Enhancing Conventional Biofiltration Odour Control

High Efficiency Advanced Biofiltration (HEAB)

"A Sustainable Solution for Compliance and Efficiency"

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V1.3

Introduction

Conventional Biofiltration – Context & Challenges

Industry Context

- Biofiltration = BAT under EC guidelines
- Proven, sustainable odour control method, highly applicable to waste industry

Key Challenges

- Encroachment of sensitive receptors demand lower residual odours
- Stricter emission limits (odour & ammonia)

Pathways to Better Performance

- Enhanced operator engagement and inspection
- Regular third-party emissions monitoring
- Engineering upgrades

However, these measures do not always guarantee the desired abatement performance and may introduce addition complexity and operational costs.

Introduction

Conventional Biofiltration Solutions and their Limitations

Performance Variability

Microbial activity is sensitive to temperature, moisture, and toxic compounds. These factors can reduce removal efficiency.

Long Start-Up Period

Establishing a stable microbial community can take week to months. Initial performance may be suboptimal, requiring close monitoring and interventions.

Overloading & Toxicity Risks

Shock loads or high levels of toxic compounds like ammonia can inhibit microbial activity, reducing removal efficiency. Recovery from toxic events can be slow or require media replacement.

Maintenance Demands

Requires regular inspection and media replacement, issues like channelling, biofilm buildup, and compaction can impair performance.

HEAB – High-Efficiency Advanced Biofiltration

A Smarter Biofiltration Solution

Introduction and Advantages of HEAB

HEAB - High-Efficiency Advanced Biofiltration

Why HEAB? A Smarter Biofiltration Solution

Conventional biofilters face increasing challenges. **HEAB was developed to overcomes these limitations, offering:**

- Higher odour abatement efficiency
- Immediate performance & Extended media life
- Reduced operational complexity

HEAB - High-Efficiency Advanced Biofiltration

What Makes SUEZ Advanced Biomedia Different?

The media consists of two phases (Inorganic & Organic)

Inorganic Phase

- Very high surface area

- Highly homogenous distribution of air (= reduced channelling)

- Good mechanical and chemical strength (= increased longevity)

- Reduced head loss/backpressure

- Sterilised prior to inoculation

Organic Phase

- Comprising fully composted organic matter

- Provides suitable conditions for microorganism growth

- Very low intrinsic media odour

Pre-inoculated with a specialist make up of >50 microorganisms

- ✓ Increased removal efficiency
- ✓ Higher density of useful microorganisms
- ✓ Resistance to opportunistic invasive microorganisms.

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HEAB Biofilter Structure

Process Airflow

Untreated process air is extracted from a facility and ducted to the biofilter, via any necessary pre-treatment.

Plenum Flooring

Specialist floor providing support and airstream distribution

LECA

Further assists in homogenous distribution

HEAB Media

High performance media where odour removal occurs

HEAB - High-Efficiency Advanced Biofiltration

Integrated Components for Optimised Performance

Plenum Floor

- Specifically designed for biofilters
- Rated for 10 T/m2 (2T dynamic loading

Expo-net

- Prevents unwanted media migration

Irrigation system

- In-house designed specialist irrigation system.
- Provides homogenous irrigation at 20 L/m2/day.
- Utilises innovative sprinkler system.

LECA

- 0.2m diffusion layer comprising porous calcinated clay balls.
- Optimises distribution of untreated process air.

Airstop

- Perimeter skirt preventing short circuiting & channelling

Biocide System

- Chemical dosing system utilising duct mounted high pressure nebulizers.
- Prevents proliferation of unwanted/invasive microorganisms.
- Inhibits biofilm accumulation.

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HEAB Advantages - High Efficiency. Low Energy. Long Life

High Removal Efficiency

<1,000 ou_E/m^3 or >95% abatement
Reduced residence time requirement = less footprint

