

Intermunicipal Association Hooge Maey

From historical blackpoint to integrated green production site



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History

- Polder located on higher grounds in the Antwerp harbour
- 1967: start of landfill operation, owner: city of Antwerp
- Resulting in an true dump site and a polluted area
- Mid '90s: remediation was inevitable

⇒ Intermunicipal Association Hooge Maey was founded in 1998 as a PPP with Indaver as private partner

Location



Sustainable remediation



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Sustainable remediation

- Based on risk assessment
 - Main risks:
 - Groundwater pollution
 - Pollution of the atmosphere
 - Soil pollution
- => fitting remediation plan
- remediation plan based on the IMC-principle:

- 
- Isolate
 - Master
 - Control

Isolate

All pathways for contaminants to soil, groundwater and atmosphere must be sealed off by:

- the underlying natural clay barrier
- remodelling the slopes
- final capping which consists of:
 - impermeable support layer
 - artificial liner
 - drainage sand
 - cover soil
- vertical clay barriers

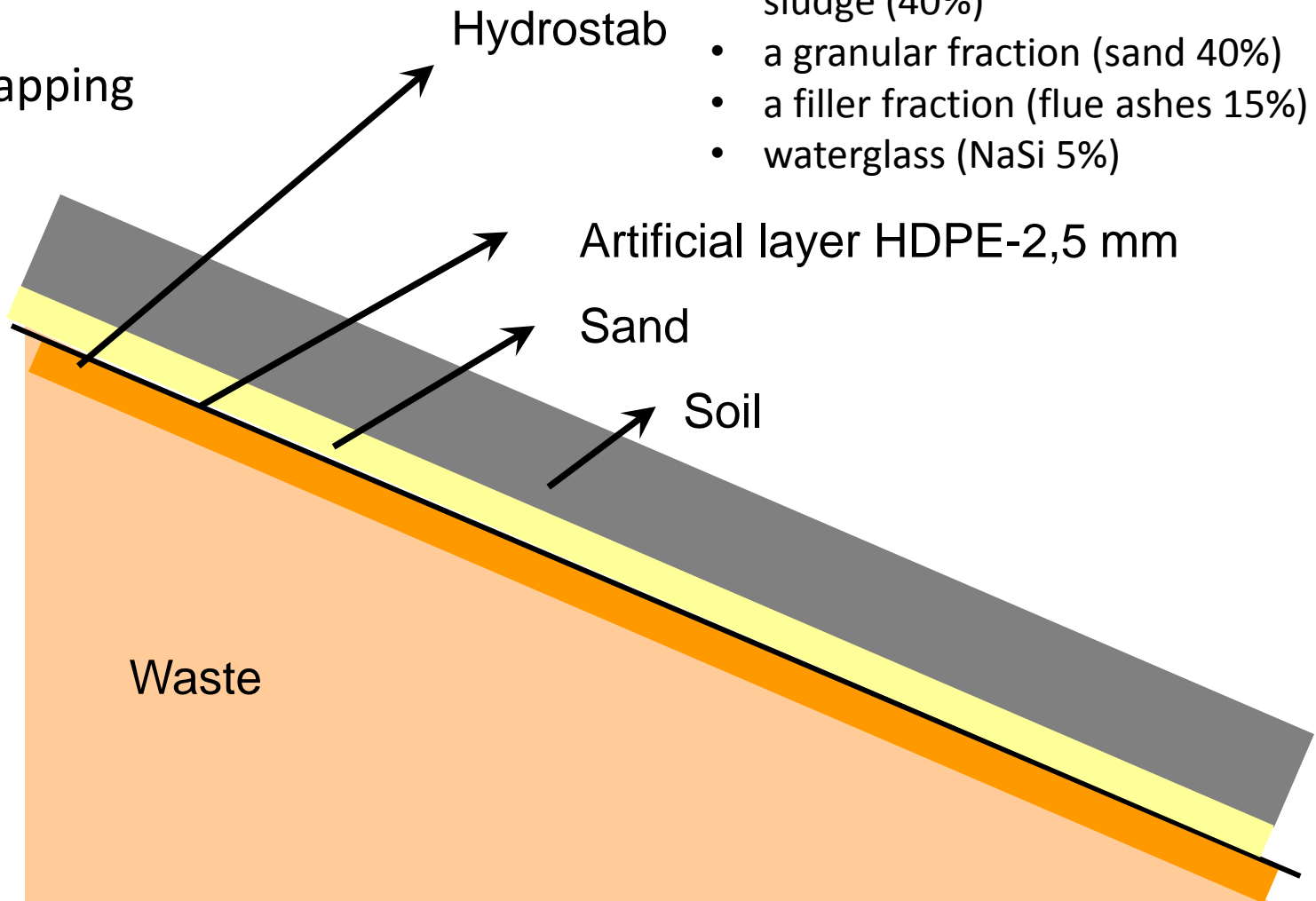


Isolate – slope modulation



Isolate – Final capping

Final Capping



mixture of:

