

# Air Treatment Methods as Possible Alternatives to Activated Carbon



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# Content

- Introduction
- Case #1: Biological Compost Filter
- Case #2: BAFT and Bioscrubber
- Conclusions



# Introduction

- Activated Carbon
  - charred wood left from campfires



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- Activated Carbon
  - charred wood left from campfires
  - First used by Egyptians!



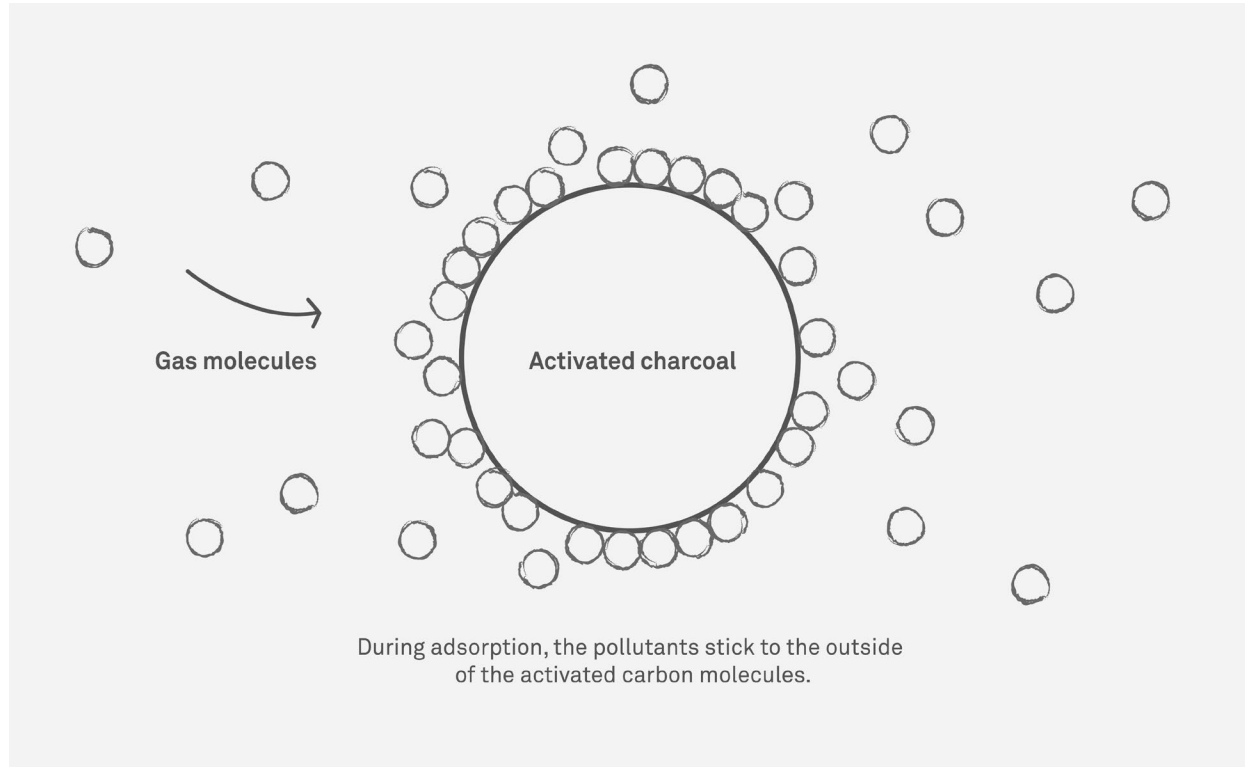
# Introduction

- Activated Carbon
    - charred wood left from campfires
    - First used by Egyptians!
    - Activated by injecting air or CO<sub>2</sub> to increase the surface area
- ☐ More pores to trap molecules



# Introduction

- Activated Carbon



# Introduction

- Activated Carbon
  - Most used to remove gases
  - Filter (c)VOC



# Introduction



## DROWBACKS

- To be replaced once saturated  
→ Regeneration/Recycling results in less efficiency
  
- Expensive (~ 4€/kg)



# Introduction



## DROWBACKS

- To be replaced once saturated  
→ Efficiency reduced during operation
- Expensive (~ 4€/kg)



- Case #1:

