

# Landfill gas research, recovery and after care

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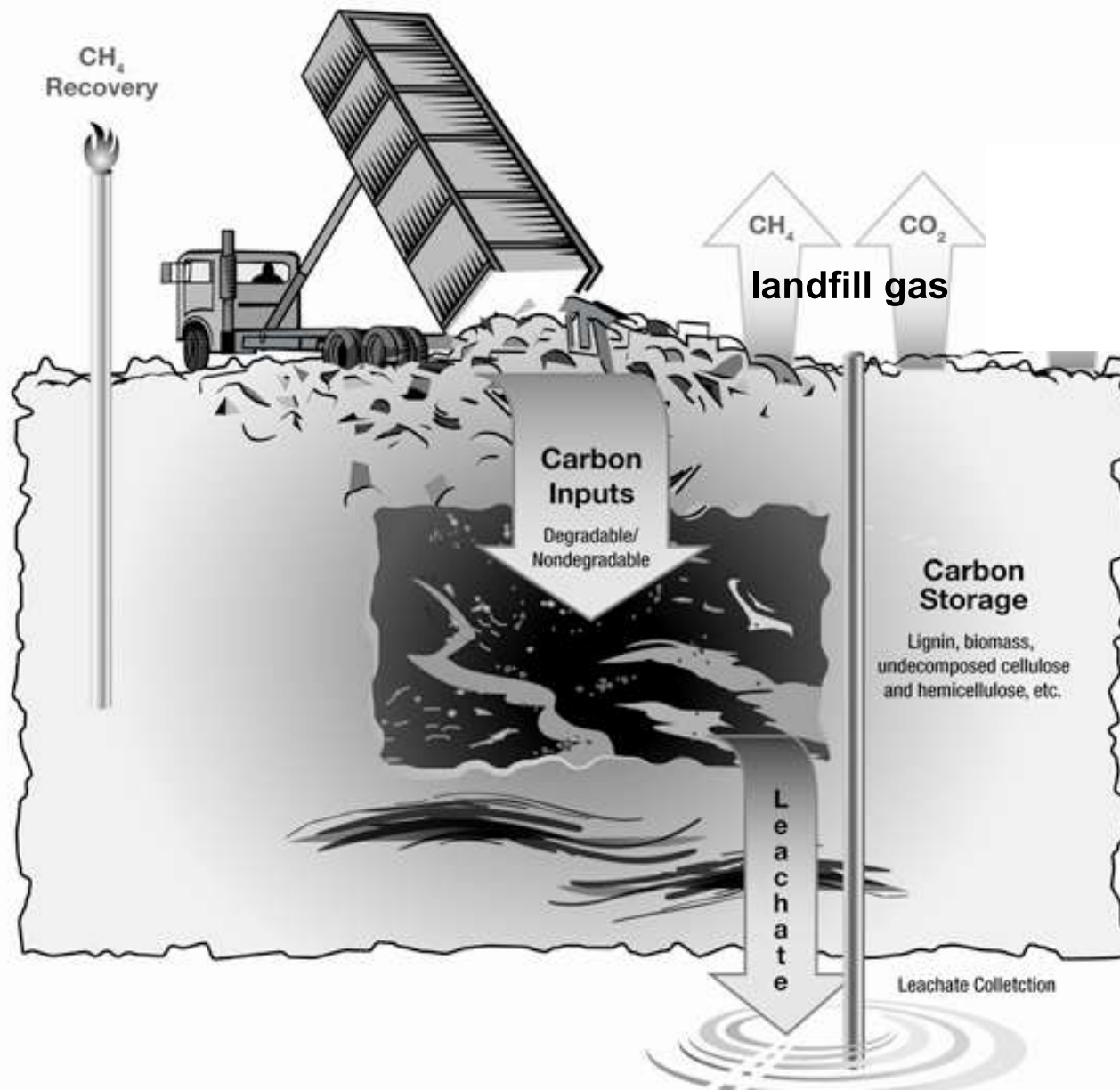