- dehydrated water purification sludge (40%)
- a granular fraction (sand 40%)
- a filler fraction (flue ashes 15%)
- waterglass (NaSi 5%)

Isolate – Final capping



Isolate – Hydro seeding



Isolate - Final result

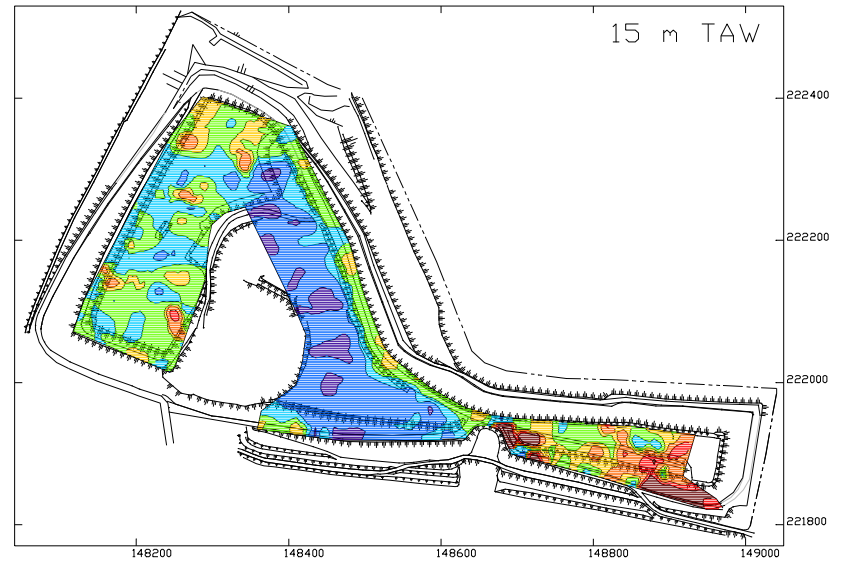
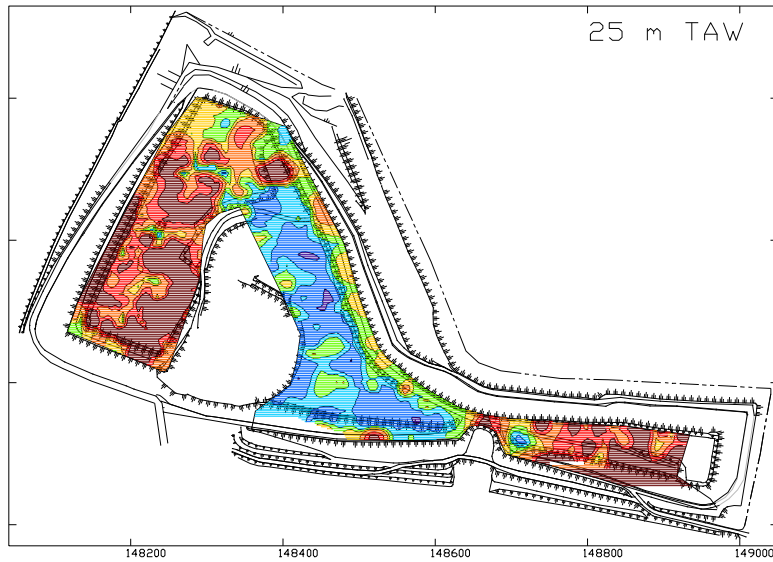


Master

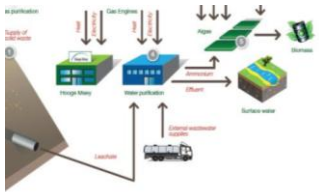
- To avoid
 - Contamination of groundwater
 - Methane emission to the atmosphere

- Done by:
 - Geo-electrical survey
 - Extraction of leachate
 - Extraction of landfill gas
 - Rainwater management