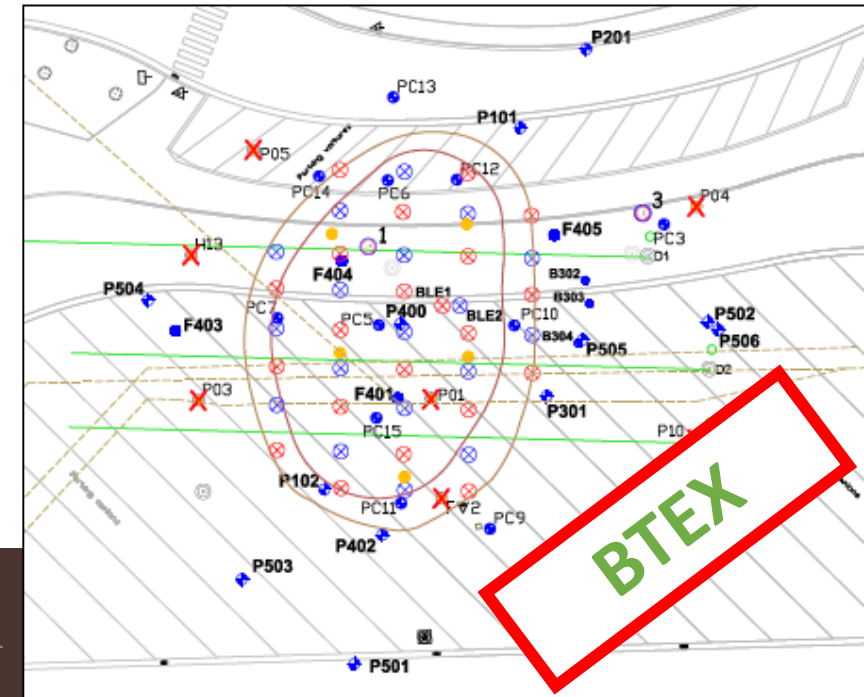
# Biological compost filter



# Case #1: Biological Compost Filter



- Soil contamination 0.6-11 m-g/l
- Groundwater contamination 11-17 m-g/l
- Approach:
  - SVE
    - 44 filters
    - 500 Nm<sup>3</sup>/h – high concentration levels
    - ATEX
  - 4 P&T
  - Biological water treatment
  - Biological compost filter + GAC