## **Overview:**

- Landfill gas generation
- Landfill gas management - where to start
- Recovery and treatment of landfill gas
- Summary and conclusion



# Landfill gas generation





**How much landfill gas is  
being produced?**



**AFVALZORG**

# How much landfill gas is being produced?

**Situation 2014:**

**Operational landfill site Nauerna, The Netherlands  
80 hectares, 14 mln tonnes of waste, 28 years in operation**



**600 m<sup>3</sup>/h**

**Operational landfill site Sakarya, Turkey  
10 hectares: 1,2 mln tonnes of waste  
7 years in operation**



**1.000 m<sup>3</sup>/h**

**Size doesn't always  
matter....**

# Landfill gas model

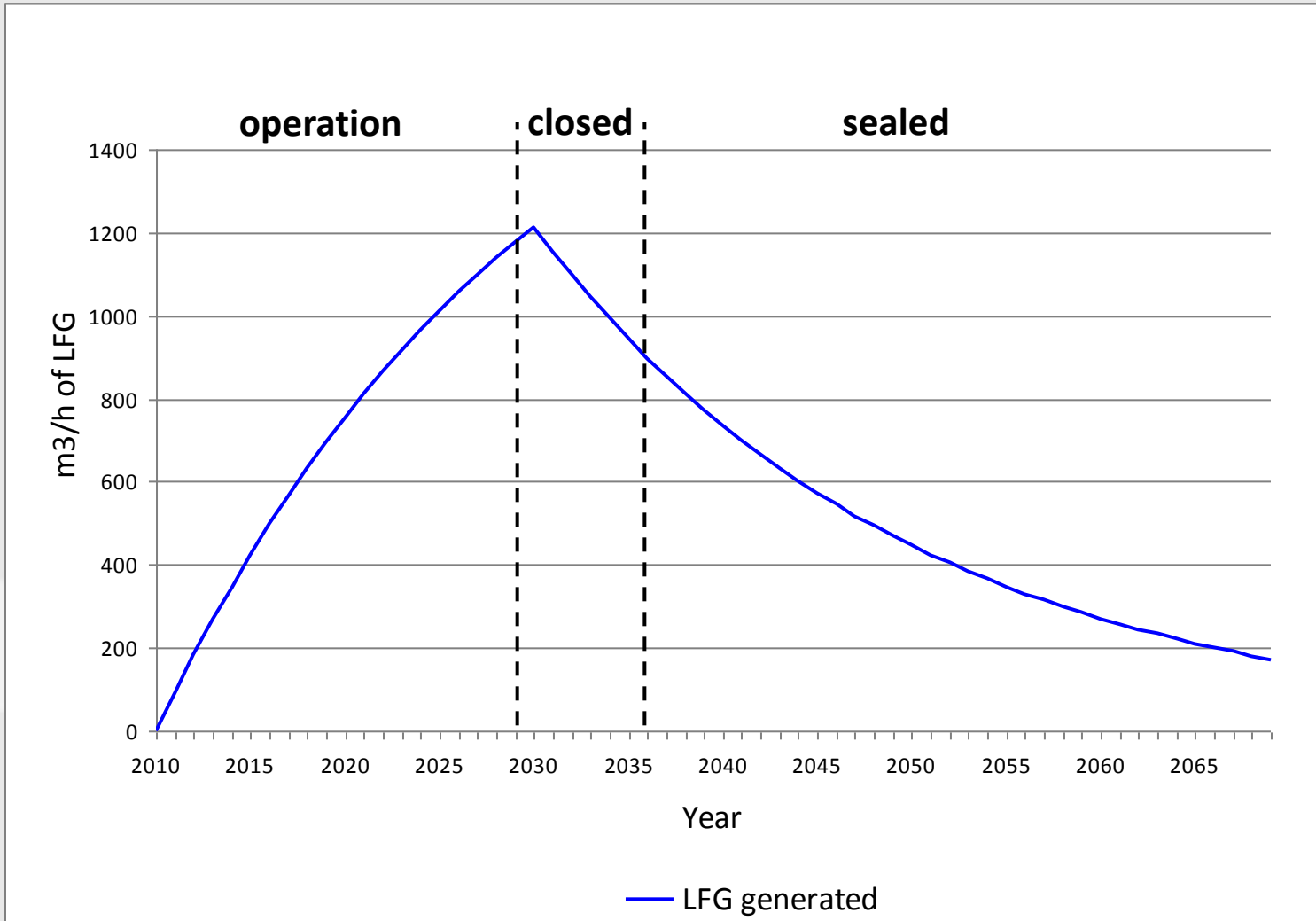
- Basic parameters needed:
  - Amount and composition of waste deposited in time  
(degradable organic material)