Master - Geo-electrical survey



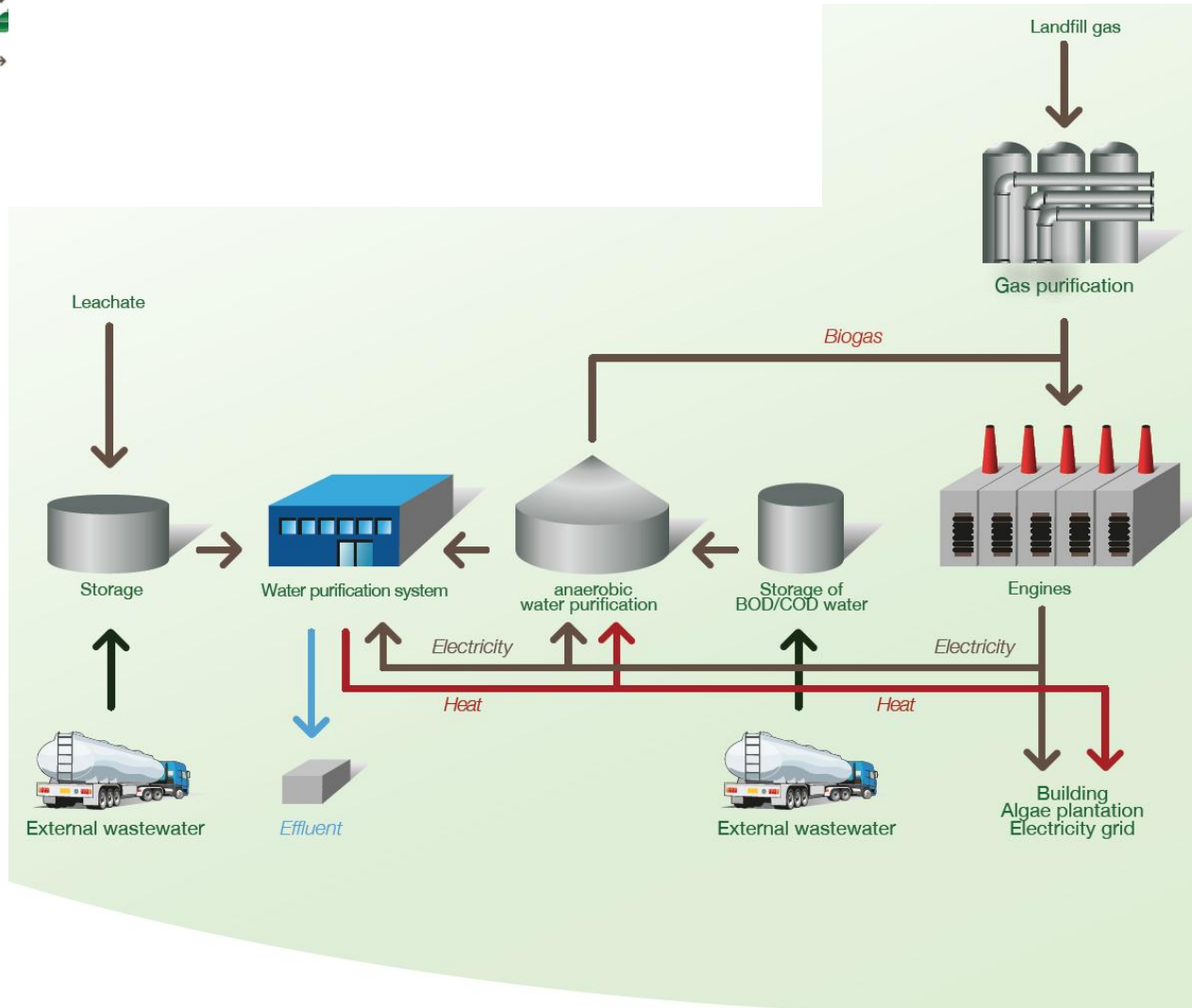
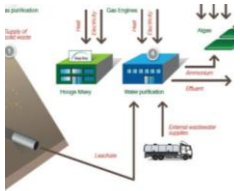
Master – Leachate extraction and waterpurification



- modern and high-performance water purification plant
- Biological aerobic and anaerobic reactor
- licensed to treat its own water + external waste water
- additional storage tanks are being built to accept water from 3rd parties

