


# PFAS verwijderen: lessen uit de industriële praktijk

07/10/2026

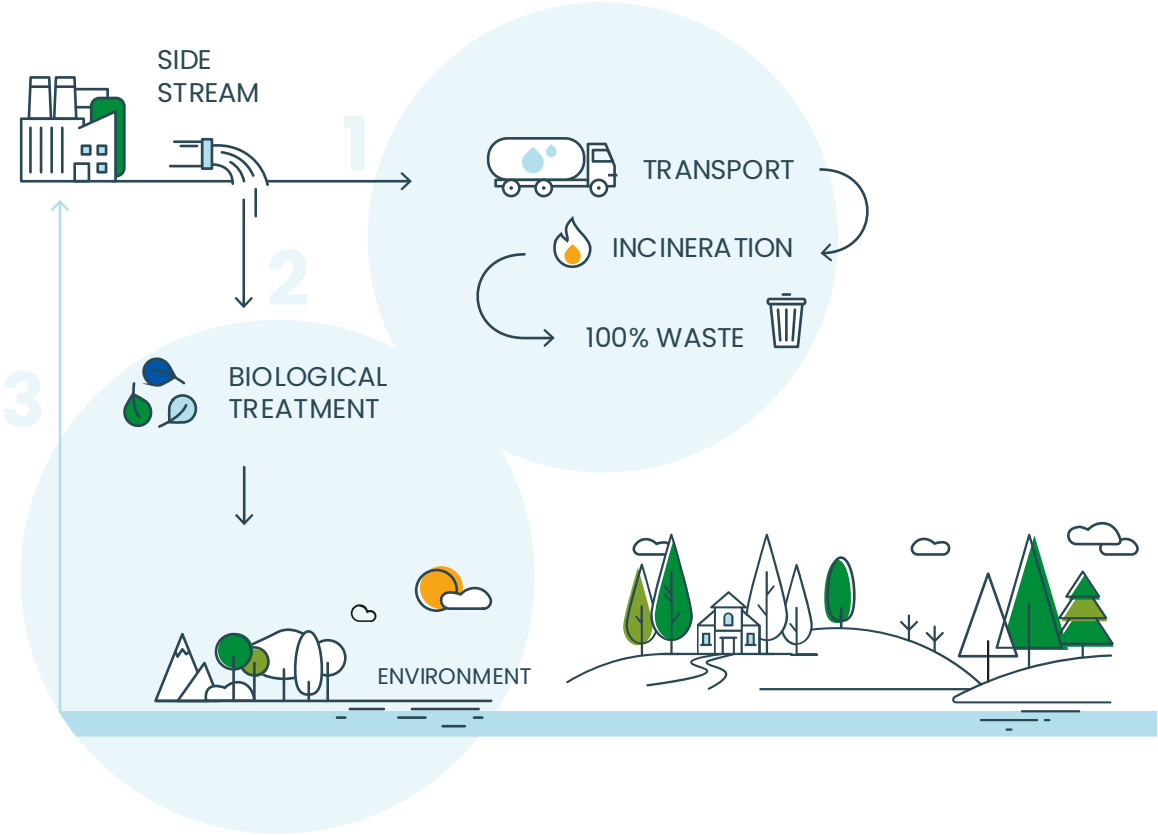
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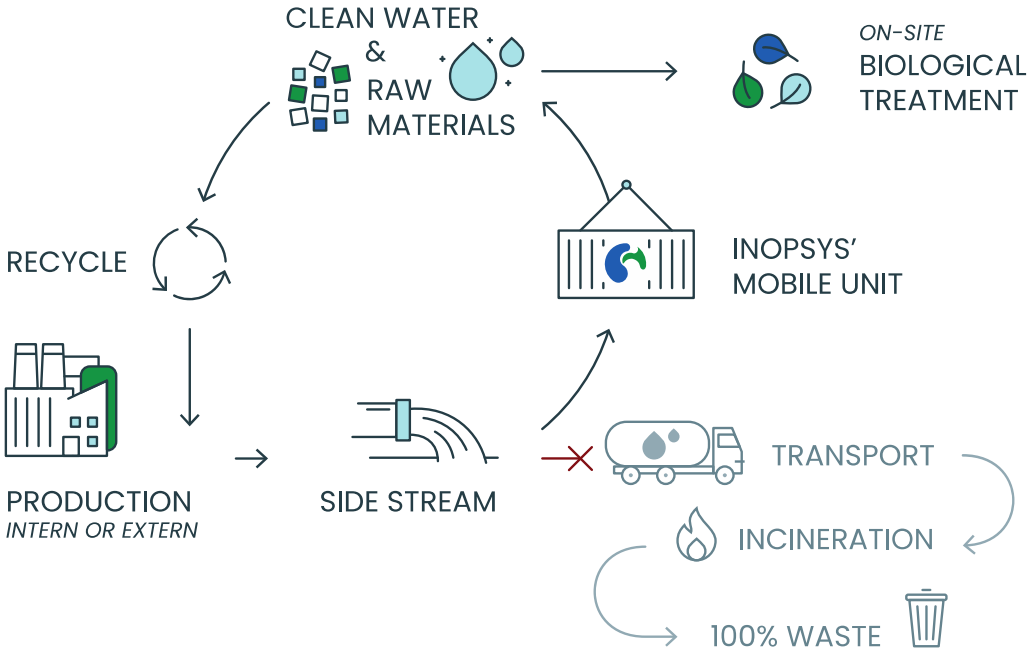
# industrial challenges.