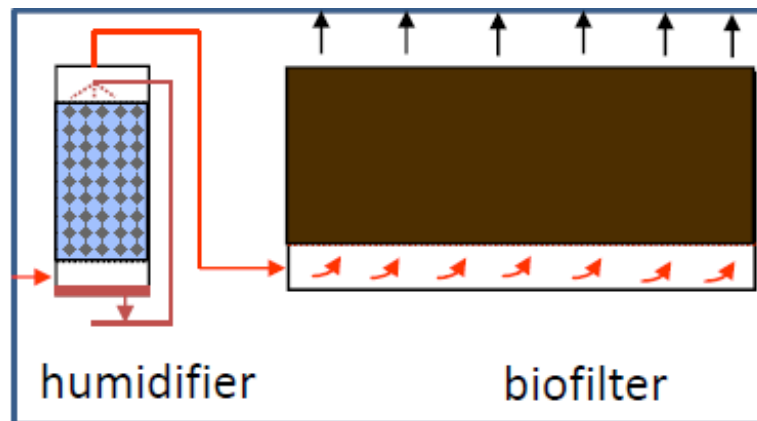


# Case #1: Biological Compost Filter

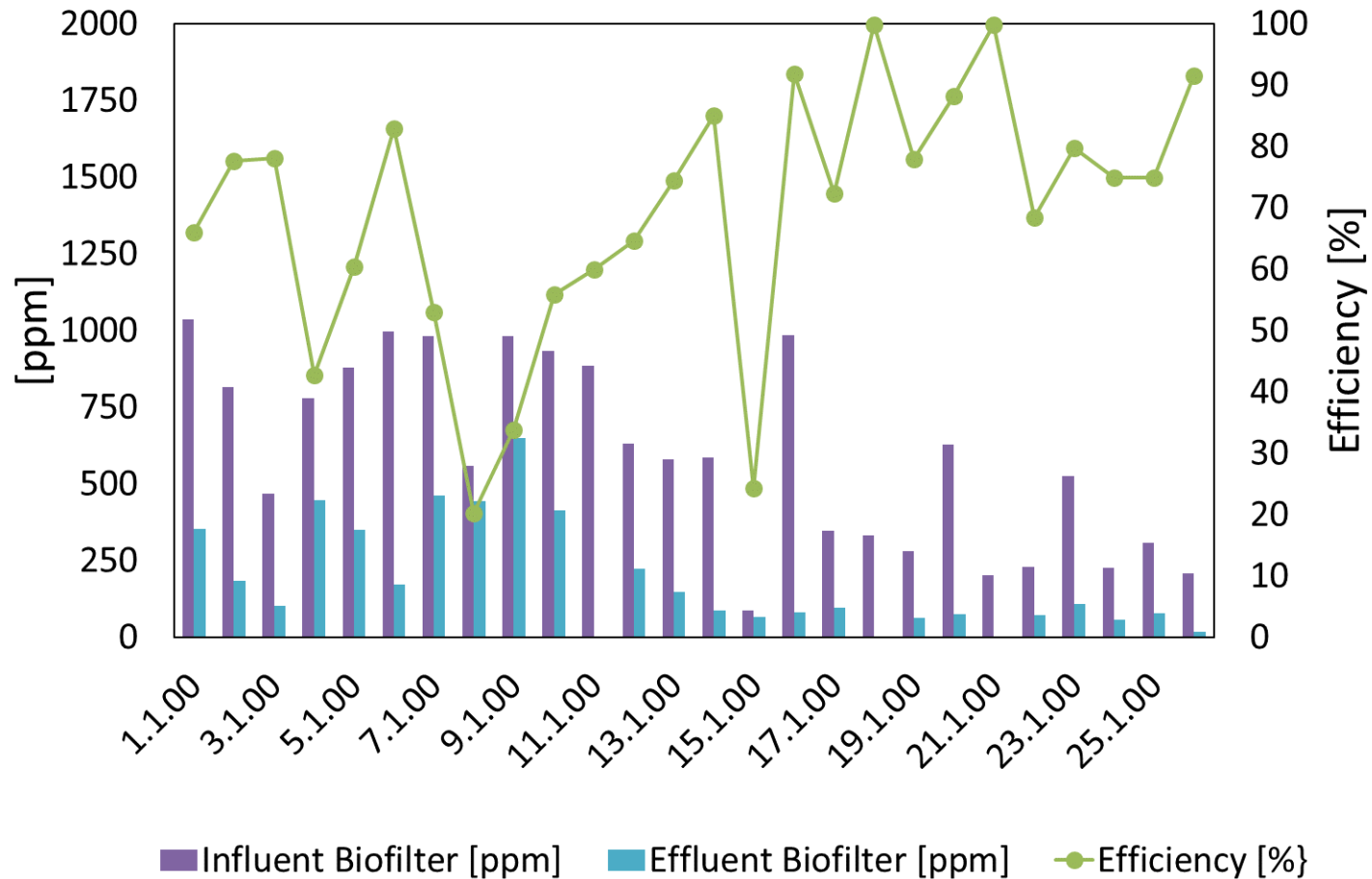


- Biological Compost filter

- 1500 Nm<sup>3</sup>/u
- ATEX , 40-ft
- Humidifier
- Nutrient dosage
- Automated control (T, O<sub>2</sub>, nutrients, pressure, flow...)