Low Maintenance

Comparatively less maintenance required

Rapid Commissioning

Removal performance established within days

Energy Efficient

40-50% less fan power consumption

Long Service Life

8-10 years media lifespan

Safe End-of-Life

Non-hazardous, landfill safe

HEAB – High-Efficiency Advanced Biofiltration

CAPEX & OPEX – A cost-effective long-term solution

Years 1-3

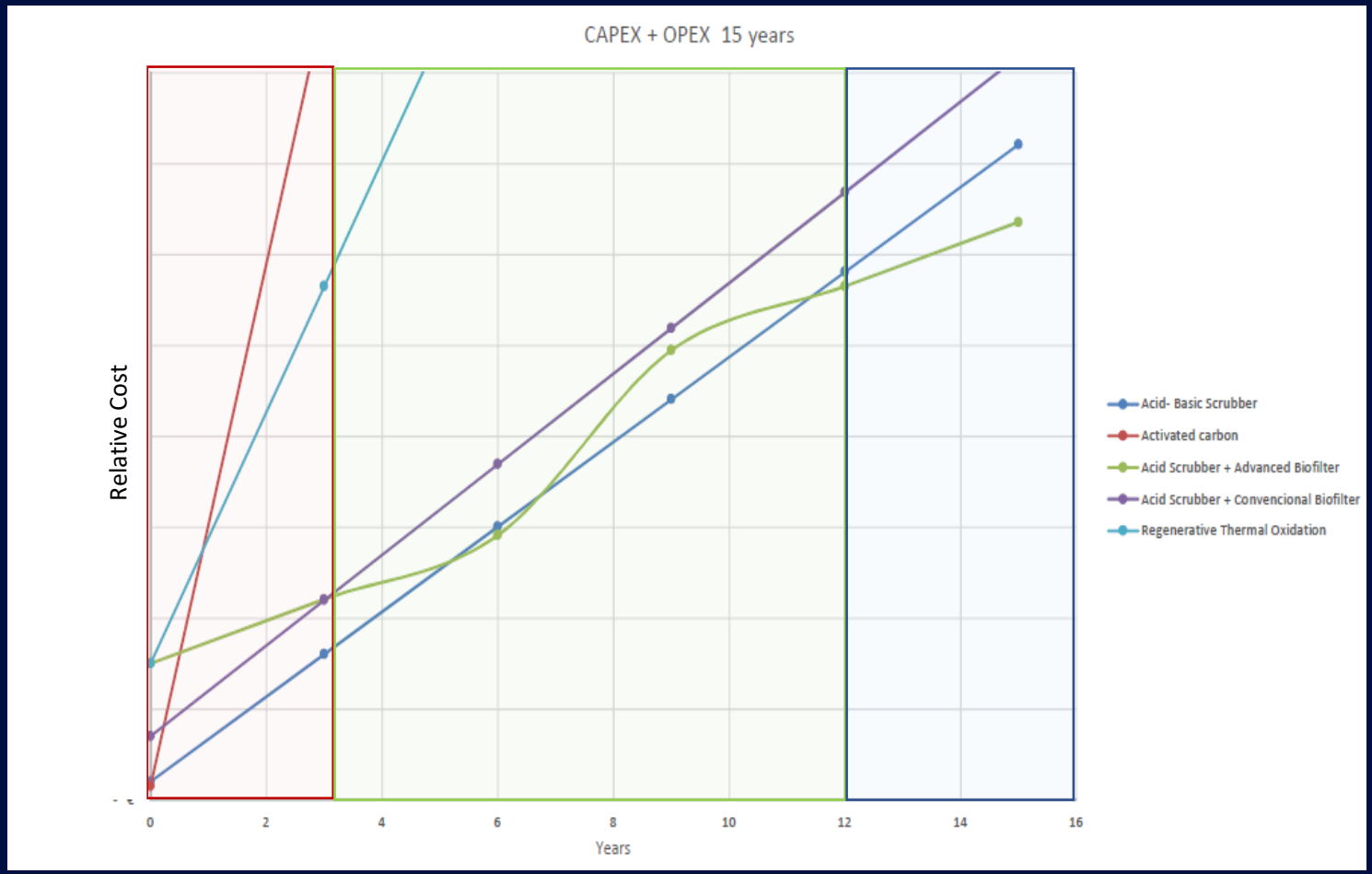
- HEAB lower cost then AC & Thermal oxidation.
- Provides higher remove efficiency then chemical scrubber and conventional biofilter

Years 3-12

- HEAB becomes lower cost than conventional biofiltration, while providing substantially improved removal performance.

Year 12 onwards

- HEAB becomes lower cost than all considered alternatives, while providing high levels of odour abatement.



Conventional biofilter media lifespan assumed to be 3 years.
HEAB conservatively estimated at 6 years.

