

# **Status of landfilling and legal aspects in Europe**

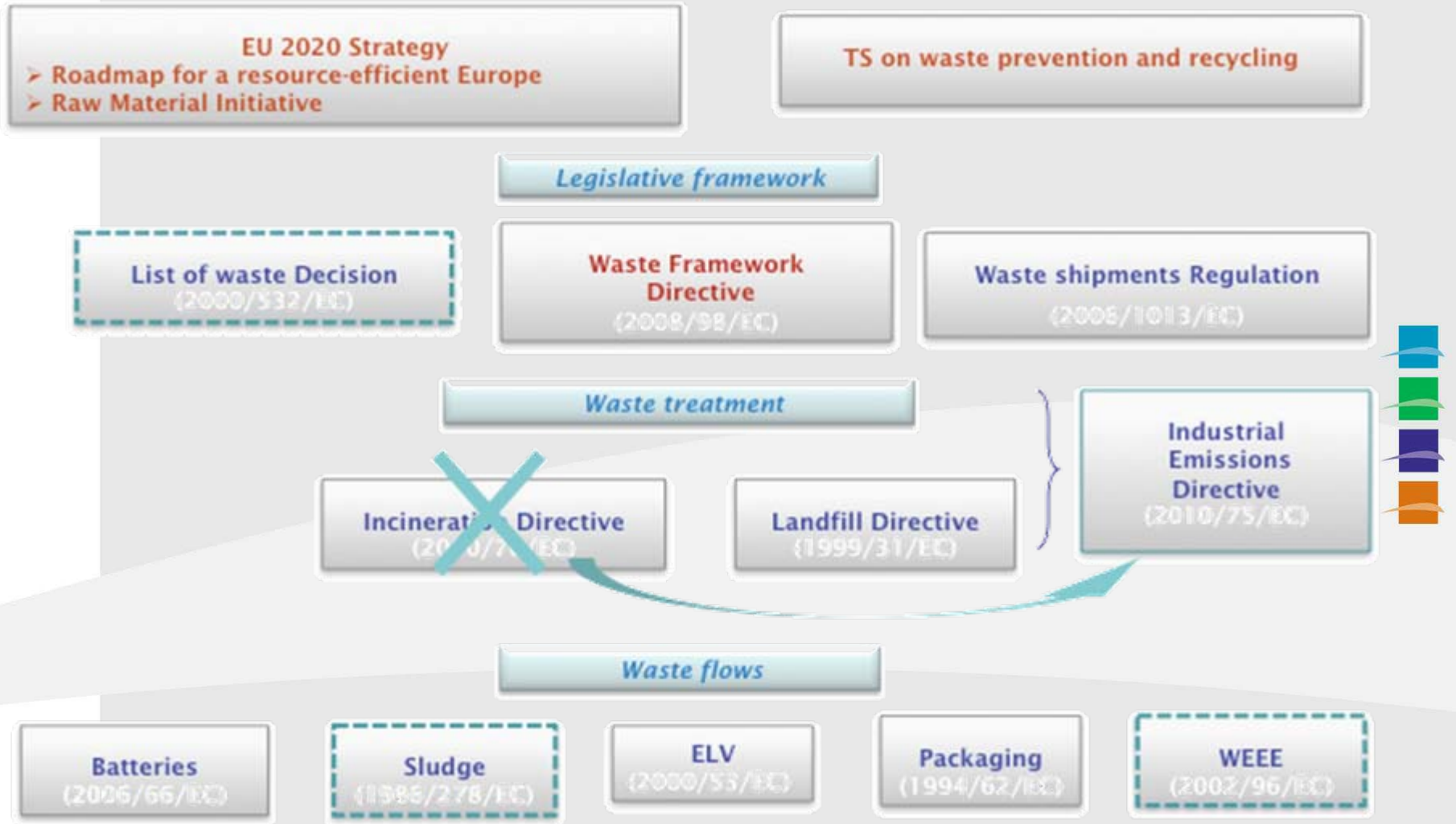


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# European landfill regulations

- v COUNCIL DIRECTIVE 1999/31/EC of 26 April 1999 on the landfill of waste (LFD)
- v COUNCIL DECISION of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC (WAC)



# European landfill directive

v 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

- v The articles of the LFD provide:
  - v definitions of waste and waste treatment
  - v define the scope of the directive: e.g. mining waste and land application of sludge are excluded
  - v define the classes of landfill: for hazardous, non-hazardous and inert waste
  - v provides the biodegradable municipal waste reduction targets: 75% (2006), 50% (2009) and 35% (2016) of the amount landfilled in 1995



# European landfill directive

- v The articles of the LFD provide:
  - v requirements for permit application, conditions and content of the permit
  - v requirements for financial security and coverage of the cost of landfill
  - v requirements for control and monitoring procedures (detailed in Annex III)
  - v requirements for closure and aftercare procedures
  - v requirements for existing sites (conditioning plan or close)
  - v reporting obligations
  - v requirements for leachate management, liner systems, gas control, stability, nuisance and hazards in Annex I