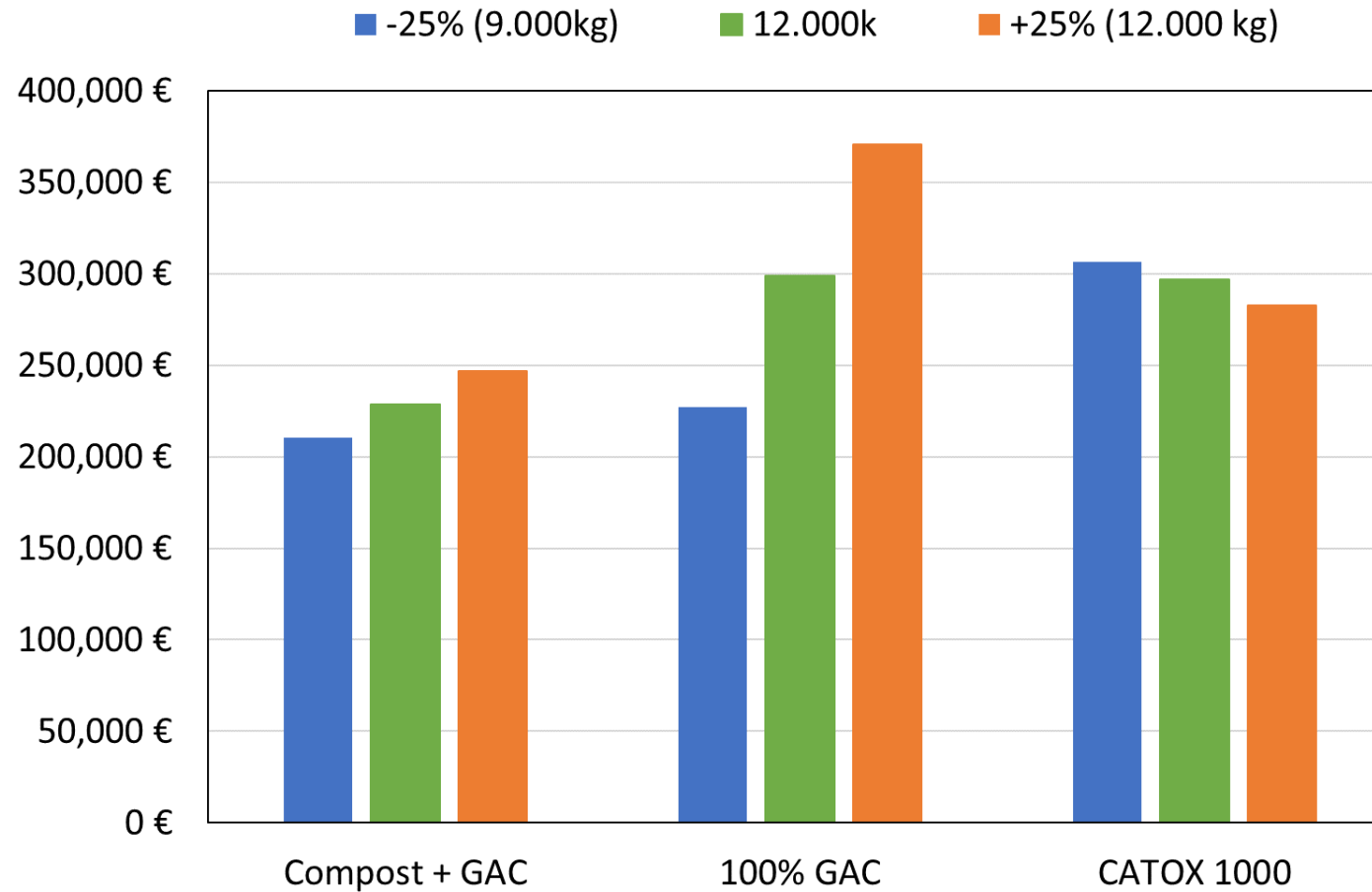


# Case #1: Biological Compost Filter



- Load 600-1,500ppm
- Efficiency: ~ 73%