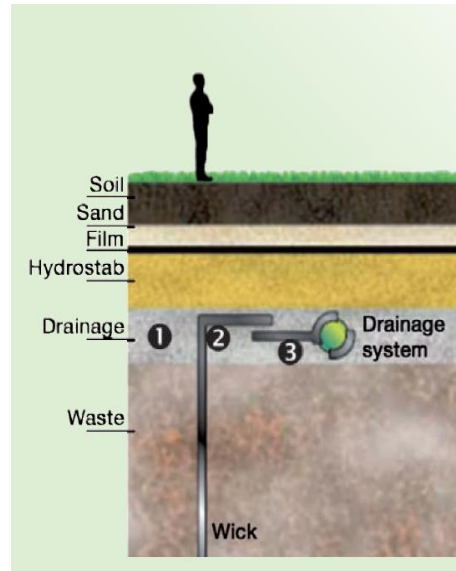


Master – Leachate extraction and waterpurification

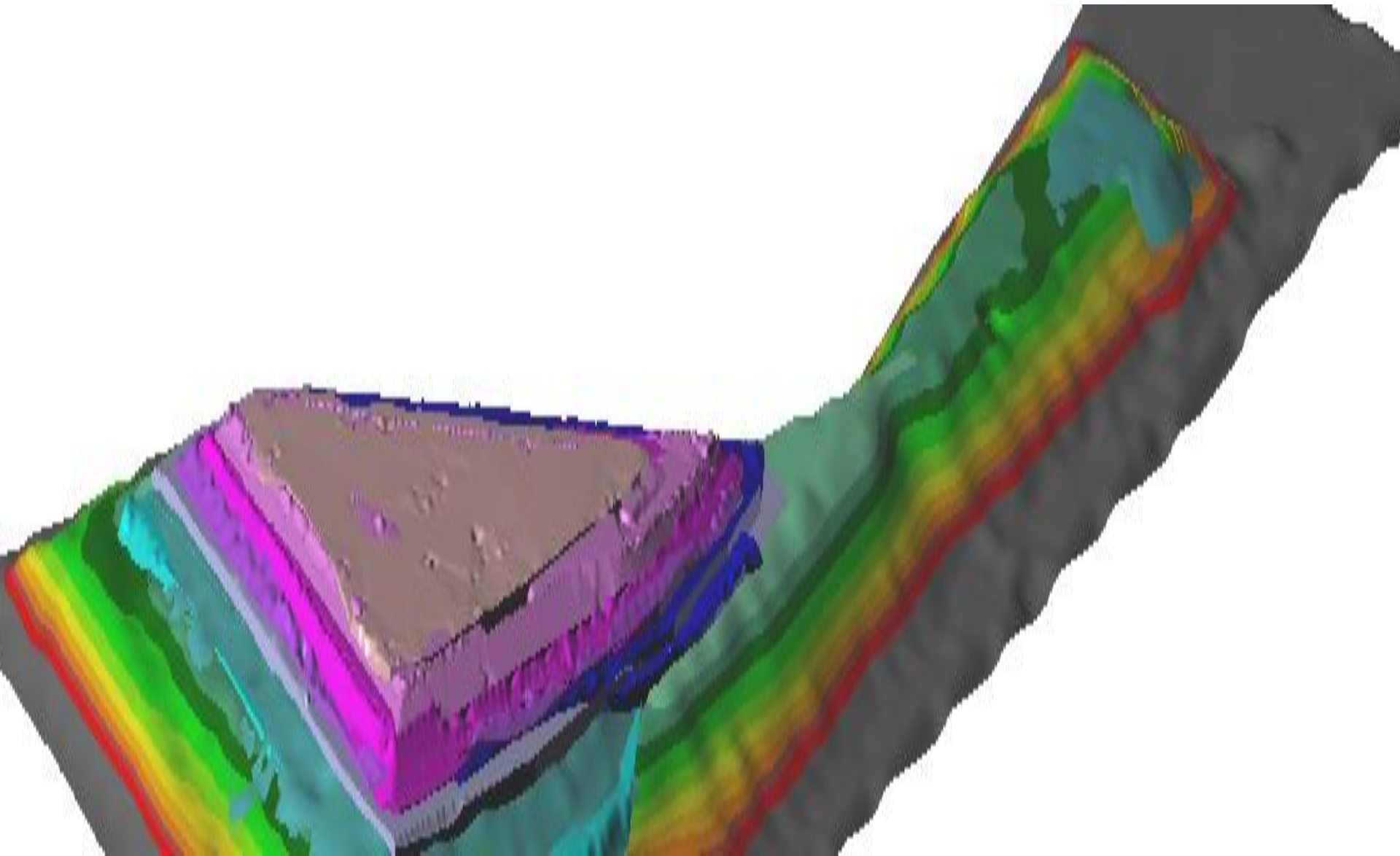


Master – Gas extraction and valorisation

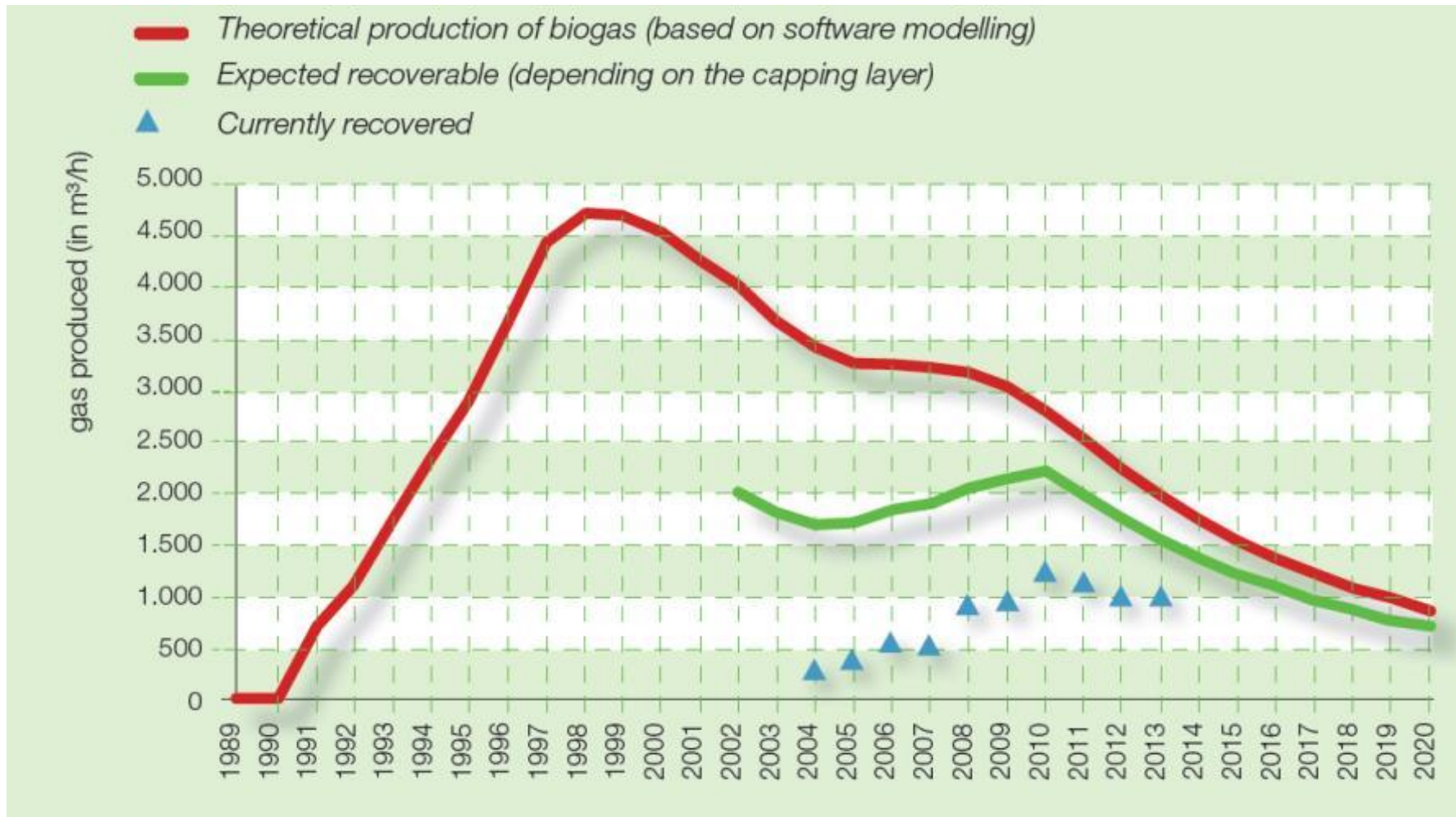
- Extraction through shafts and vertical wick drains
- Biogas is led to purification system
- Engines produce electricity
- Gas production will reduce over time
- Main goal is to maximize the gas flow
 - network adjustments
 - optimized maintenance
 - water injection



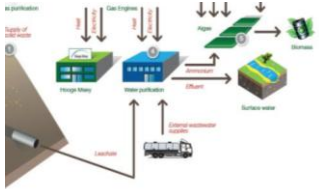
Master – Gas extraction and valorisation