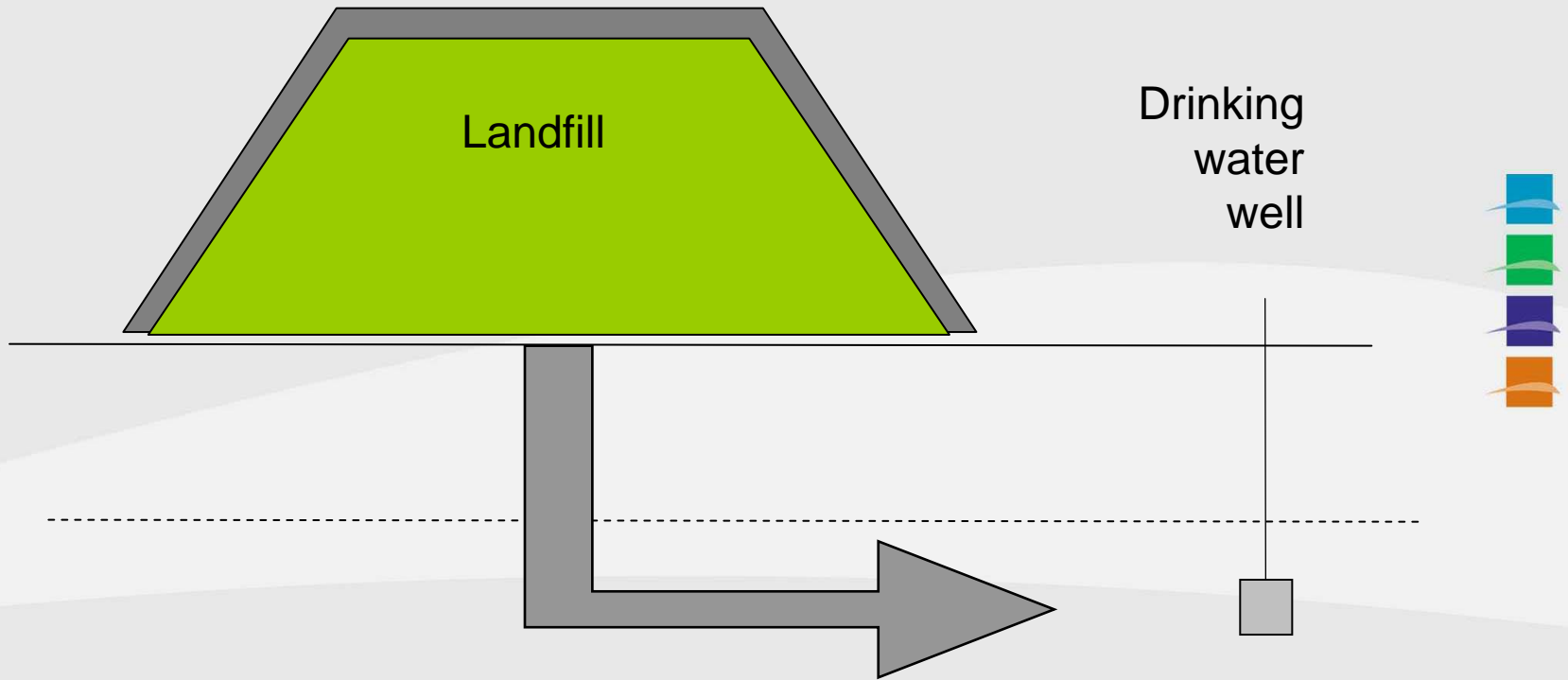
# Waste Acceptance Criteria (Annex II)

- v WAC specifies procedures and limit values for testing, verification and acceptance of waste on the different classes of landfills including underground storage
- v 'Composition, leachability, long-term behaviour and general properties of a waste must be known as precisely as possible...'
- v Leaching limit values were introduced with regard to groundwater protection: source – path – threatened object
- v Backward modelling from a point of compliance





# Establishment of WAC



# Transposition of WAC

- v It is a very complicated piece of regulation leaving a lot of room for interpretation
- v It is insufficiently detailed and specified to result in national regulations that are verifiable, workable or enforceable
- v Decisions have to be made at national level in order to obtain enforceable regulation
- v Many members states have literally translated the Council Decision and consequently something hard to verify and enforce