- ~ 80% GAC savings

# Case #1: Biological Compost Filter

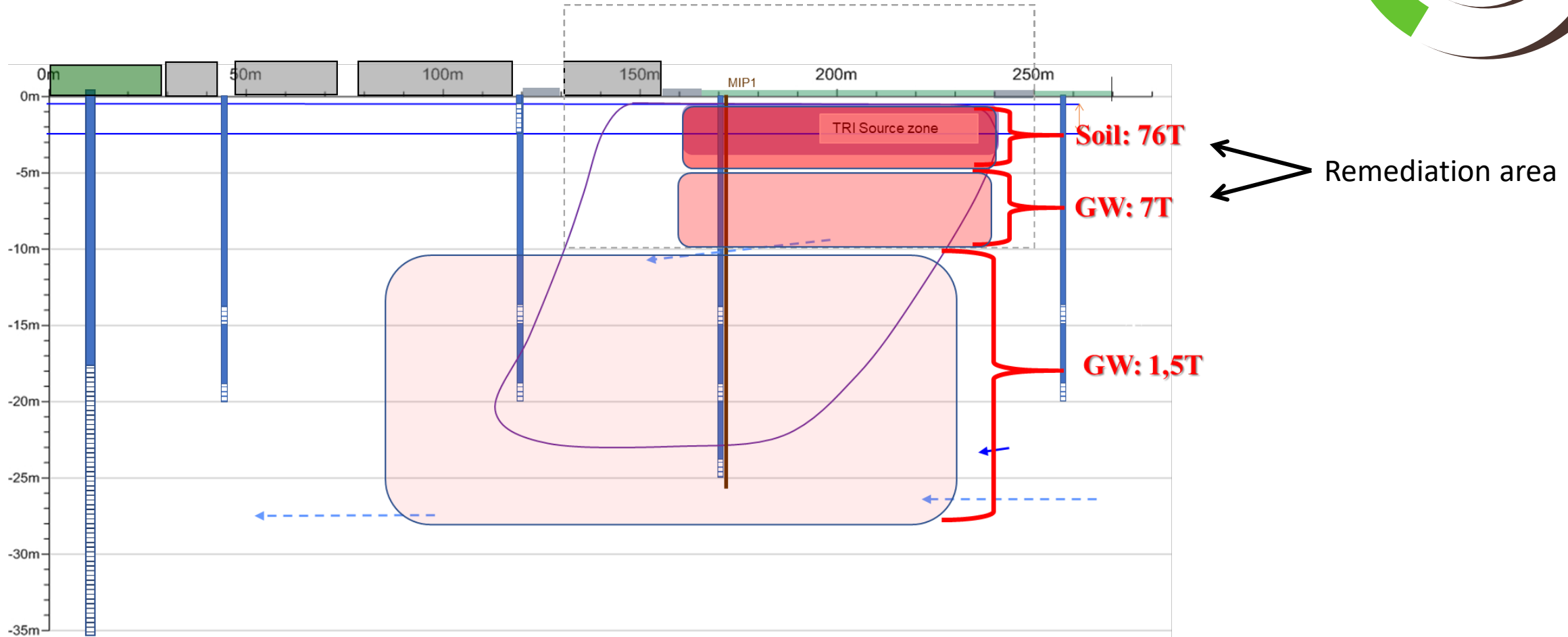