Master – Gas extraction and valorisation



Master – Rainwater management



- The capping system prevents contact between waste and the environment but also prevents rainwater seeping into the landfill mass
- A hydrodynamic study was performed, the basis to design the drainage system



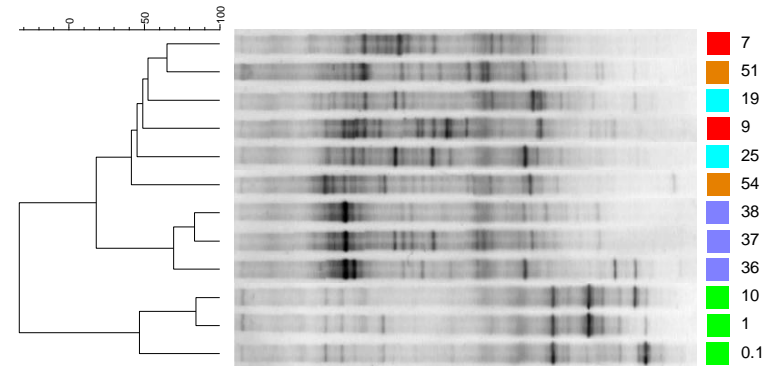
Control

Control landfill environmental impact on groundwater

- Monitoring shafts in 37 locations
- 3 shafts to every control area (depths to 10, 20 and 40 m)
- Regular check-ups
- Tracers:
 - Genetic identification of groundwater and leachate bacteria
 - tritium H_3