# European landfill directive: problems

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

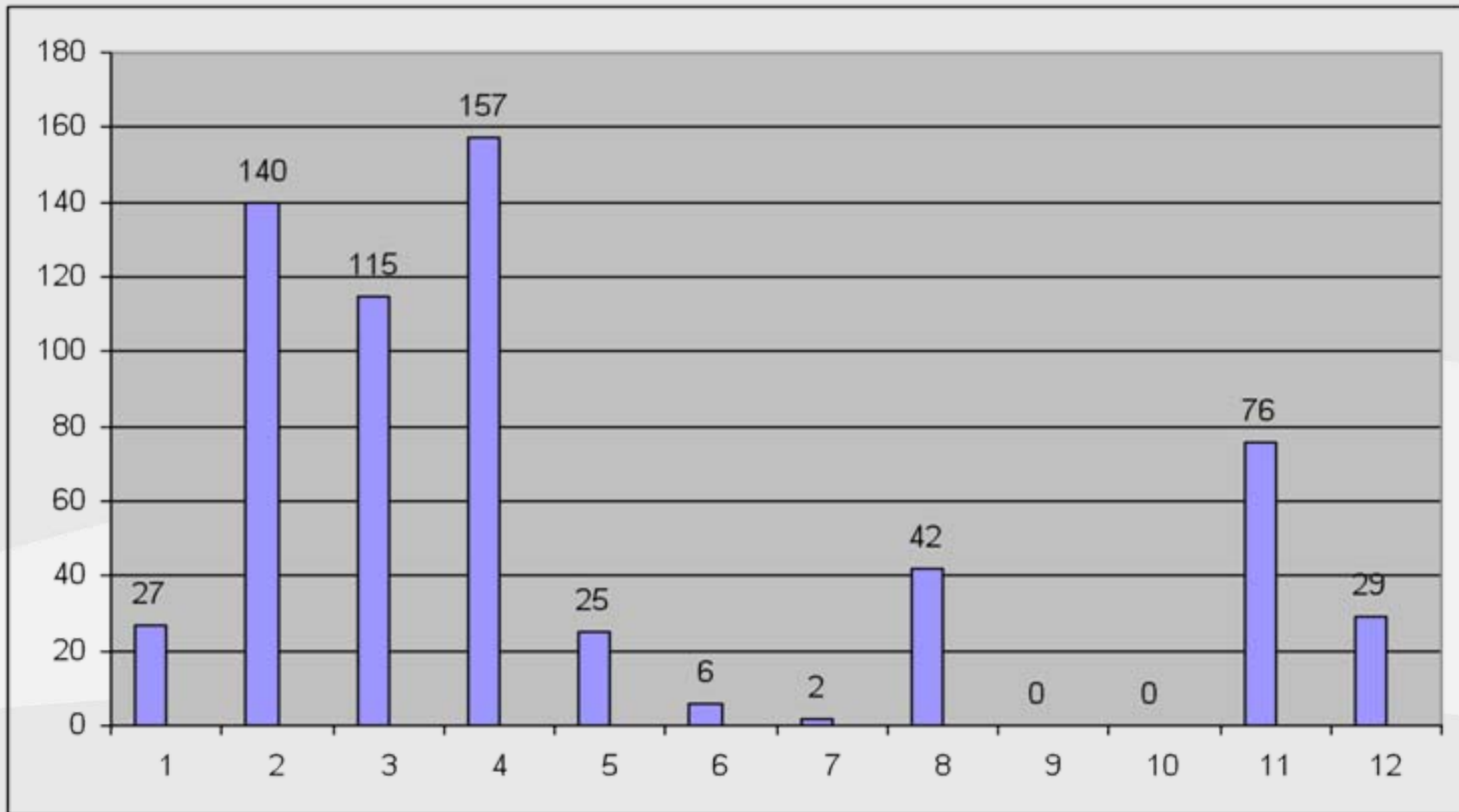


# European Commission landfill priorities

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

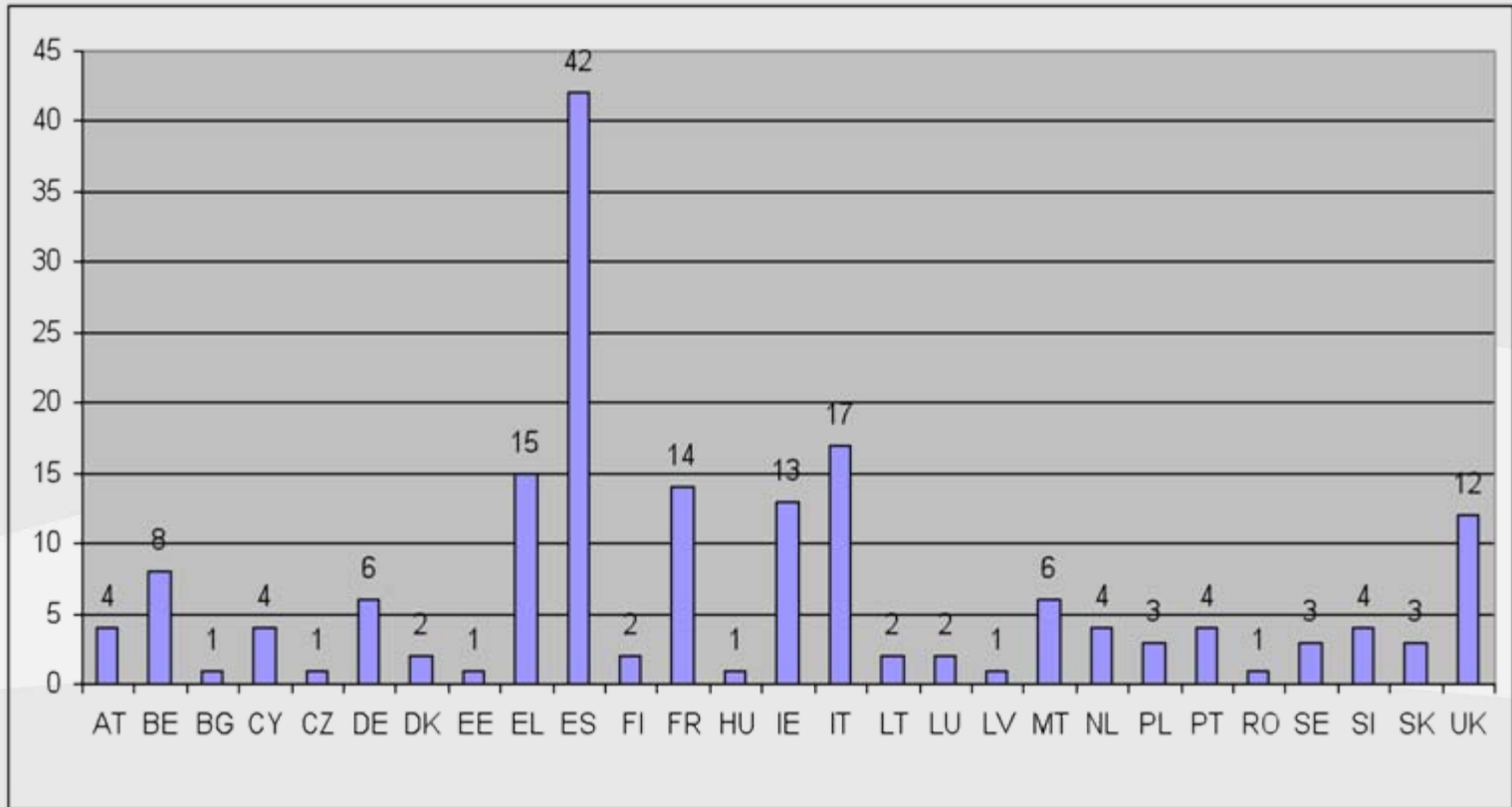


# At least 619 illegal landfills in the EU

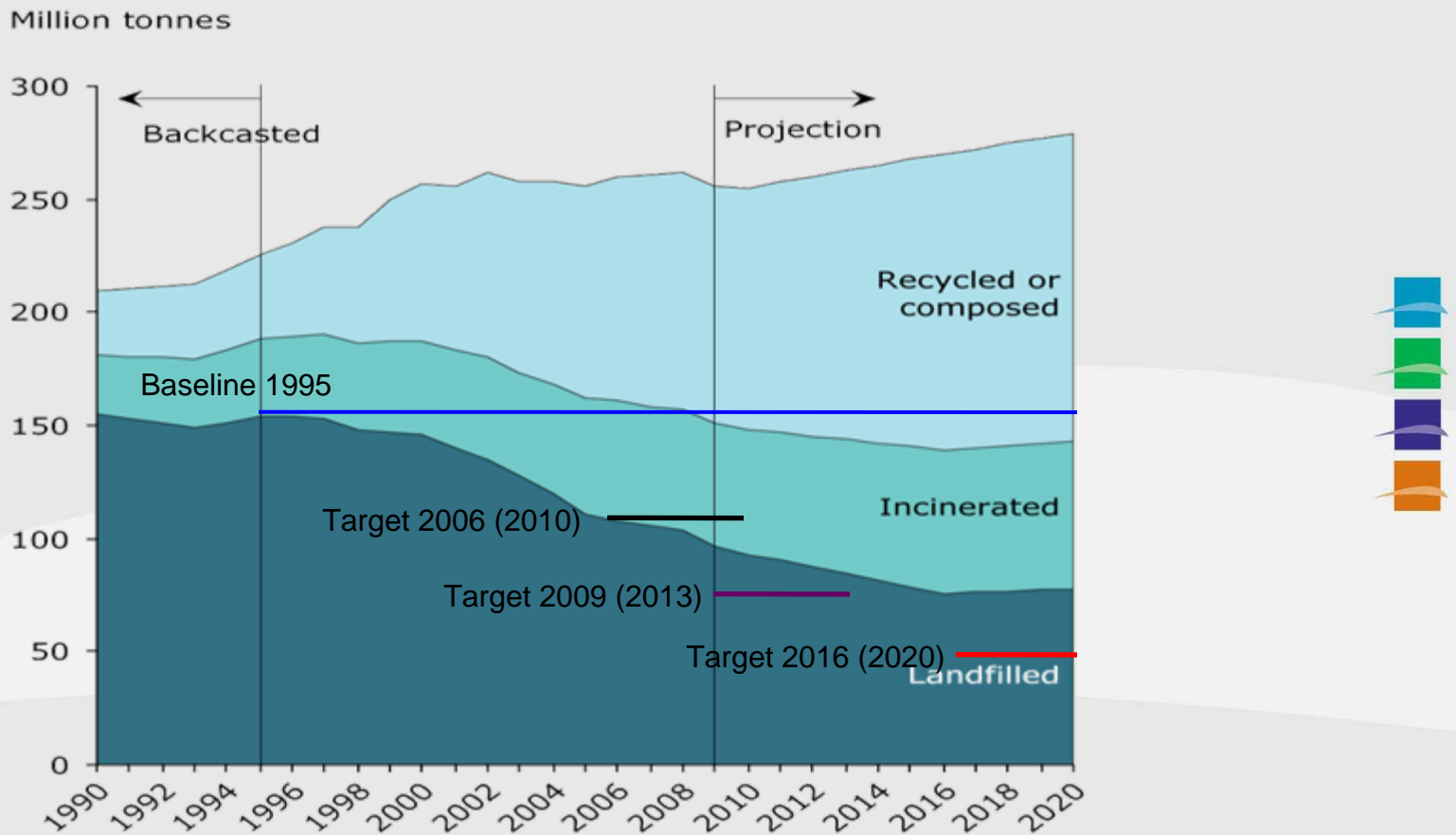


Source: DG Environment, Waste Unit, personal communication 2011

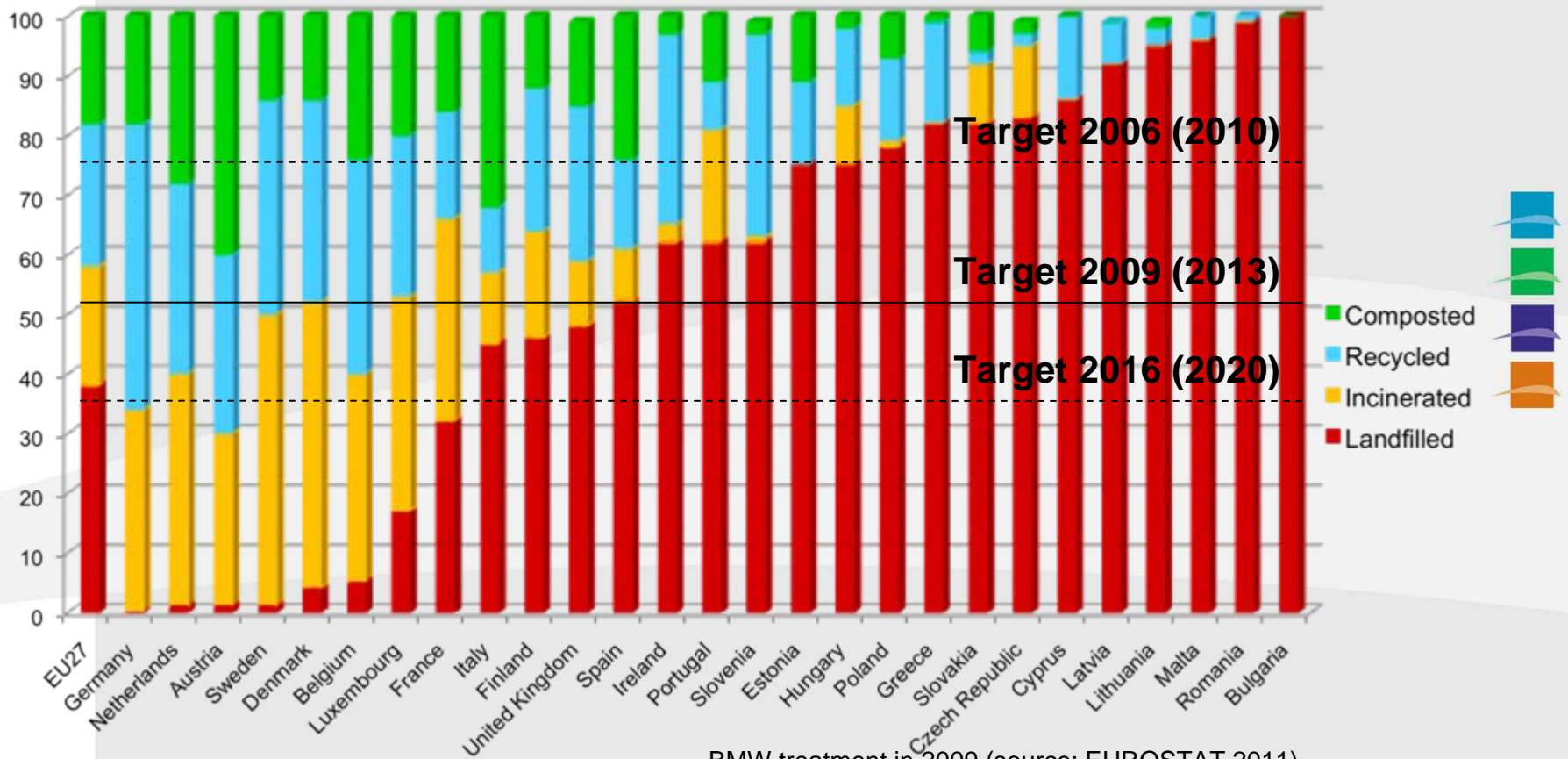
# 177 waste infringement cases



# Biodegradable waste reduction targets

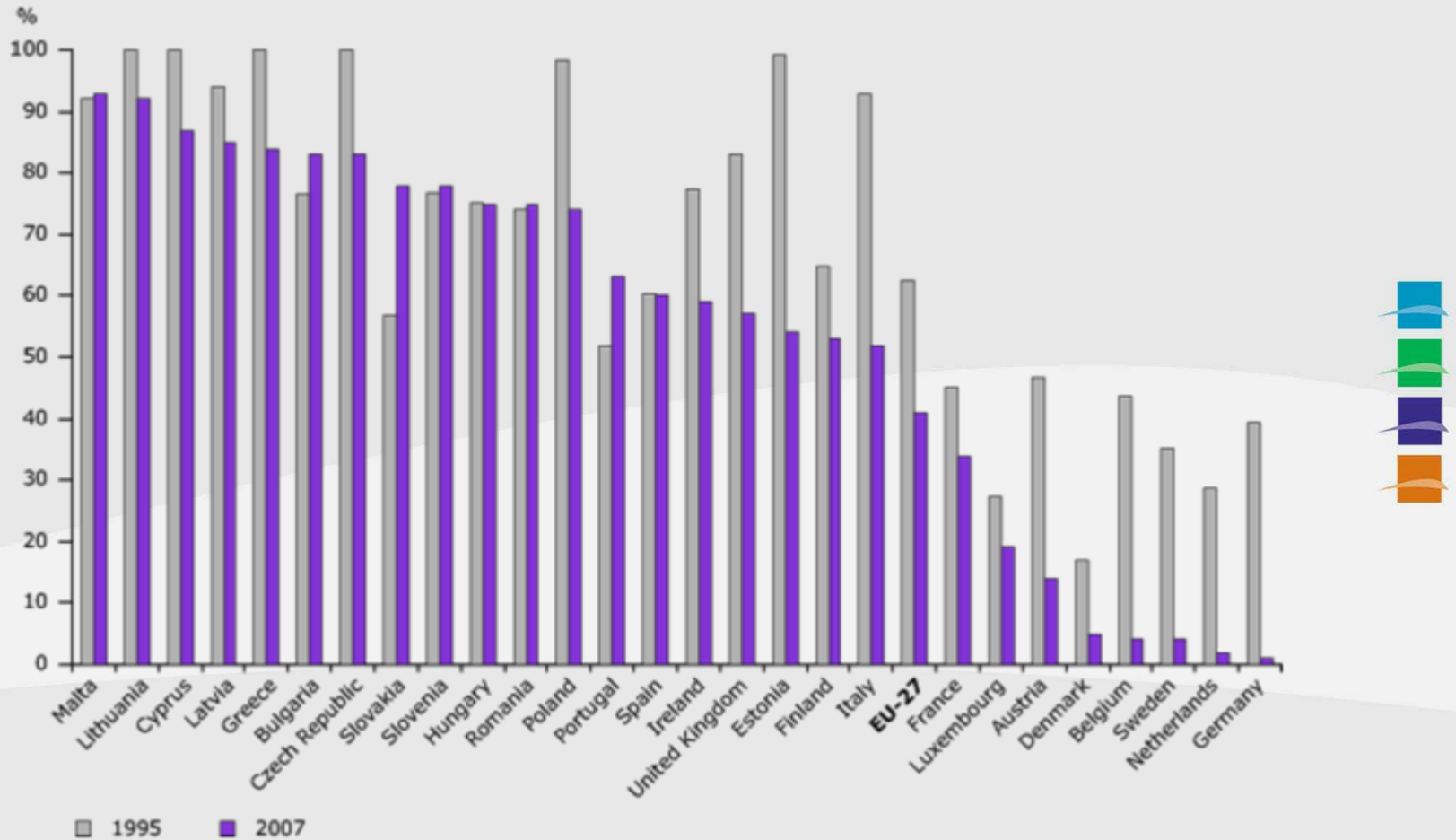