- Case #2:

# BAFT and Bioscrubber

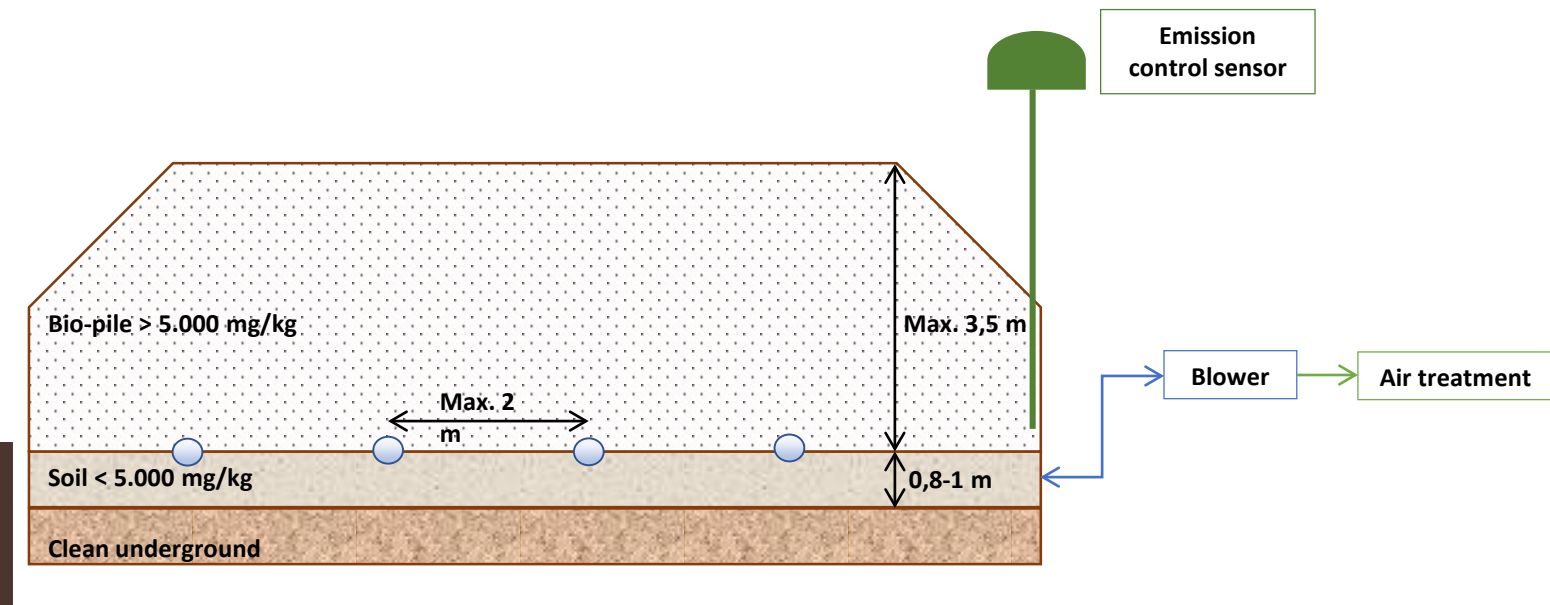
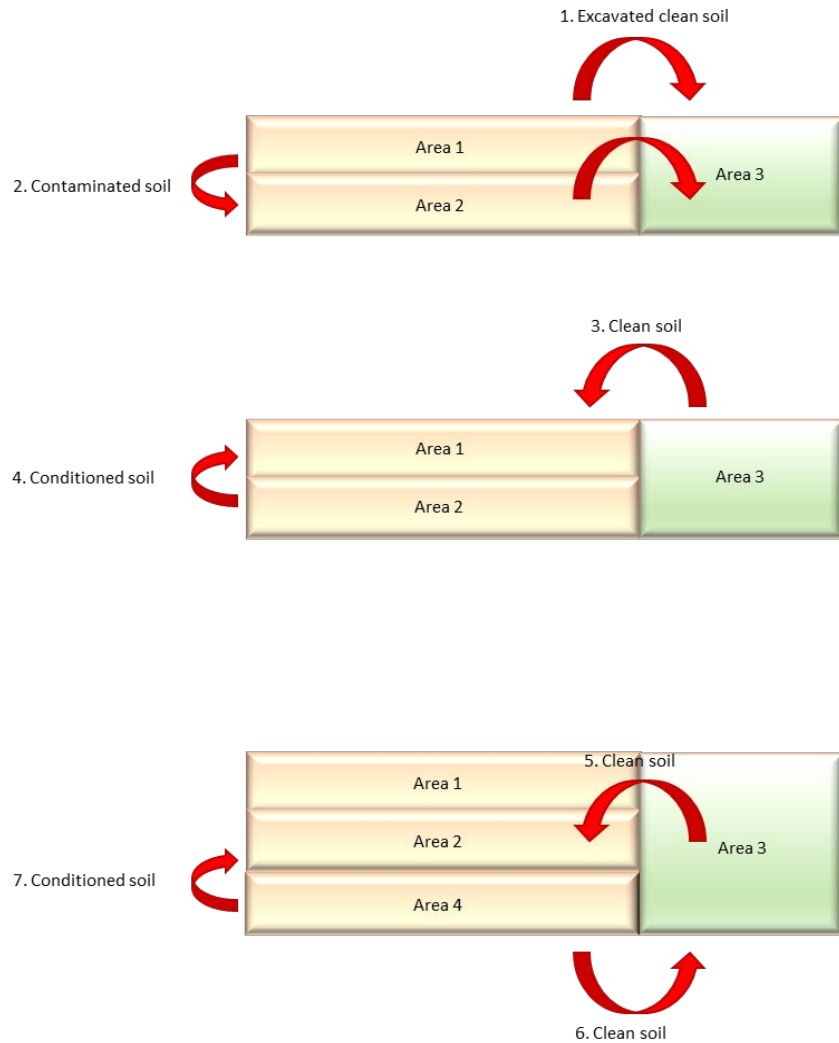