Cosine coefficient (Tol 1.0%-1.0%) (H>0.0% S>0.0%) [0.0%-100.0%]
dgge dgge

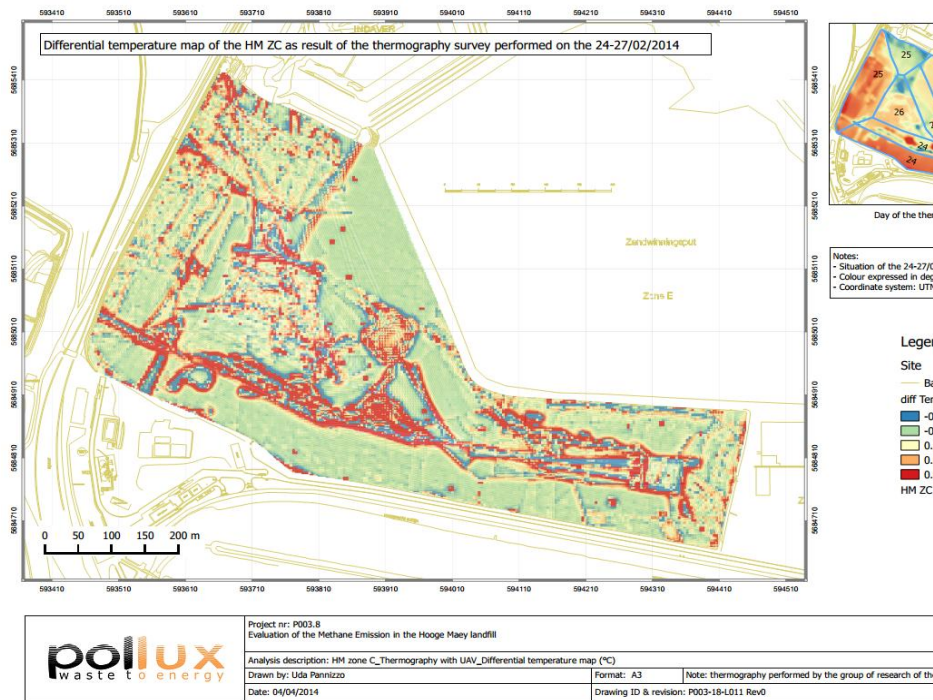


Control

Control landfill environmental impact on the atmosphere



- Emissions of methane to the atmosphere
- Leaks are contra-productive
- Investigation by means of:
 - Thermography with UAV (Unmanned Aerial Vehicle, Drone)
 - Qualitative method
 - Find areas of higher emission or leaks
 - Flux chamber technique
 - Quantitative method
 - Quantify amount of emission and effect of leaks



Activities today

- Landfilling of non-hazardous waste
- Temporary storage of combustible waste
- Energy production and heat recovery
- Water purification
- Algae production

Landfilling of non-hazardous waste



- Close the old landfill
- Build a new landfill completely isolated from his environment using:
 - A clay barrier
 - Leak detection
 - Artificial liner
 - Drainage system

These days waste inflow decreasing strongly due to waste treatment hierarchy and increased incineration capacity

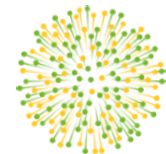
Landfilling of non hazardous waste - Supply

weight (tonnes)



Activities today

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- **Temporary storage of combustible waste**
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Temporary storage of combustible waste



Landfill functions as

- Safety net in case of emergencies
- Temporary storage of combustible waste for incinerators, thus increasing their storage capacity
 - Temporary storage of combustible waste for WtE plant (37,500 ton permit)

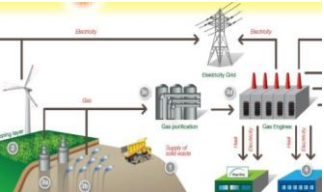


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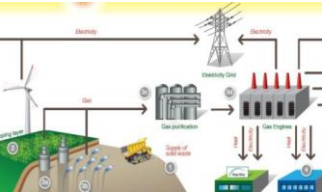


Energy production and heat recovery



- Gas valorisation
- Solar energy
- Wind energy
- Heat recovery

Energy recovery : gas engines



- Gas extraction : 1,200 m³/h
- 4 engines, installed 4 MW power capacity
- Production: 15,000 MWh per year
- Gascleaning based on gas drying and active carbon