# Biodegradable waste reduction targets





# Biodegradable waste reduction targets



Source: EEA 2009, Diverting waste from landfill – Effectiveness of waste-management policies in the European Union (Report 7)

# EC landfill technical discussions

- v Curbing methane emissions in landfills: TAC WG1
  - v Proposal: limit operational period combined with efficient gas extraction
  - v Opposition of MS => EC feared blocking minority
  - v Instead the EC intends to aim for a total BMW ban around 2020-2025
  - v WG1 will limit its work to non-committal technical guidance
- v Setting criteria for monolithic waste: TAC WG2
- v Unfortunately no work on geological barrier, surface sealing and (end of) aftercare



# Outlook gas recovery guidance

- v LFG generation and emission
- v Quantification and prediction
- v State-of-the-art recovery systems
- v Design of recovery systems
- v Pipe work
- v Blowers and flares
- v LFG utilisation options
- v Operation and maintenance
- v Monitoring
- v Additional measures:
  - v Leachate recirculation
  - v Landfill bioreactor
  - v Aeration
  - v Enhanced methane oxidation



# Surface sealing and aftercare

- v 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

- v 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..’
- v 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.’
- v In practice: impermeable sealing and 30-60 years aftercare is mandatory, but no guidance on ending aftercare



# Surface sealing and aftercare

- v Assumption: regulations require a combination surface sealing on a landfill for non-hazardous waste (gas extraction in place)
- v Combination surface sealing: support layer, gas drainage, mineral liner, hdpe membrane, rainwater drainage, top soil cover
- v Costs: € 40 - 50 per m<sup>2</sup>: on a 10 m high landfill → € 4 - 5 per m<sup>3</sup>  
on a 20 m high landfill → € 2 – 2.5 per m<sup>3</sup>
- v NB: highly indicative, costs can vary per landfill and country