# Case #2: BAFT and Bioscrubber





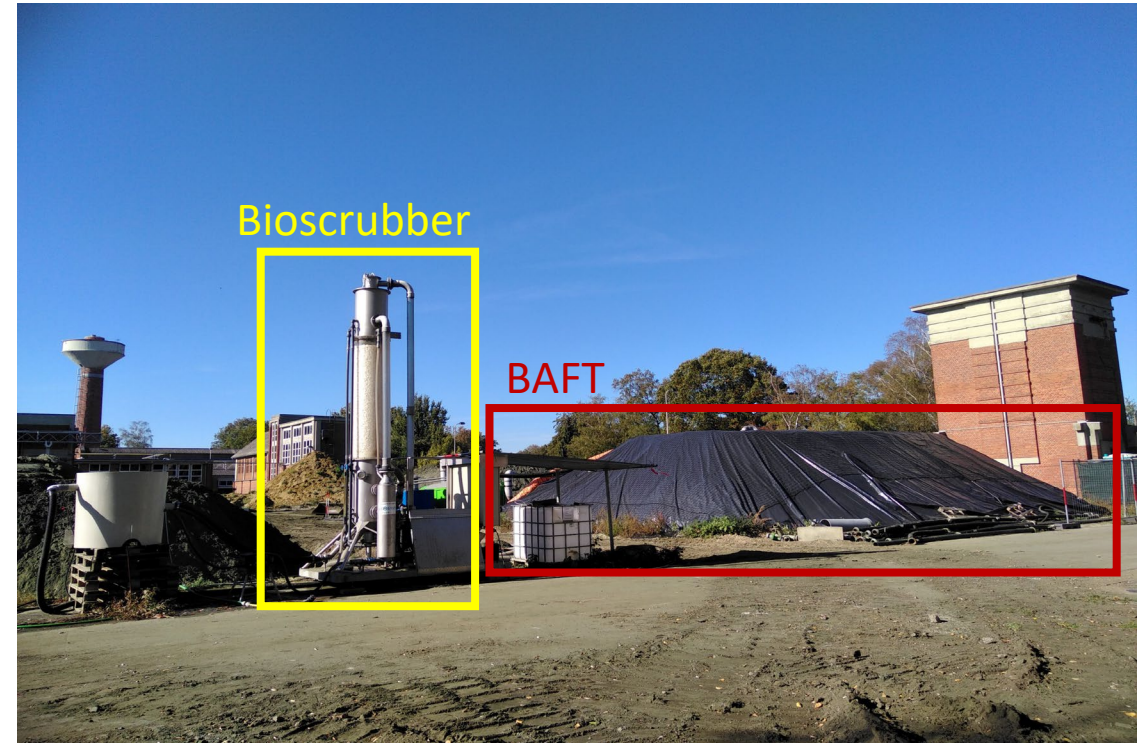
# Case #2: BAFT and Bioscrubber



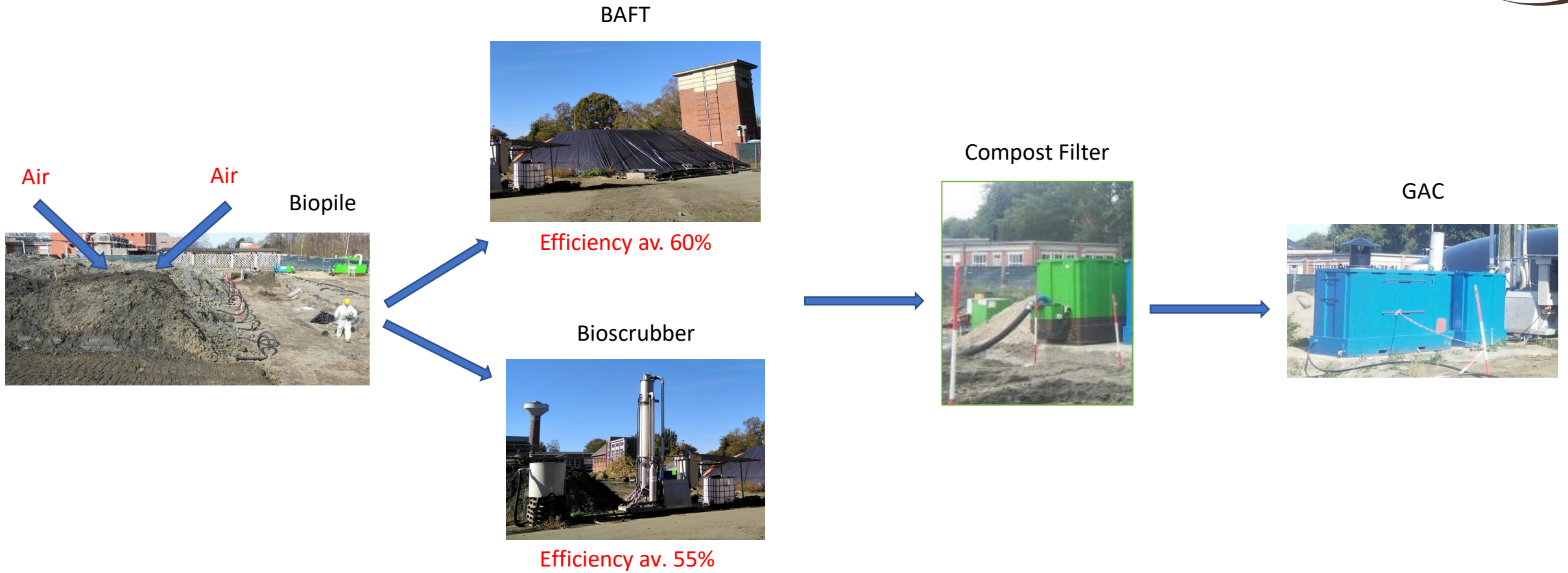
# Case #2: BAFT and Bioscrubber



- BAFT
  - Turned around clean biopile
- Bioscrubber
  - Column filled with carrier material



