



The LIFE SOuRCE project (LIFE20 ENV/ES/000880) has received funding from the LIFE Programme of the European Union



# LIFE SOuRCE



## AquaConSoil

11 - 15 september 2023 | Prague



# Testing innovative technologies to enhance PFAS polluted groundwater treatment – The LIFE SOuRCE Project

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Swedish University of Agricultural Sciences



# Objectives of the LIFE SOuRCE project

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- Effective and economic remediation solution for PFAS contaminated groundwater (GW)
- Remove long-chain (LC-PFAS) (> 99%) and short-chain (SC-PFAS) (> 95%)
- Aiming to destroy PFAS
- EU DW Directive targets (0.1 µg/L individual PFAS and 0.5 µg/L for PFAS in total)
- Affordable costs (up to 0.1 €/m<sup>3</sup> treated groundwater)
- Modular solution applicable to a broad range of contaminated site characteristics



## Spanish site

- Mediterranean climate
- Firefighting foams
- 5 µg/l
- One major pollutant



**eurecat**  
Centre Tecnològic de Catalunya

**esolve**  
Soil and water remediation

## Swedish site

- Temperate climate
- Landfill leachate
- 2-3 µg/l
- Other pollutants



**envytech**  
Miljö & teknik

**UPPSALA VATTEN**

**LAQUA**  
TREATMENT AB

Swedish University of  
Agricultural Sciences  
**SLU**

**NOVA** **DIAMANT**

**SWEDISH  
GEOTECHNICAL  
INSTITUTE**



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# LIFE SOuRCE Solution

**SAFF**



**Surface Active Foam Fractionation**

**PHYTO**



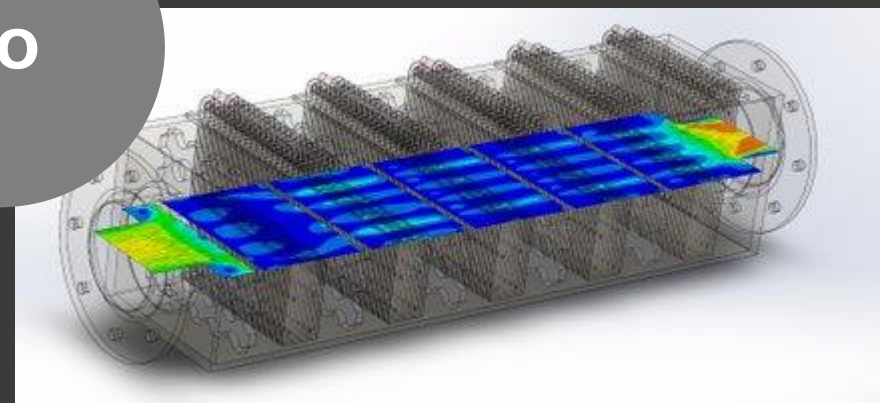
**Phytoremediation**

**AEX**



**Anion Exchange Filters**

**EO**



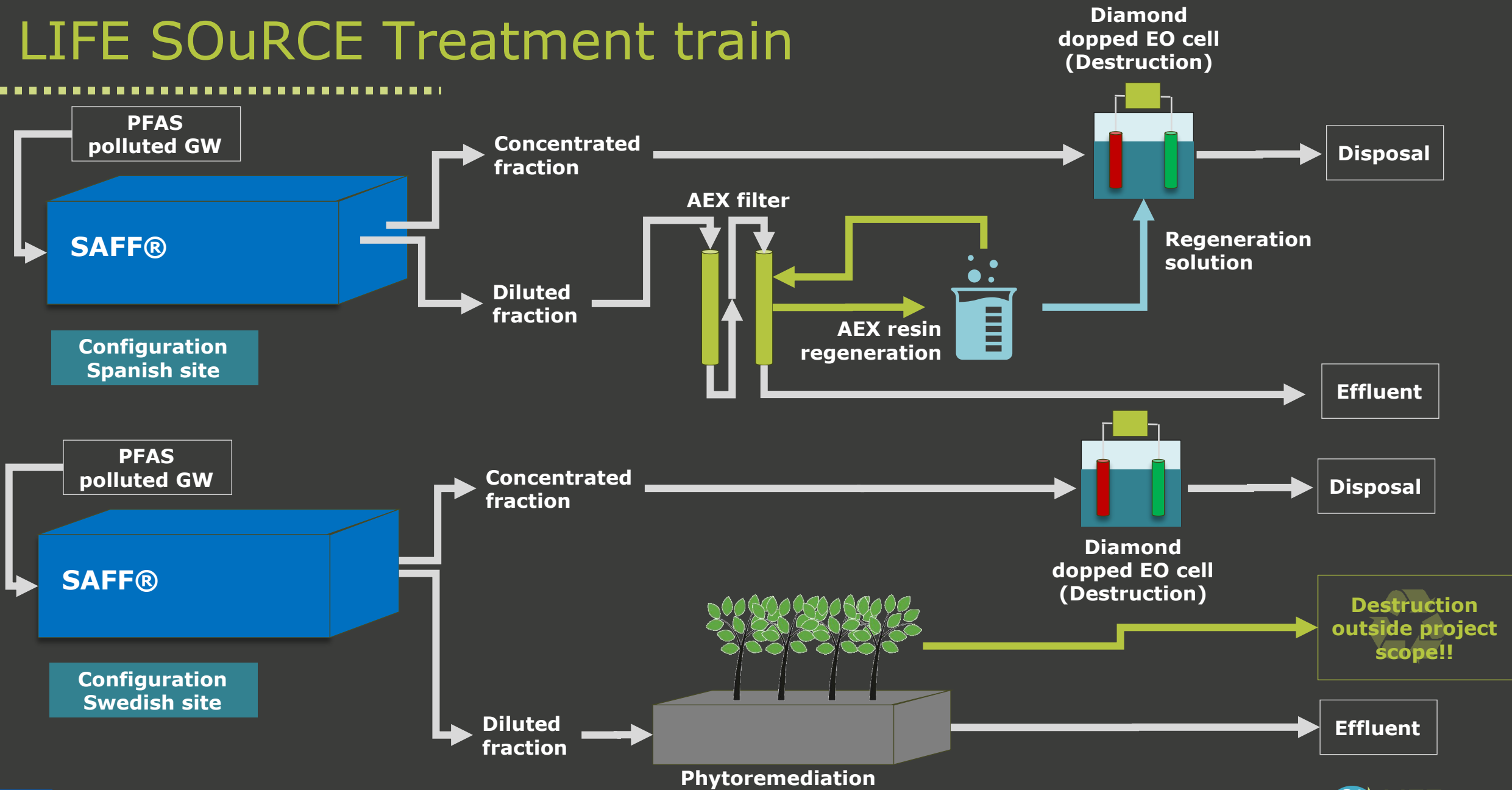
**Diamond Doped electrodes Electrooxidation cell**



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# LIFE SOuRCE Treatment train