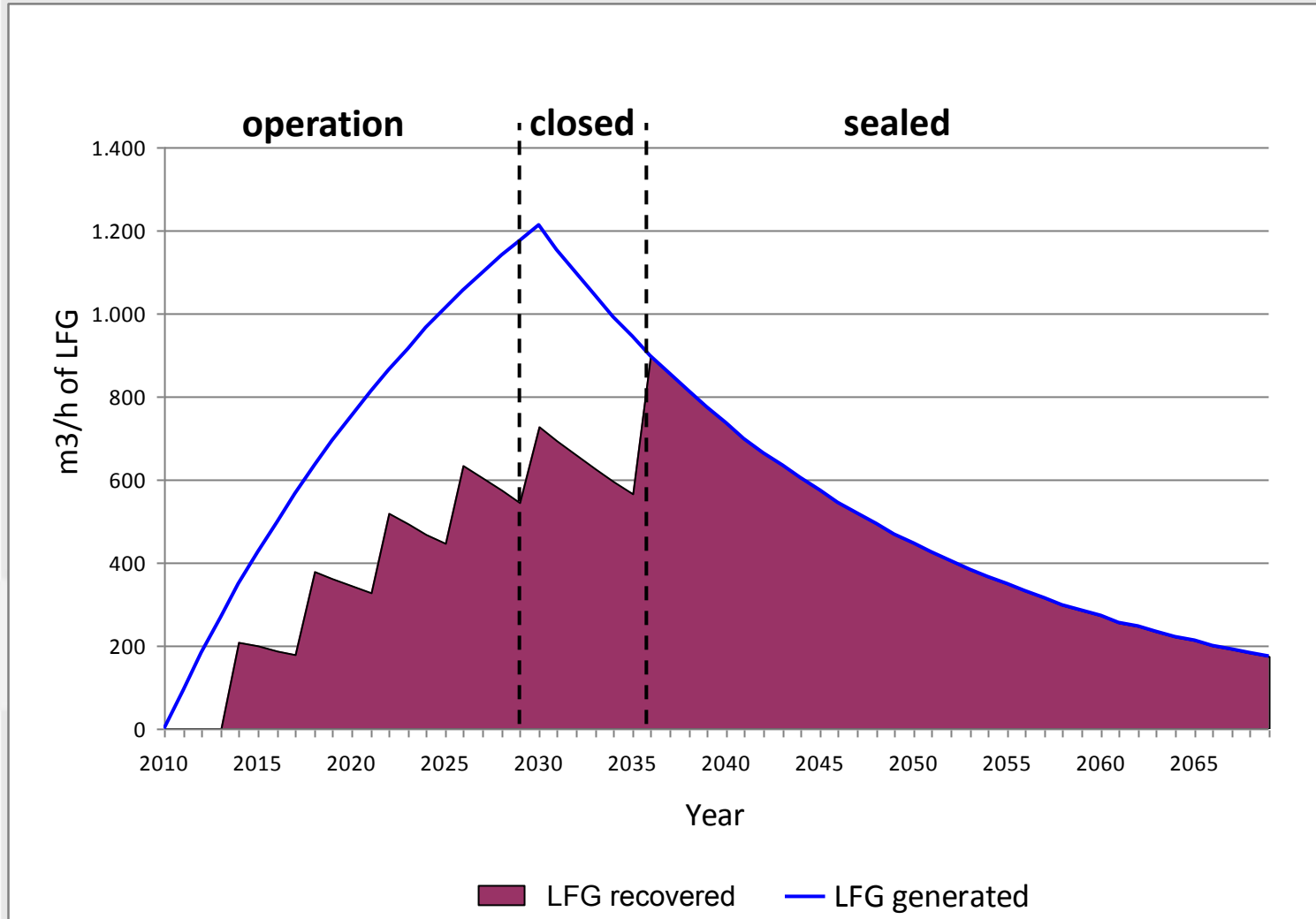
- Climate conditions
- Landfill characteristics