toxic, non-biodegradable, persistent organics & heavy metals **1**

metals, micropollutants, PIE, EDC, .. **2**

water uptake **3**






**we believe in circles and provide the missing link.**

one stop shop for side stream treatment and valorisation

# our focus areas.



MOBILE &
MODULAR



CAPEX FREE
PAY-PER-USE



CIRCULAR
ECONOMY

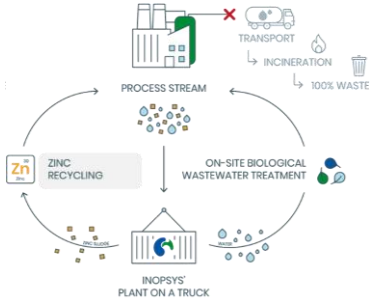


SELECTIVE
REMOVAL



WE TAKE CARE
*DBFOM*

# micropollutant challenges.

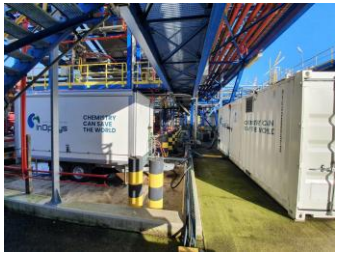


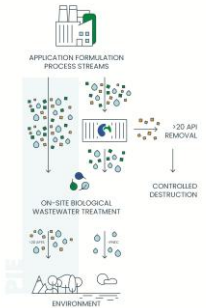

METAL





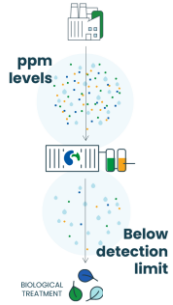

API






PIE






PFAS

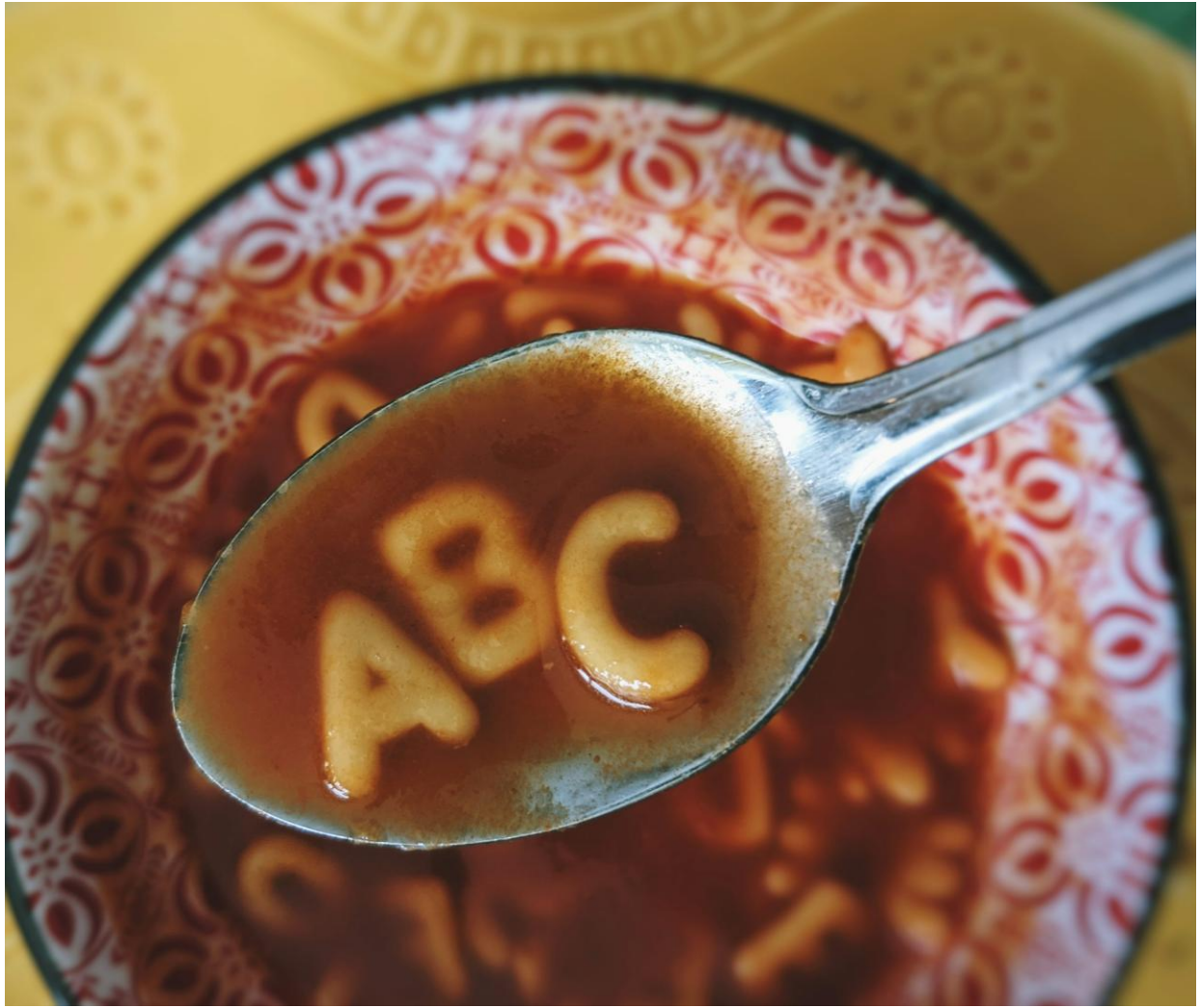


# Set target

PROBLEM COMPONENT

WATER COMPOSITION