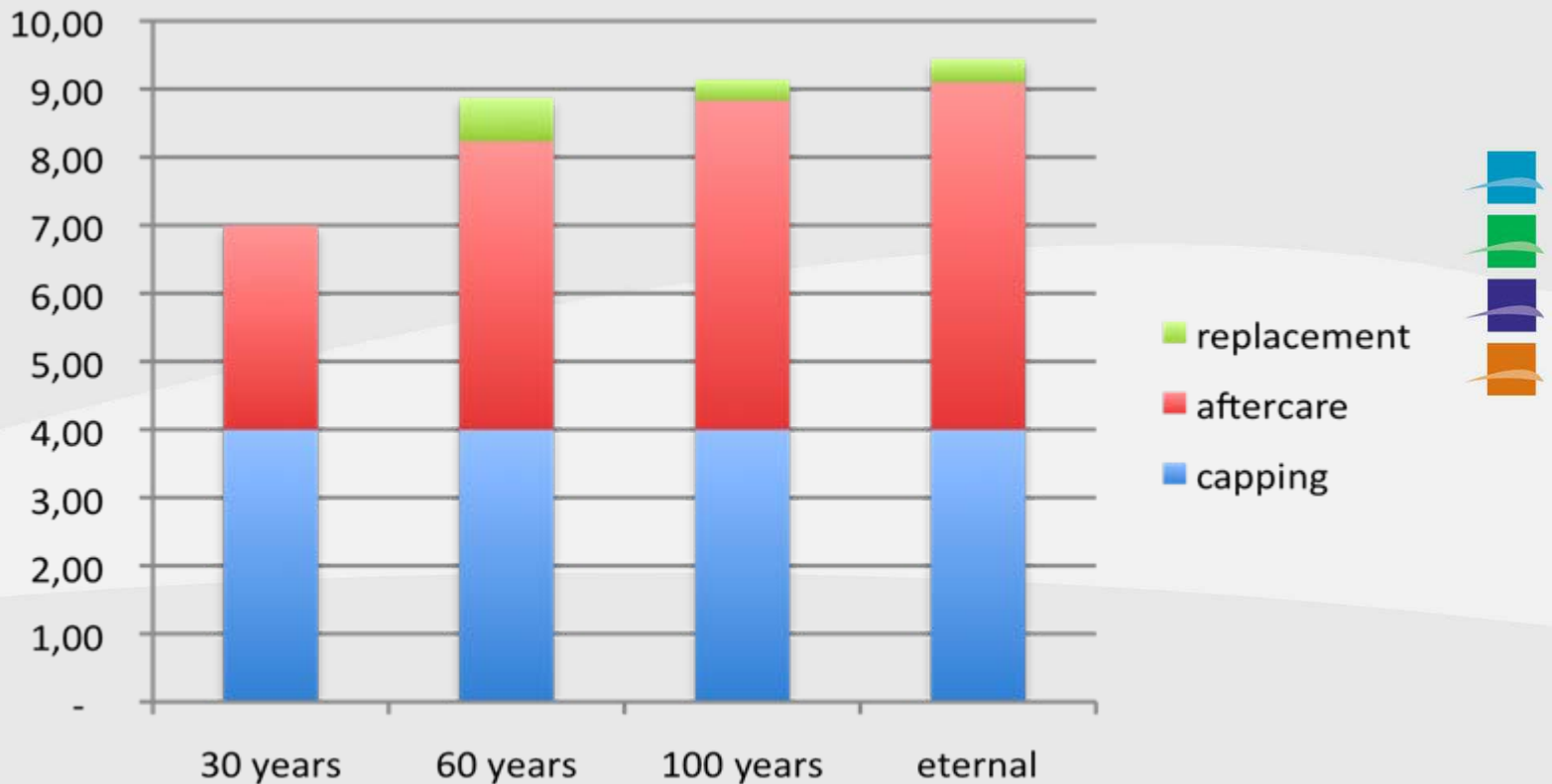
# Surface sealing and aftercare

- v Assumption: aftercare is carried out for 30 years
- v Leachate treatment: €1,40 - 2,10 per m<sup>3</sup>
- v Landfill gas control: €0,40 - 0,50 per m<sup>3</sup>
- v Monitoring: €0,40 - 0,80 per m<sup>3</sup>
- v Maintenance: €0,50 - 0,90 per m<sup>3</sup>
- v Management: €0,30 - 0,70 per m<sup>3</sup>
- v Total for capping and aftercare €5,00 – 10,00 per m<sup>3</sup>
- v NB: highly indicative, costs can vary per landfill and country