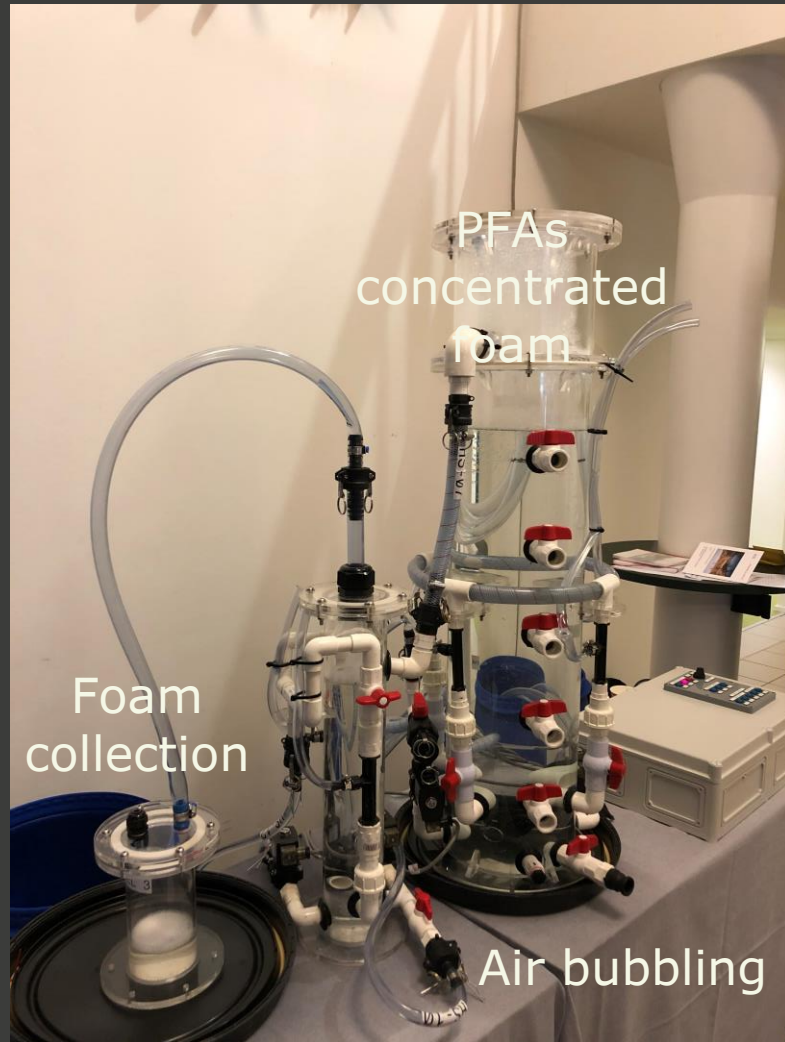


# Bench scale tests with each technology

<b>Treatment technology</b>	<b>Objective of bench scale test</b>
<b>SAFF</b>	Checking the removal efficiency of short and long chain PFAS with each water matrix (different sites)
<b>AEX</b>	<ul style="list-style-type: none"><li>- Select from the three identified resins from Purolite (PFA694, A532E and A592EBF) the most suited for PFAS removal.</li><li>- Estimate the adsorption capacity of the most suitable resin.</li><li>- Select the most efficient regeneration solution for the selected resin.</li></ul>
<b>EO</b>	Optimization of electric consumption for treatment of regeneration solution