HEAB – High-Efficiency Advanced Biofiltration

Guaranteed Performance – Reliable Odour Abatement

Performance Guarantee

<1,000 ou_E/m^3 or >95% abatement
Performance is guaranteed for 5 years

Ongoing monitoring

Monitoring is provided throughout the asset life

Limit Conditions

Site/process airstream limits apply

Expert Maintenance

Specialist service and maintenance is provided by SUEZ quarterly

SUEZ HEAB systems routinely exceed performance targets, and are backed by our expert technical support

HEAB – High-Efficiency Advanced Biofiltration

A Smarter Biofiltration Solution

UK Case Study – *Delivering Reliable Odour Abatement at a UK MBT Facility*

HEAB – UK Case Study

Introduction

Site: Large MBT with underperforming biofilter

Scope: Upgrade conventional biofilter to SUEZ HEAB

Timeline: January – April 2025

Outcome: Operational success & 1st UK reference site

HEAB – UK Case Study

Introduction

Site Challenges

Poor odour removal and odour complaints

Plenum floor and media condition

Irrigation system deficiencies

Biofilm accumulation

Client objectives

Reduce media changeover frequency

Improved biofilter abatement efficiency (regulatory compliance)

Keeping the system operational throughout the project, working in sections

Ensure high removal efficiency within days of commissioning

All client objectives were successfully achieved

Historically media changeovers had been associated with increased complaint receipt

HEAB – UK Case Study

Existing System

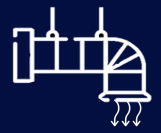
System Overview

The existing conventional biofilter system serves the MBT processes and provides general building extraction.

Process air is extracted from the facility via a number of extract fans, before entering the biofilter, which contained woodchip media.

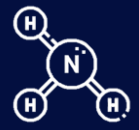
Following treatment, the process airstream is discharged via two dispersion stacks.

Key Figures



Design airflow: 70,000 m3/hr

Odour load: High/variable [≈50,000 ou_E/m^3]



Ammonia load: High [≈30ppm]*

*commissioning testing highlighted at times this figure was greatly exceeded.

Historically media changeovers had been associated with increased complaint receipt

HEAB – UK Case Study

HEAB Upgrade Scope

Core Works

Step 1: Remove existing filter media (section 1)

- Remove 800m^3 of spent woodchip media
- Remove existing failing plenum flooring
- Clean and decontaminate area

Step 2: Install HEAB components (section 1)

- Install specialist biofilter plenum flooring (10T/m^2 & 2 T dynamic)
- Install LECA diffusion layer
- Fit Airstop side skirt for prevention of short circuiting
- Add HEAB media to required depth
- Apply secondary inoculation.

Repeat steps 1 and 2 for the remaining biofilter sections (2&3).

Ancillary works

Design and install a biocide dosing system

Design and install a new irrigation system

Undertake comprehensive commissioning testing

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HEAB System Design Parameters & Operational Limits

Core Works

Biofilter surface: 560 m^2

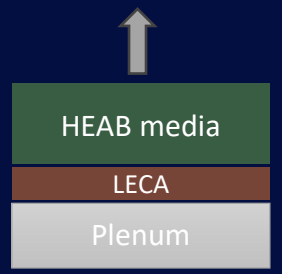
HEAB media volume: 560 m^3

LECA volume: 85 m^3

Residence time: 30 s

Working ratio: 120 $m^3/m^2/hr$

3 **Biofilter sections**



Site Specific Guarantee Limits

Hydrogen sulphide: <10 ppm*

Ammonia: <40-50 ppm

Inlet air temperature: <40 °C

Inlet relative humidity: >70 %

Airflow: <80,000 m^3/hr

Performance Guarantee

<1,000 ou_E/m^3 Residual odour

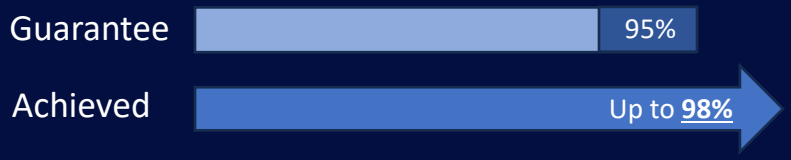
>95% Odour abatement

*Alternative HEAB 2-stage systems can treat H_2S concentration in exceedance of 250 ppm.

HEAB – UK Case Study

HEAB Performance Results

- 5 performance monitoring campaigns completed
- All results met or exceeded the guaranteed performance level (<1,000 ou_E/m^3 or >95%)
- System remained operational throughout upgrade works
- No odour complaints received during media changeover



HEAB

A Smarter Biofiltration Solution

<1,000 ou_E/m^3 Residual odour

>95% Odour abatement

Detailed test data available upon request

HEAB – UK Case Study

Photo timeline

HEAB – UK Case Study

Before and after

THANK YOU

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