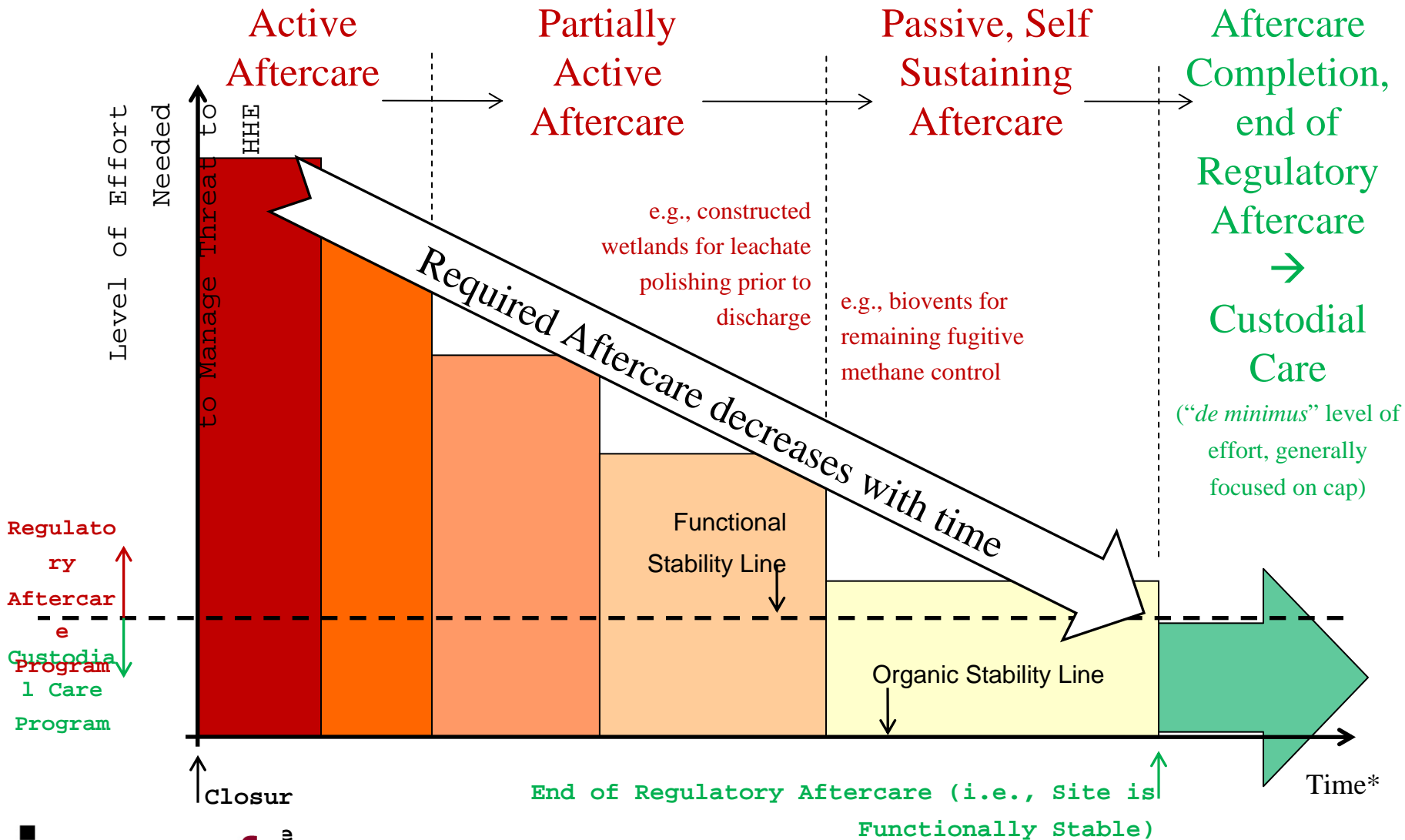
# How much money is involved

€/ m<sup>3</sup> (net present value at the start of aftercare including replacement)



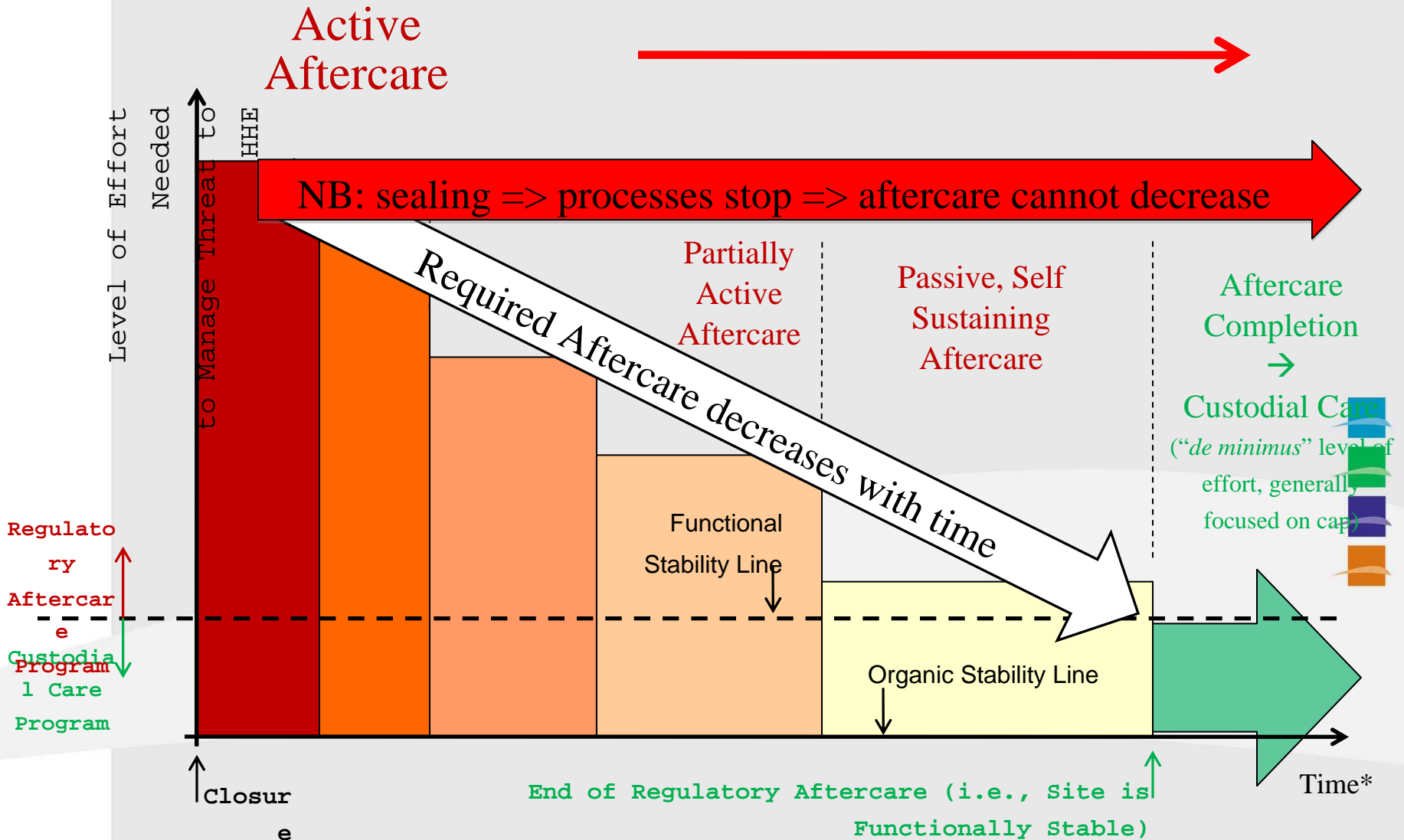


# Performance-Based Aftercare and Functional Stability



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

# Performance-Based aftercare



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

# Conclusions

- v At different paces Europe is moving away from landfill
- v Illegal landfills and incorrect implementation remain a problem
- v Some technical requirements in the LFD are not clear
- v In many member states an inconsistency exists between surface sealing requirements and 30 years aftercare
- v The real costs of landfill are not charged to the customer
- v They cannot be accurately determined without criteria and guidance for end of aftercare



**AFVALZORG**

**Thank you very much  
for your attention**