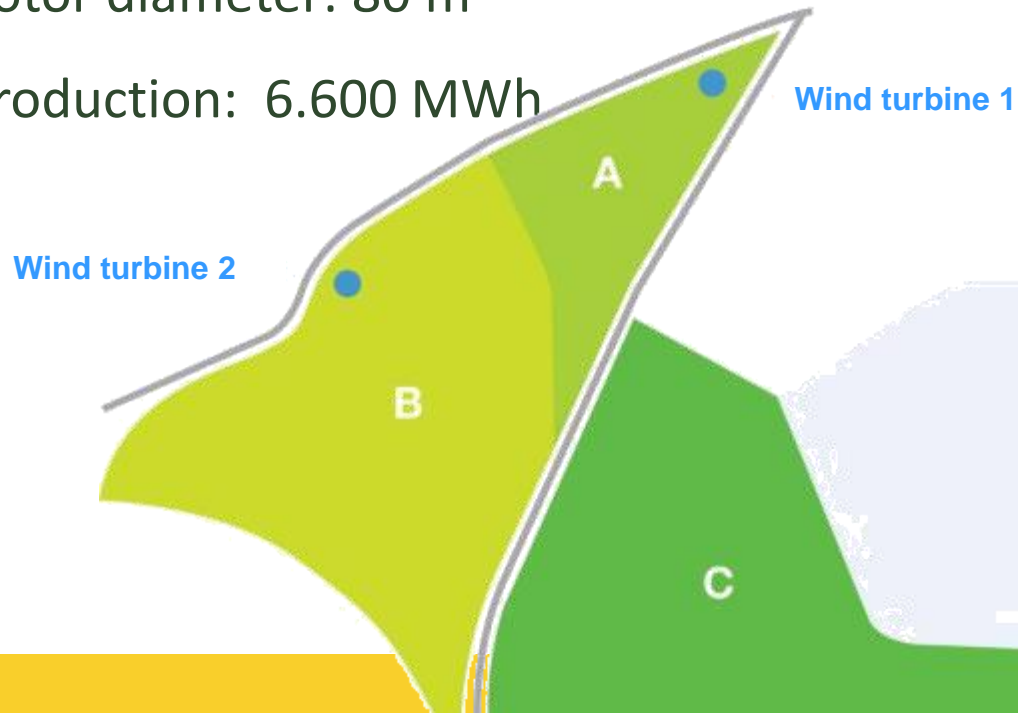
Energy recovery: solar panels

- 550 m² solar panels have been installed on one of the slopes
- Production: 80 MWh per year
- this project might be extended



Energy recovery: wind turbines

- 2 wind turbines have been constructed
- 2,35 MW each
- Tower: 138 m
- Rotor diameter: 80 m
- Production: 6.600 MWh



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Energy production and heat recovery: heat recovery

63% of the generated energy next to biogas electricity production is thermal.

Usage of this thermal energy is currently restricted to:

- heating of the administrative building
- heating of biology in the water purification plant
- heating of algae reactor

Activities today

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Algae project

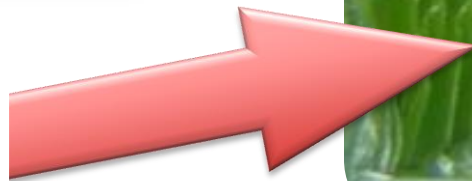
**Leachate
(nutrients + water)**



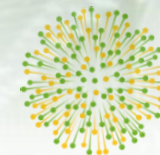
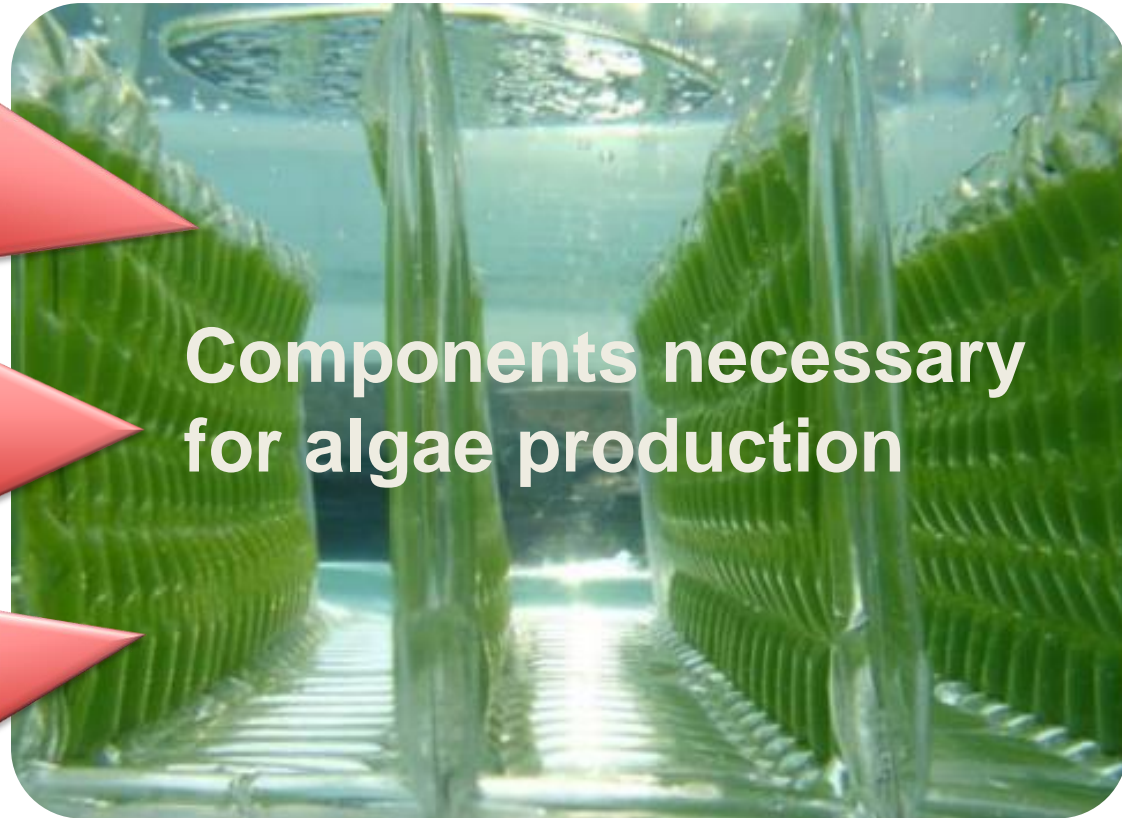
**Engines
(CO₂ + residual heat +
electricity)**