# Landfill gas generation

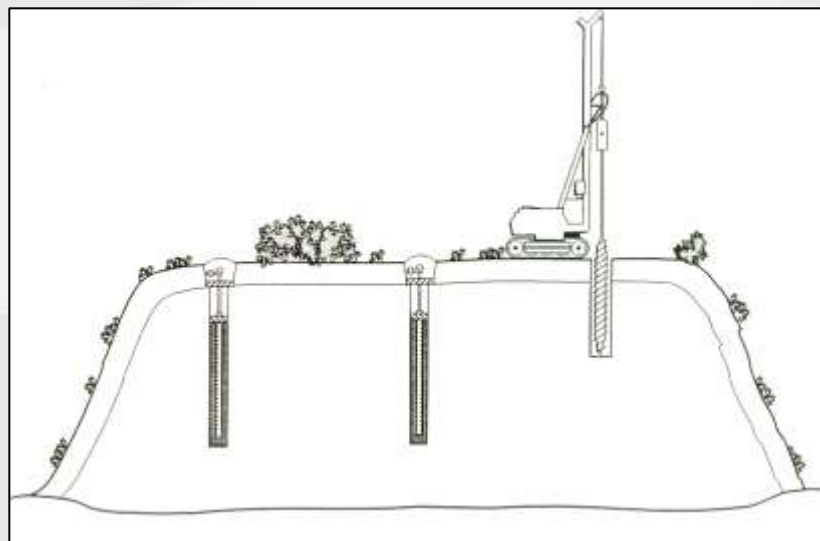
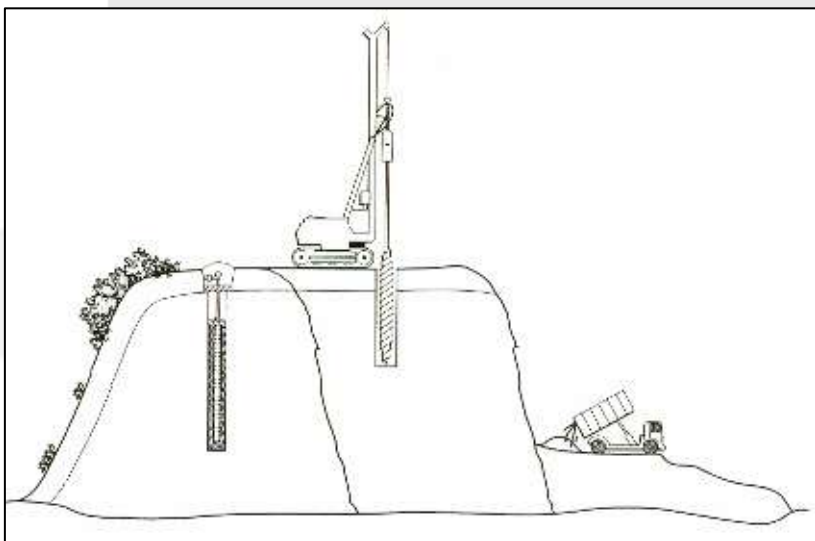
