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Introductie
Duurzaam
Stortbeheer

AFVALZORG

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Don’t isolate, but stabilise!

COCOON
Interreg Europe

Execution of full-scale pilots introduction Sustainable Landfill Mangement

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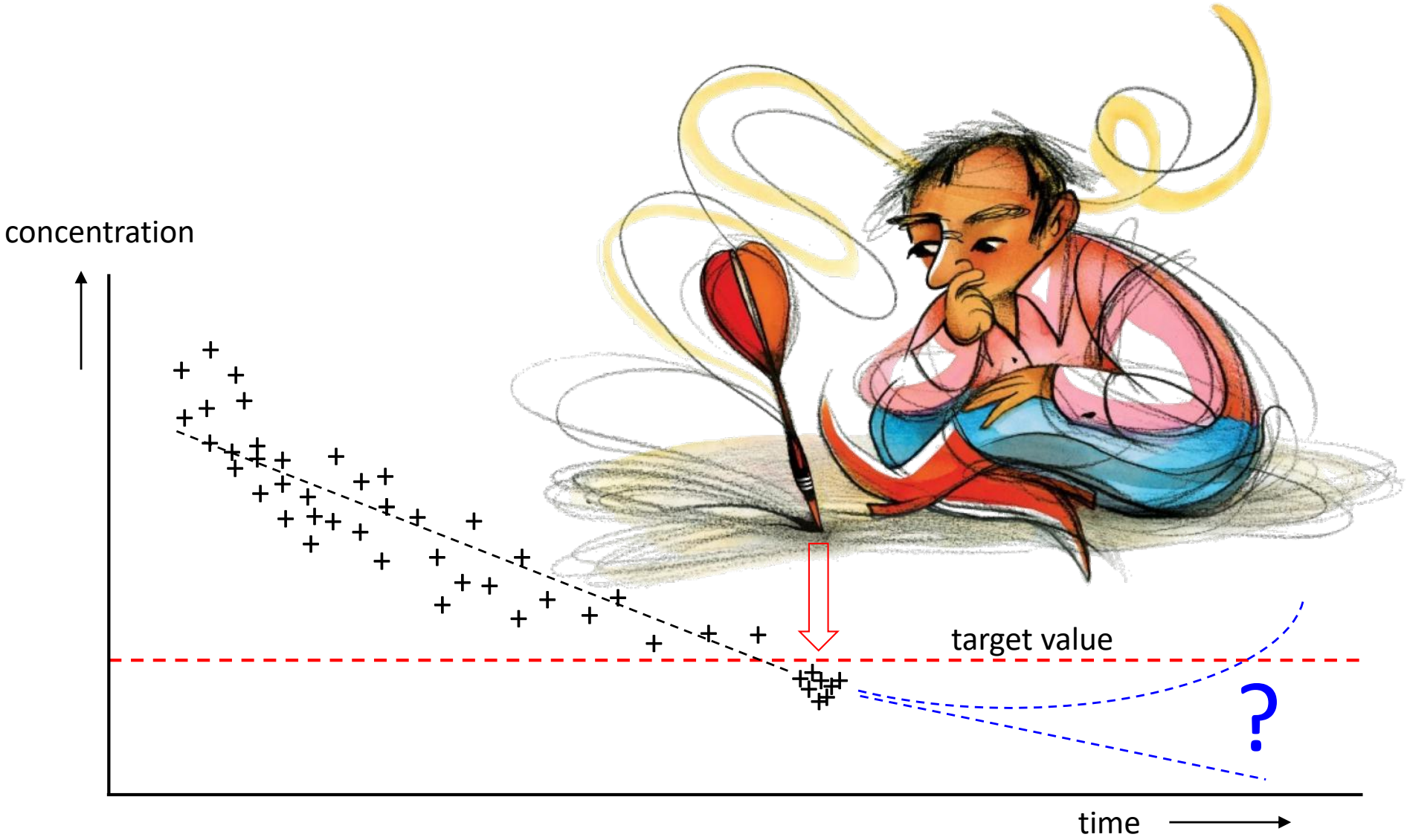
Content

- Feasibility of target values
- Technology
  - Infiltration: Kragge
  - Aeration: Braambergen en Wieringermeer
- Organisation
- Planning
- Challenges