<b>PHYTO</b>	Testing of three different plant species and substrates for optimization of PFAS removal.



# Bench scale tests with minSAFF – Method and results

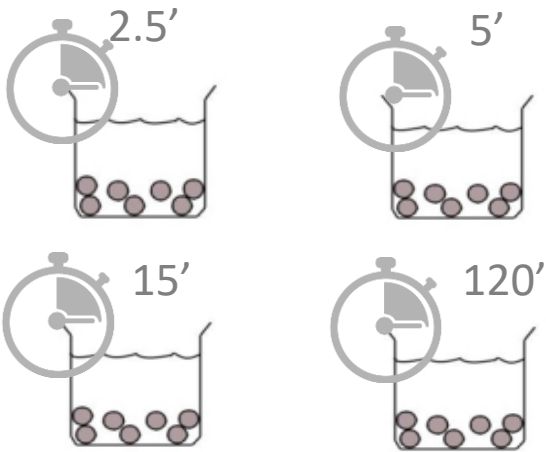


- Efficiencies >89% for longer chain PFAS (PFOA, PFNA, PFDA, PFHxS, PFOS, 6:2 FTSA)
- Efficiencies <24% for short chain PFAS: PFBA, PFPeA and PFBS

# Bench scale tests with AEX - Methods

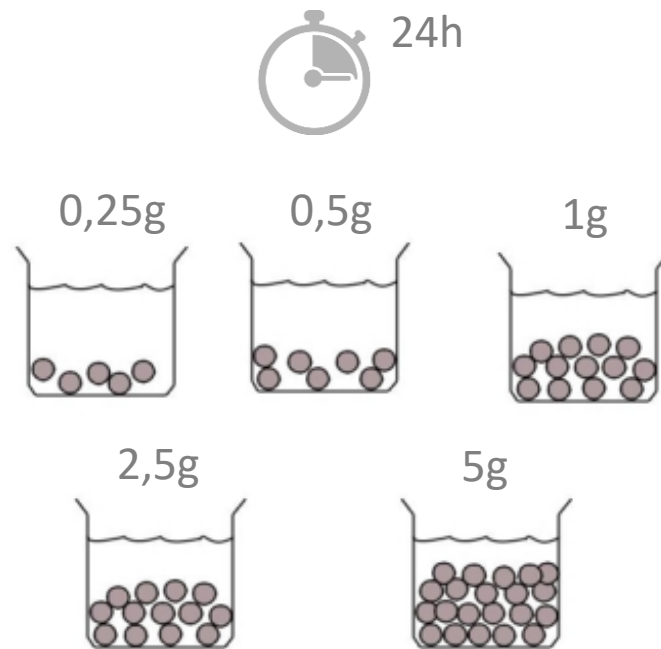
## 1. Reequilibrium rate & resin selection

- PFA694E
  - A592EBF
  - A532E
  - GAC (for reference)
- Spiked groundwater:  
6:2FTS, PFPeA and PFBA



## 2. Adsorption capacity

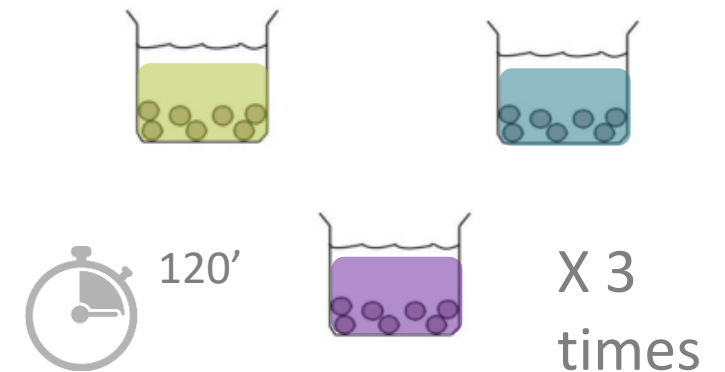
- PFA694E
- Spiked groundwater:  
6:2FTS, PFPeA and PFBA