Space

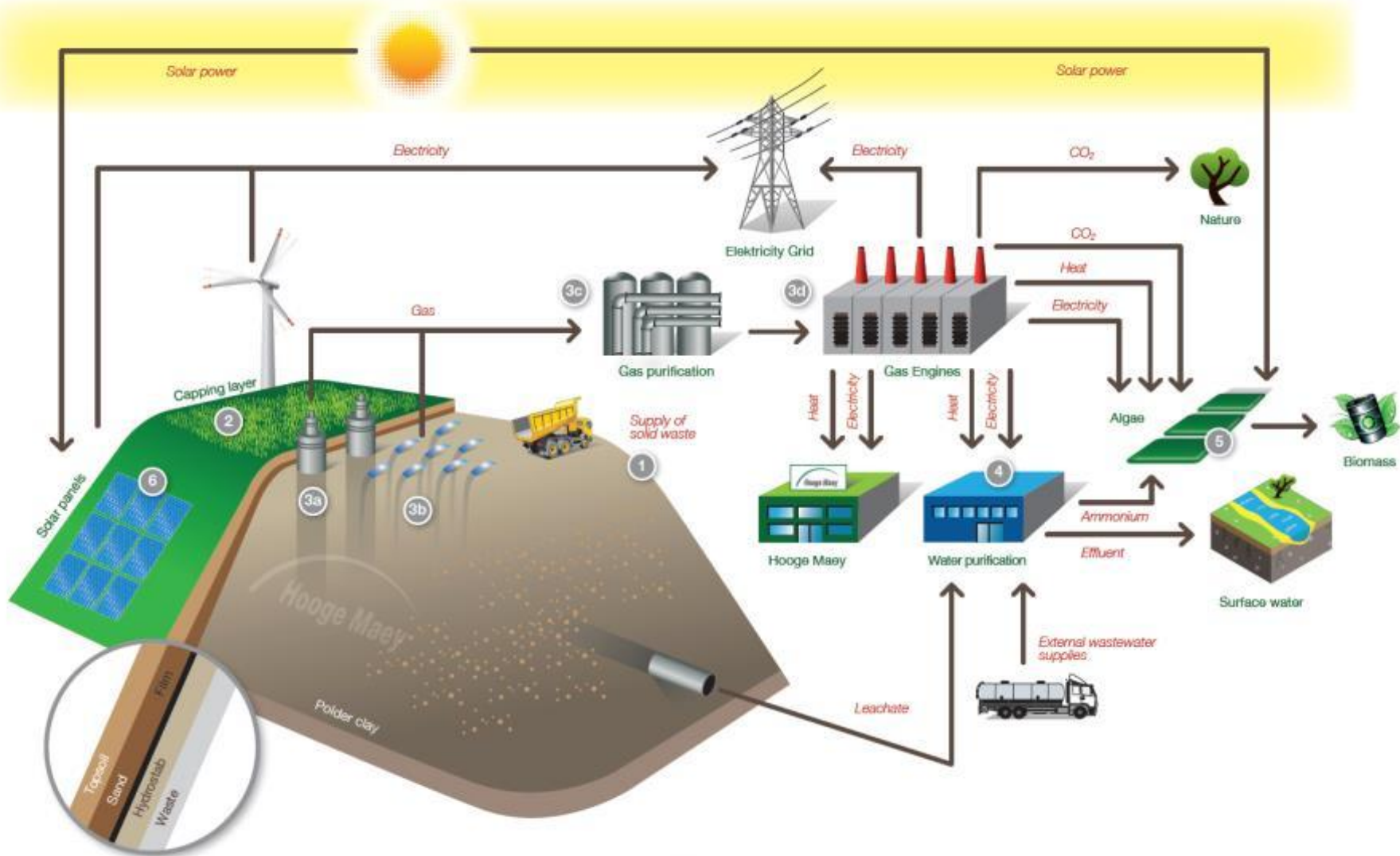


**Components necessary
for algae production**



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Today: closing cycles





Hooge Maey



Technical tours:

- **Tuesday afternoon**
- **Wednesday morning**