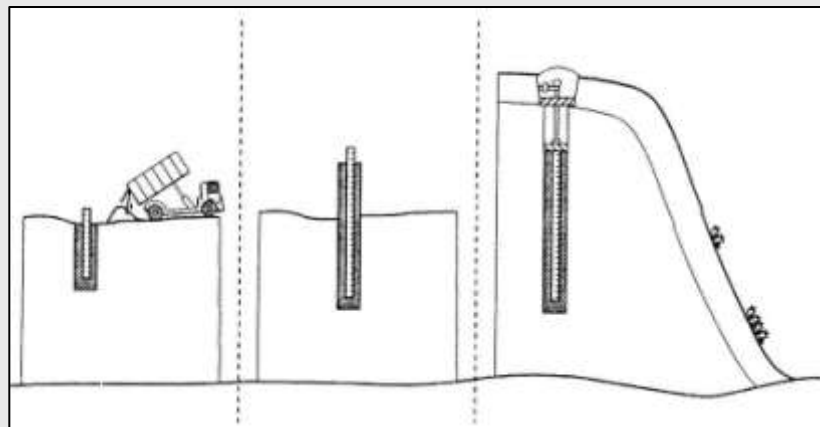
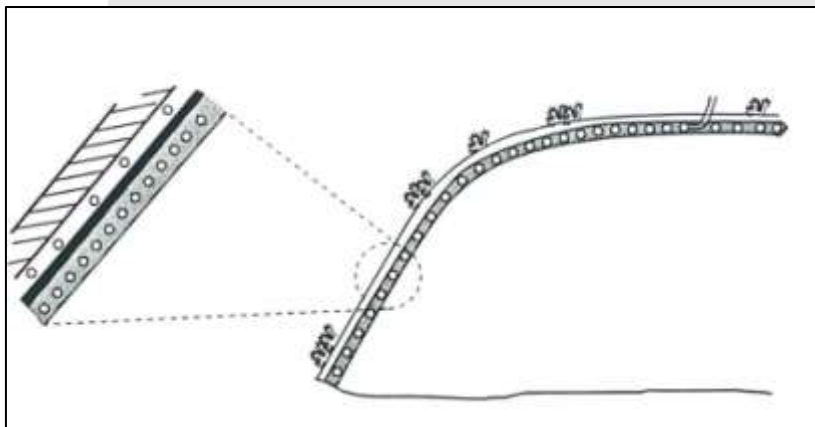