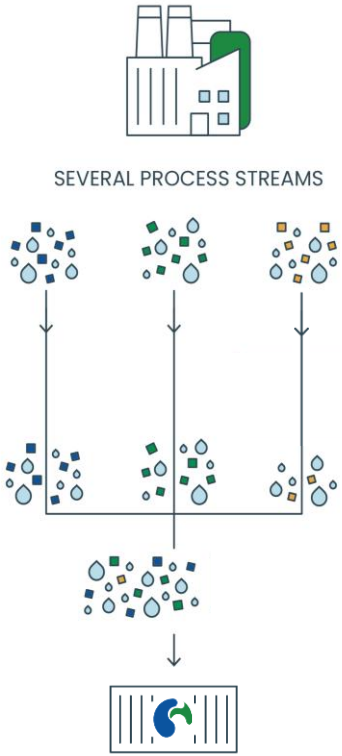
PURPOSE OF THE WATER

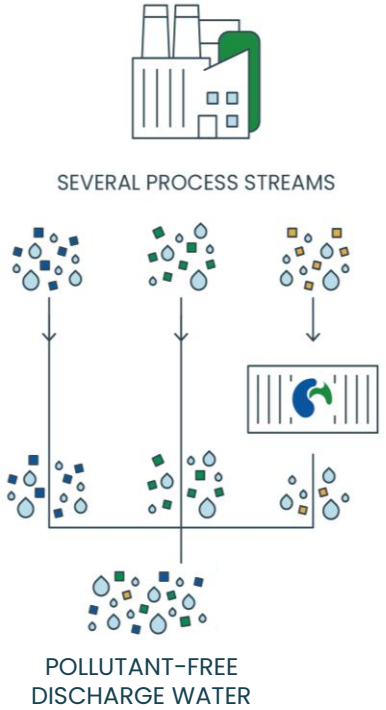



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# Set target

## TREATMENT LOCATION



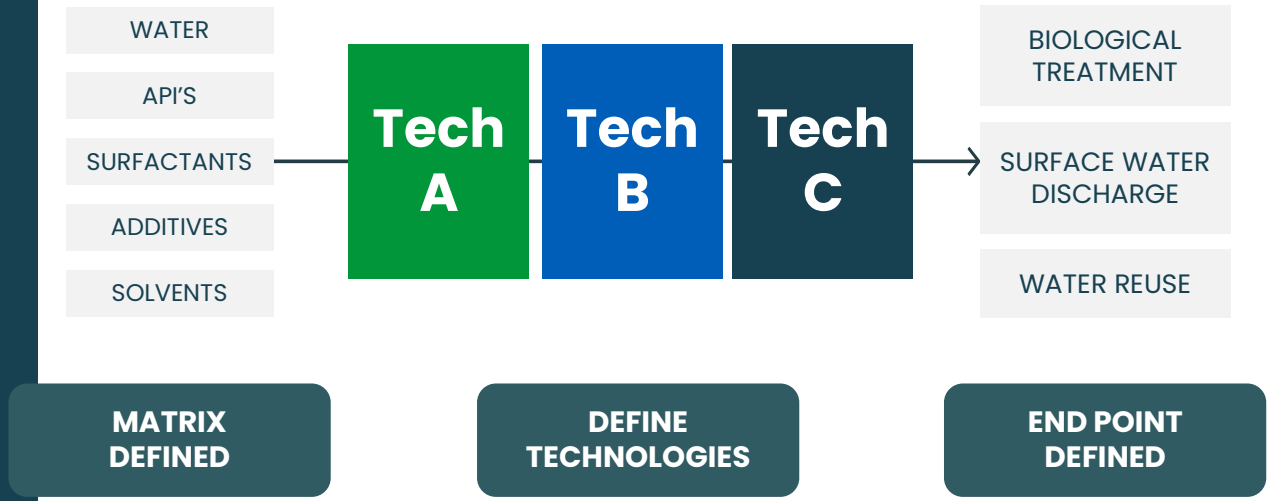




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# Aim

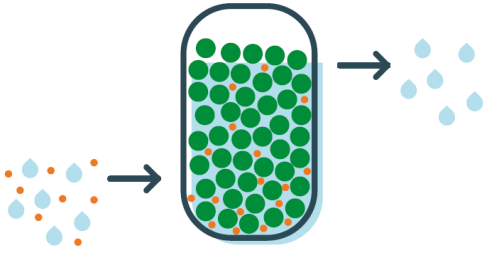
TREATMENT LOCATION

TECHNOLOGIES

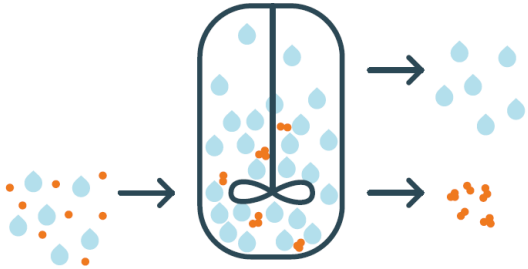



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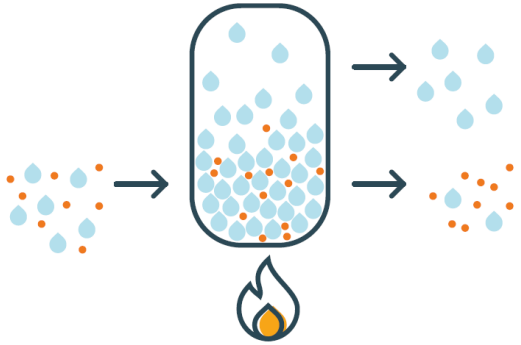
## CAGING



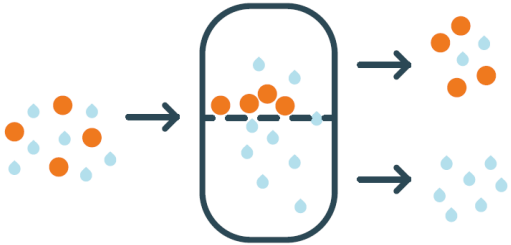
## PHYSICO-CHEMICAL



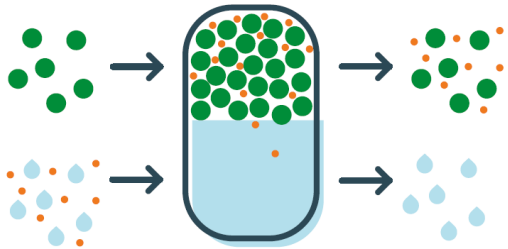
## THERMAL



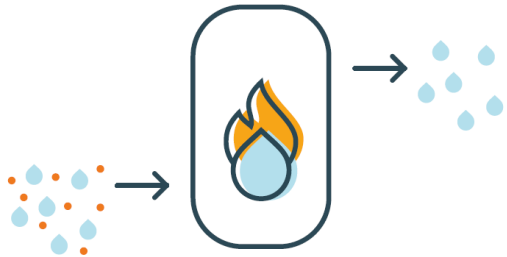