Feasibility of target values



Feasibility of target values

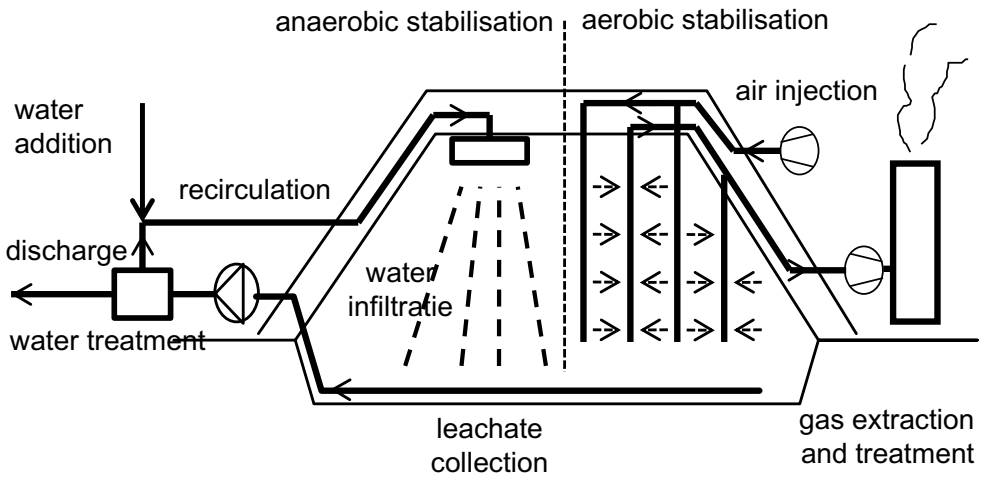
Project plans pilots: www. duurzaamstortbeheer.nl/lezen/

	Mechanisms for reduction	Estimated reduction	Necessary reduction
Heavy metals			
arsenic	increase Fe(OH)3-complexation	20-50%	0-10%
cadmium	n.c.		geen
chromium	decrease DOC-complexation	>60%	0-80%
copper	n.c.		geen
nickel	decrease DOC-complexation	>60%	~30-50%
lead	decrease DOC-complexation	>25%	geen
zinc	decrease DOC-complexation	>0%	0-40%
mercury	n.c.		geen
Macroparameters			
chloride	leaching	10-80%	0-90%
sulphate	formation during aeration	0%	0-10%
ammonium	aeration (anamox)	50-90%	75-98%
Organic micro cont			
mineral oil	decrease DOC-complexation, aerobic degradation	>90%	0-70%
VOX	stripping, aerobic degradation	>95%	0-90%
PAH	decrease DOC-complexation, aerobic degradation	>90%	95-99%
BTEX	stripping, aerobic degradation	>95%	60-99%
fenols	aerobic degradation	>> 90%	0-99%

n.c.: not considered, the actual concentrations already comply with the target values

Technical approach

- Essentially there are two options for stabilisation
  - Infiltration and recirculation of water can accelerate anaerobic degradation, but cannot complete degradation
  - Aeration is necessary to degrade remaining organic matter aerobically
- These techniques have been applied succesfully on landfills and in soil and groundwater remediation
- It is however not demonstrated that target values can be reached and remain unchanged in the future