# Landfill gas generation and recovery





# Landfill gas recovery



# Landfill gas well installation



# Landfill gas recovery





# Landfill gas treatment

- Flare – emission reduction ( $\text{CH}_4 > 12\%$ )
- Utilisation – revenues ( $\text{CH}_4 > 35\%$ )







# Landfill site Vlagheide – 45 ha.





# Landfill 'Schoteroog', Haarlem 22 ha.

1973-1977 and 1996-1998

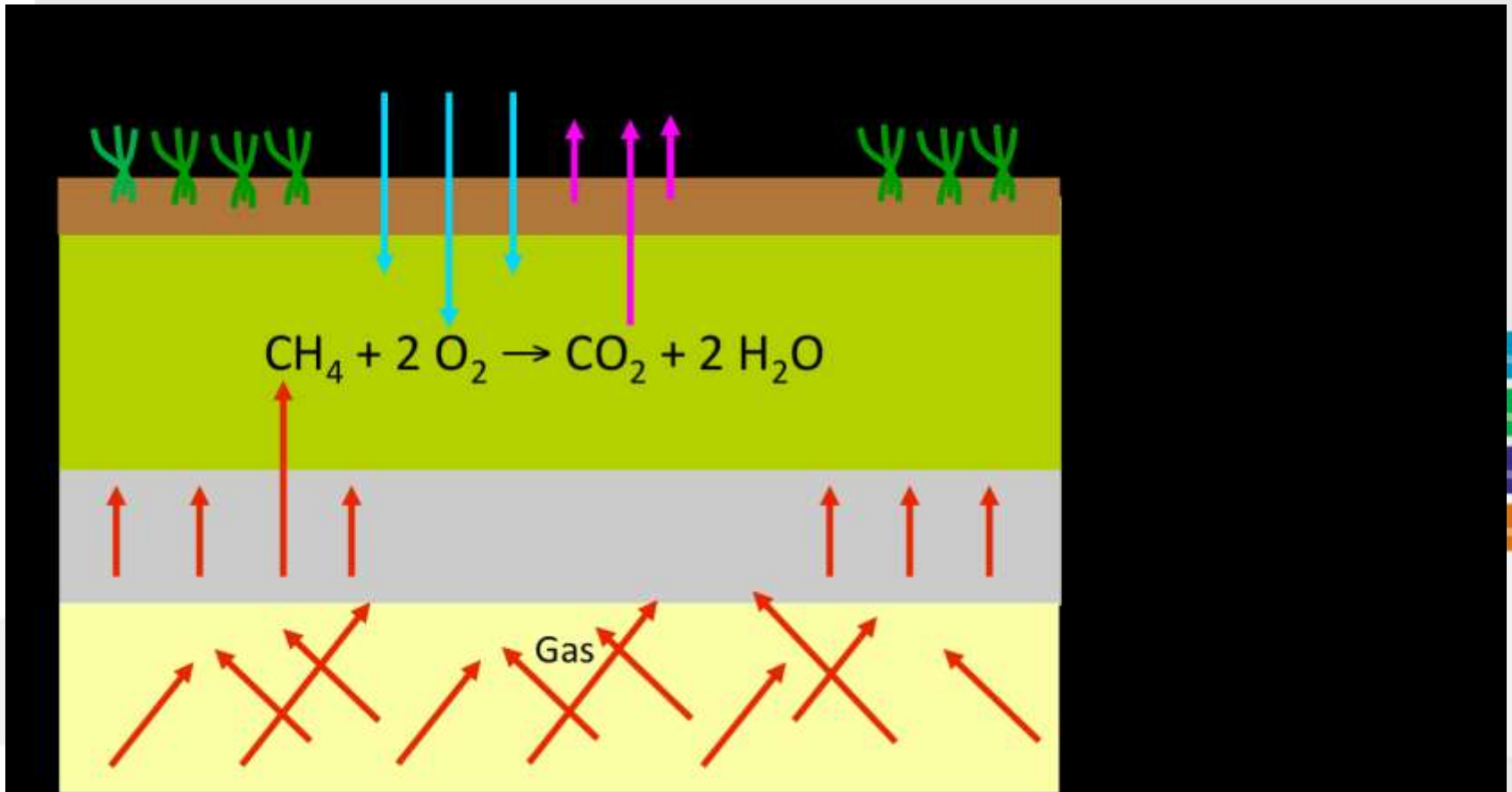


## Landfill gas treatment

- Flare – emission reduction ( $\text{CH}_4 > 12\%$ )
- Utilisation – revenues ( $\text{CH}_4 > 35\%$ )
- Methane oxidation – emission reduction ( $\text{CH}_4 > 0\%$ )



# Methane oxidation



*Nature does the work for you!*

## Summary

Landfill gas management during operation and after care:

- Always start with landfill gas modelling!
- Decide which measures are needed in time
- Active landfill gas recovery – flare / utilisation
- Low landfill gas generation - methane oxidation



## Overall conclusion

### Bad news:

- There is **no standard solution** for landfill gas management

### Good news:

- There **is** a solution for every landfill!





**Thank you very much for your attention!**

For more information:

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