## MEMBRANES



## EXTRACTION



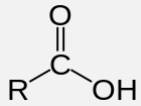
## OXIDATION



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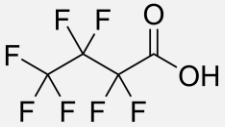
| | | Ground water | Drain water |
|---|---|---|---|
| | | Concentration (ppb) | |
| Short chain PFCAs (≤ C6) | | | |
| PFBA | C4 | 0,4 | 0,038 |
| PFPeA | C5 | 0,27 | 0,096 |
| PFHxA | C6 | 0,67 | 0,2 |
| Long chainPFCAs (≥ C7) | | | |
| PFHpA | C7 | 0,18 | 0,05 |
| PFOA (linear) | C8 | 0,51 | 0,19 |
| PFOA (branched) | C8 | 0,14 | 0,04 |
| PFNA | C9 | < LOQ | 0,033 |
| PFDA | C10 | < LOQ | 0,025 |
| PFuDA | C11 | < LOQ | 0,0022 |
| PFDoA | C12 | < LOQ | < LOQ |
| PFTrDA | C13 | < LOQ | < LOQ |
| PFTeDA | C14 | < LOQ | < LOQ |
| PFHxDA | C16 | < LOQ | < LOQ |
| PFOcDA | C18 | < LOQ | < LOQ |
| Short chain PFSAs (≤ C5) | | | |
| PFBS | C4 | 0,33 | 0,027 |
| PFPeS | C5 | 0,24 | 0,023 |
| Long chain PFSAs (≥ C6) | | | |
| PFHxS | C6 | 2,4 | 0,5 |
| PFHpS | C7 | 0,15 | 0,092 |
| PFOS (linear) | C8 | 9,8 | 18 |
| PFOS (branched) | C8 | 6,5 | 3,1 |
| PFDS | C10 | < LOQ | 0,0034 |
| Fluorotelomers | | | |
| 4:2 FTS | | 0,00121 | < LOQ |
| 6:2 FTS | | 0,35 | 0,25 |
| 8:2 FTS | | 0,13 | 0,75 |
| 10:2 FTS | | < LOQ | 0,0011 |
| Others | | | |
| HPFO-DA | | 0,0054 | 0,007 |
| PFOSA | | < LOQ | 0,1 |
| N-MeFOSAA | | < LOQ | < LOQ |
| N-EtFOSAA | | < LOQ | 0,0027 |
| 8:2 DiPAP | | < LOQ | < LOQ |
| **Sum** | | **22,08** | **23,53** |