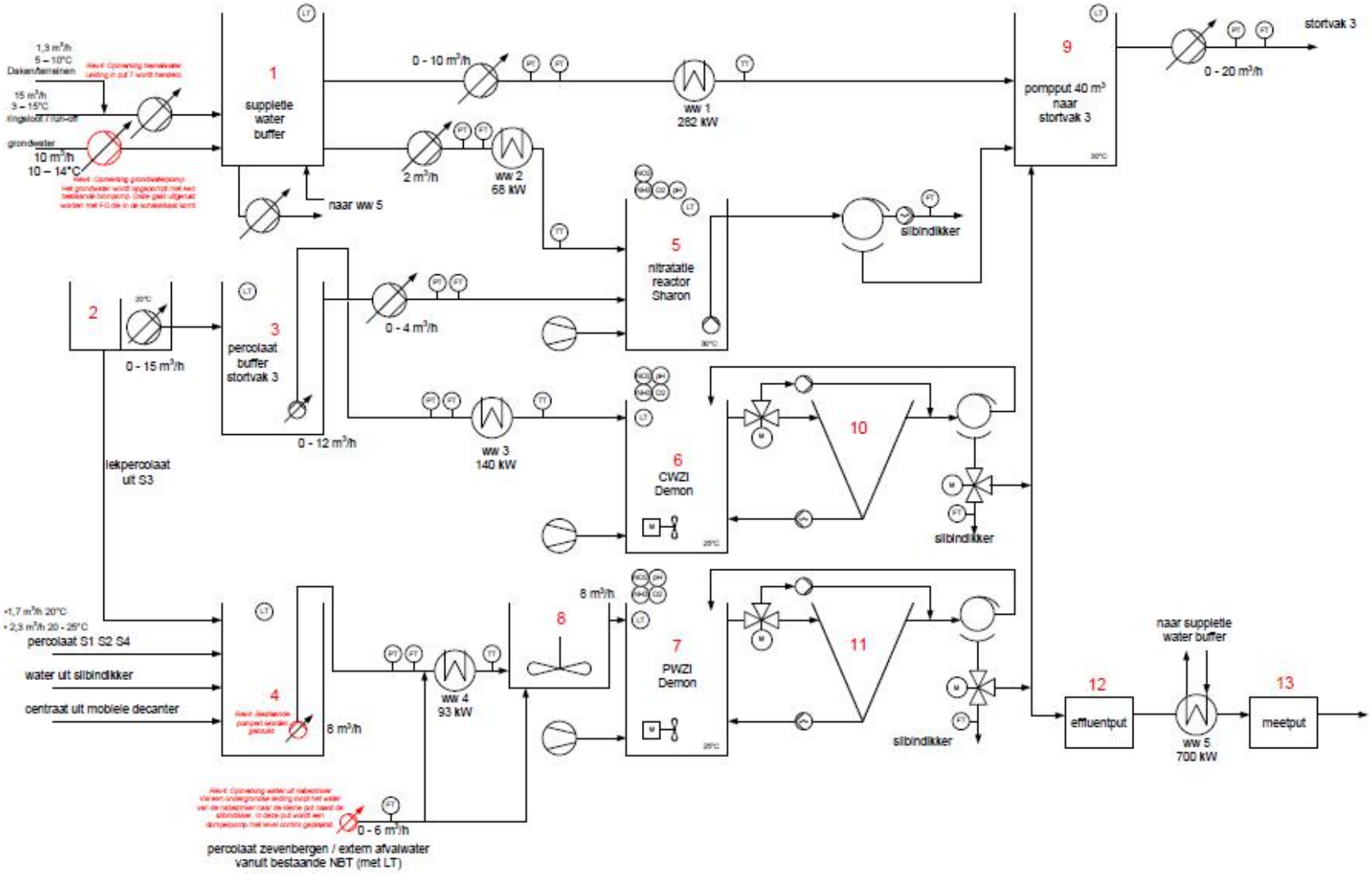


www. duurzaamstortbeheer.nl/lezen/

Infiltration and recirculation: pilot Kragge (5.6 ha)

Infiltration and recirculation: pilot Kragge

Infiltration and recirculation: pilot Kragge



attero
energiek met milieu

Aeration: pilot Braambergen (9.7 ha)

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Aeration: pilot Wieringermeer (3.0 ha)

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Aeration: pilots Braambergen and Wieringermeer

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Aeration: pilots Braambergen and Wieringermeer

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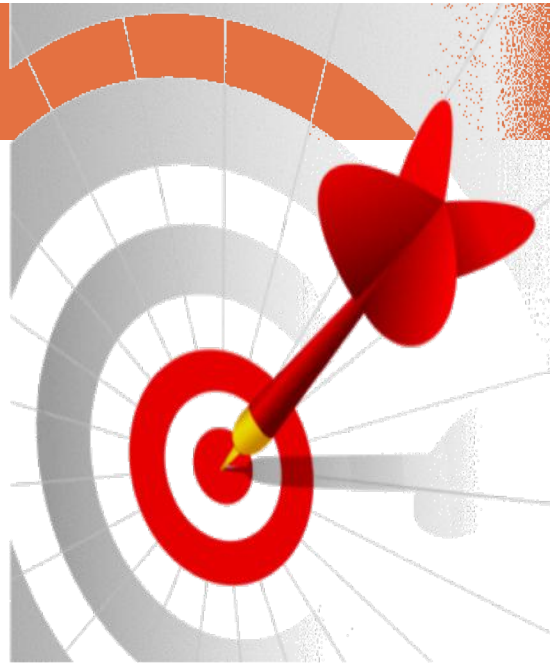
Planning

- The Green Deal introduction Sustainable Landfill Management was signed on 6 oktober 2015
- On the same day provinces and operators signed agreements to carry out pilots according project plans
- The ministry issued an amended landfill decree and a ministerial decison that entered into force 1 July 2016
- Provinces amended permits of the pilot sites
- Landfill operators carried out final design, tendering and construction of the pilots
- The aeration projects were started in August and September 2017
- The recirculation project was started in March 2018

Planning

- Official and festive start of the pilots May 2017
- The pilots will run until 2026
- 2025-2026: 1 year monitoring to determine succes
- 2026-2028: evaluation and decision to permanently amend the landfill legislation

Challenges



- Techniques are proven,
  but require optimisation
- Ammonium and chloride target values are probably harder to reach than heavy metals and organic contaminants
- The biggest challenge is not to demonstrate that target values have been reached, but to convince that they will not deteriorate in the future
- Statements on the future can only be made with models
- Existing models require combining, expanding, improvement and above all validation
- Transport (preferential pathways) and degradation / stabilisation (C, N) require fundamental research