# Case #2: BAFT and Bioscrubber



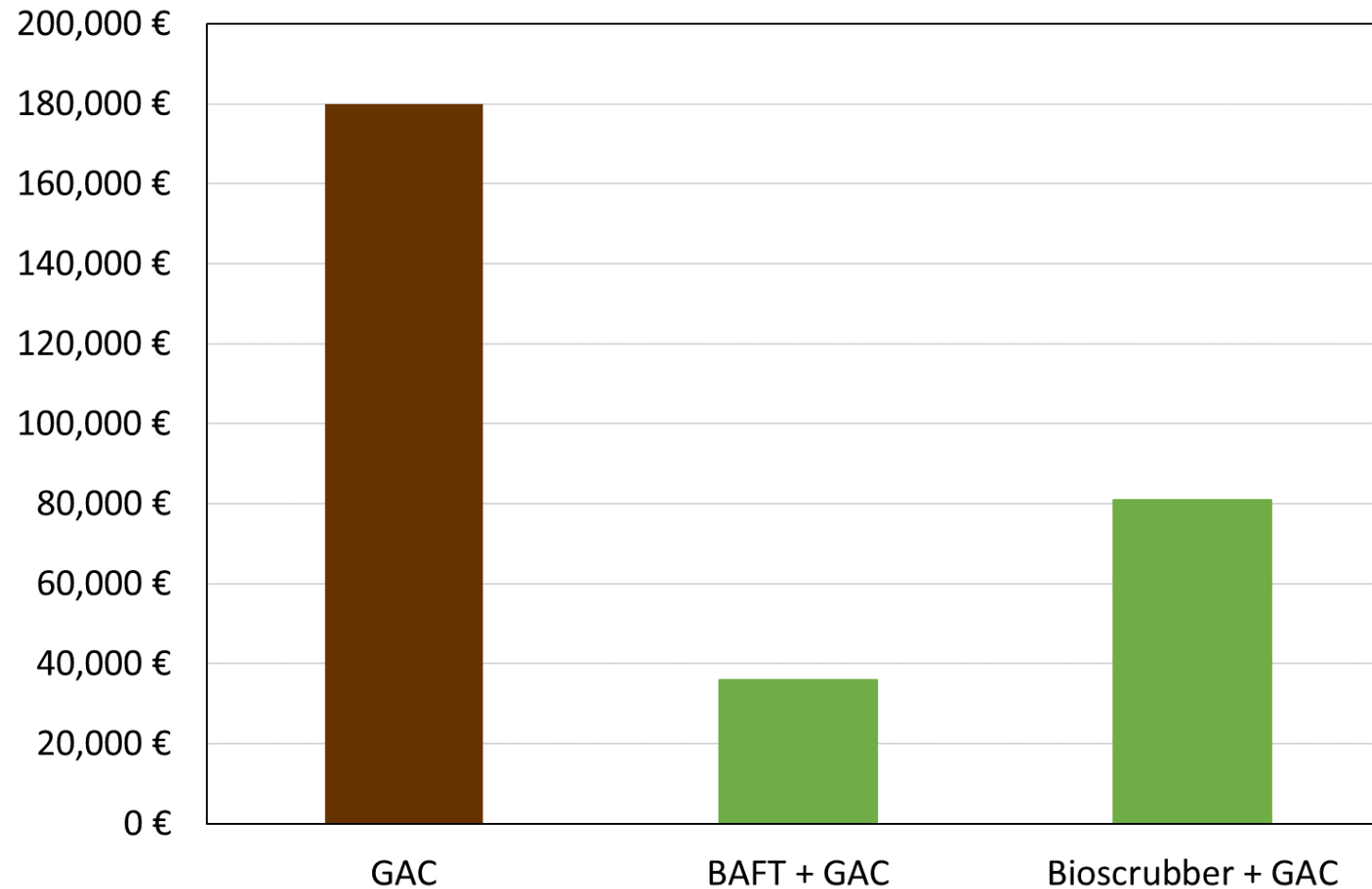
# Case #2: BAFT and Bioscrubber



- BAFT
  - Efficiency: 60 - 80%;
  - Load 500 - >2000ppm
- Bioscrubber
  - 20-40 m<sup>3</sup>/h, 950 ppm inlet, 16.5 % O<sub>2</sub>
  - Efficiency: ~ 55%;
  - Load 300 - 1000ppm
- + GAC as polishing step
  - Emission requirements
  - Total efficiency > 99%
  - Odor control



# Case #2: BAFT and Bioscrubber



# Conclusions



Biological air treatment techniques are valuable alternatives to AC:

- No creation of waste
- Less transport movements (less disposal of waste / bringing new GAC)
- We reduced up to 80% on AC usage
- Cheaper



# Contact and Questions

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