**Worst case**

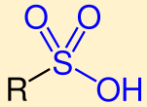



perfluoro carboxylic acids

**short chain**

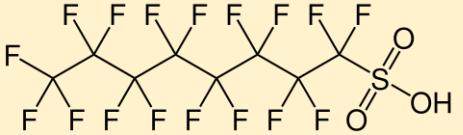



PFBA




perfluoro sulfonic acids

**long chain**




PFOS

> 1 µg/L

> 100 ng/L

# different PFAS, different challenge.

# validated methods.

for on-site PFAS removal and/or upconcentration

## adsorption

activated carbon — **Golden standard**

ion exchange

## membrane filtration

nanofiltration

reverse osmosis

# PFAS treatment options

Adsorption - Determining the right technology

| | GAC | IEX |
|---|---|---|
| Cost-efficiency | cost per kg material ↓ | • Capacity<br>• Kinetics x 3 ↑ |
| Regeneration | Limited by PFAS load | Not limited by PFAS load |
| Capacity influenced by | COD load<br>Salt concentration | COD load<br>Salt concentration |
| US-PFAS removal | Limited | Down to detection limit |








# Our standardized PFAS removal units.





# Illustration through 2 cases.

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# Selecting optimal technology for short chain PFAS removal



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# SET TARGET

| | |
|---|---|
| **Target component** | PFBS – ppm |
| **Alternative solution** | External incineration |
| **Goal** | > 99% removal |
| **Water composition** | Very high organic load |
| **Location** | $V_{EOP} = 100 . V_{upstream}$ |

AIM

Location upstream

Selection of best adsorbent: **PFAS specific IEX resin**

- **High** capacity
- **High** removal efficiency

Pretreatment required: solids removal



# AIM

WATER

PFAS

SOLIDS

COD

...



BIOLOGICAL TREATMENT

SHOOT

**Final result**

> 99,9% PFBS removal

To below detection limit



# Optimal treatment for high flowrate PFAS removal




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# SET TARGET

| | |
|---|---|
| **Target component** | PFAS (extensive list) |
| **Previous solution** | WWTP neighbour |
| **Goal** | < Detection Limit (ng/L) |
| **Water composition** | High COD load |
| **Location** | $V_{EOP} = 1 . V_{upstream} = 50\ m^3/h$ |

# AIM

Location before WWTP

Selection of best adsorbent: **PFAS specific IEX resin**

- **High** capacity
- **High** removal efficiency

Footprint – high flowrate

Possible scope shift to US-PFAS

Future regeneration of resin



# AIM

WATER

PFAS

SOLIDS

COD

...



