regulatory Aftercare → Custodial Care

(“de minimus” level of effort, generally focused on cap)

- **Regulatory Aftercare Program**
- **Custodial Care Program**

Level of Effort Needed to Manage Threat to HHE

- **Functional Stability Line**
- **Organic Stability Line**

End of Regulatory Aftercare (i.e., Site is Functionally Stable)

*(No presumptive scale; time needed to move from Closure to Aftercare Completion is site specific)*
Active Aftercare

Partially Active Aftercare

Passive, Self Sustaining Aftercare

Aftercare Completion

Custodial Care ("de minimus" level effort, generally focused on cap)

NB: sealing => processes stop => aftercare cannot decrease

Level of Effort Needed to Manage Threat to HHE

Required Aftercare decreases with time

Regulatory Aftercare Program

Custodial Care Program

Closure

End of Regulatory Aftercare (i.e., Site is Functionally Stable)

Time*

*(No presumptive scale; time needed to move from Closure to Aftercare Completion is site specific)
Summary

- At different paces Europe is moving away from landfill
- Less disposal does NOT mean less consumption of resources
- Illegal landfills and incorrect implementation remain a problem
- Some technical requirements in the LFD are not clear
- Criteria for ending aftercare have not been provided
- These are necessary to force member states and operators to cover the correct and total cost and not transfer to the future
Thank you for your attention