BIOLOGICAL TREATMENT

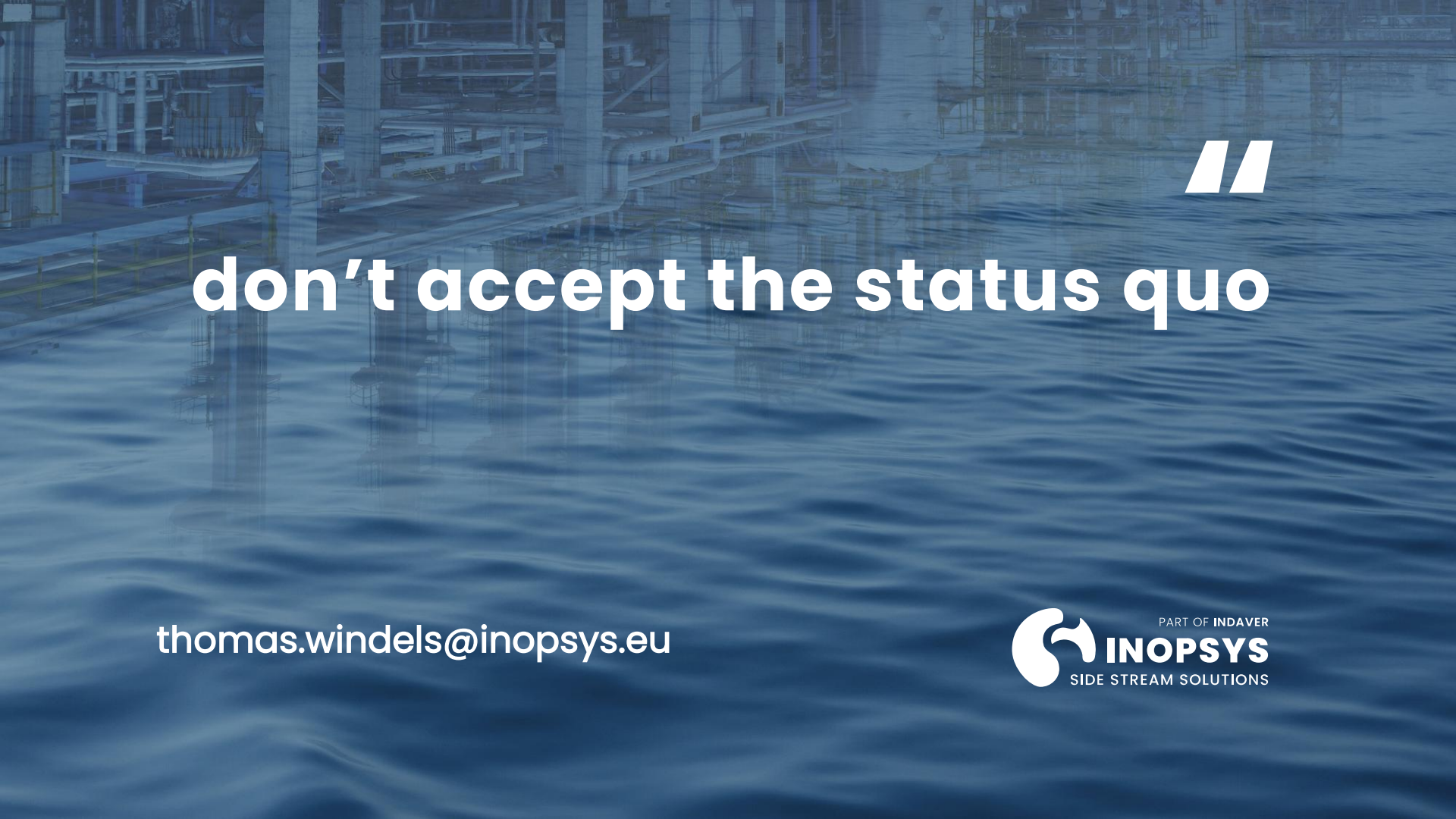
SHOOT

**Final result**

> 99,9% PFBS removal

To below detection limit





# don’t accept the status quo

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