## 3. Regeneration strategy

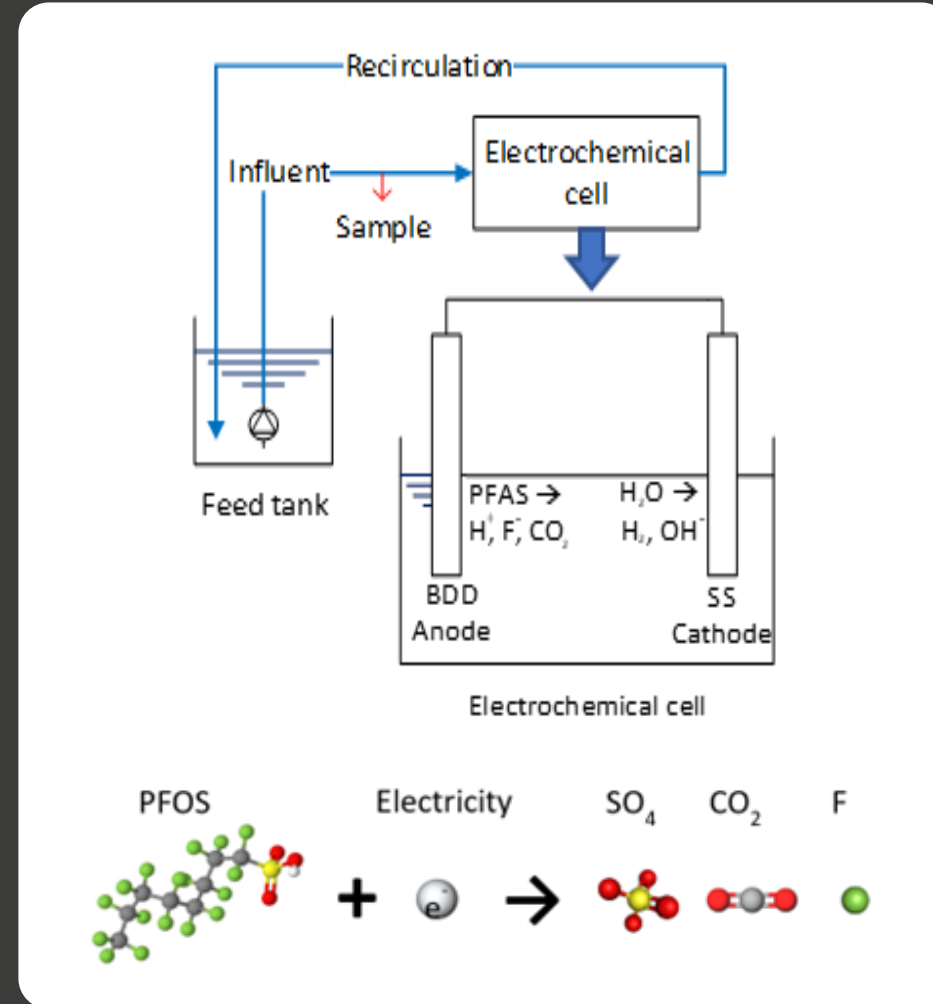
PFA694E & spiked GW  
overnight  
Resine with regeneration  
solutions:

- 0.5%NH<sub>4</sub>OH + 0.5%NH<sub>4</sub>Cl
- 80%CH<sub>3</sub>OH + 1%NH<sub>4</sub>Cl
- 80%CH<sub>3</sub>CH<sub>2</sub>OH + 1%NH<sub>4</sub>Cl





# Bench scale test with EO cell – Experimental set-up

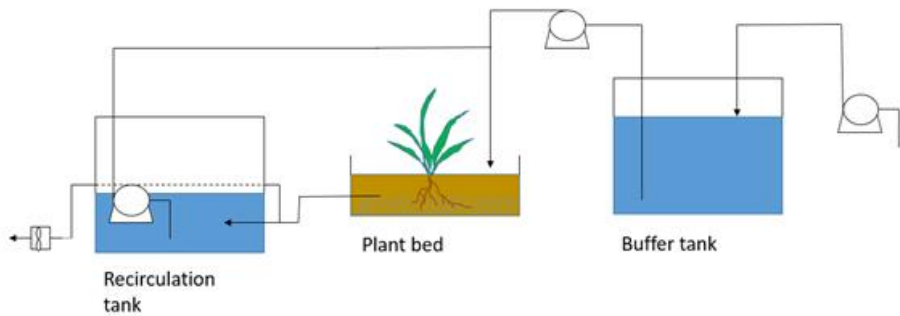


Treatment of used regeneration solutions with different intensities:

- 5A
- 15A
- 25A

Optimize electricity consumption and PFAS destruction

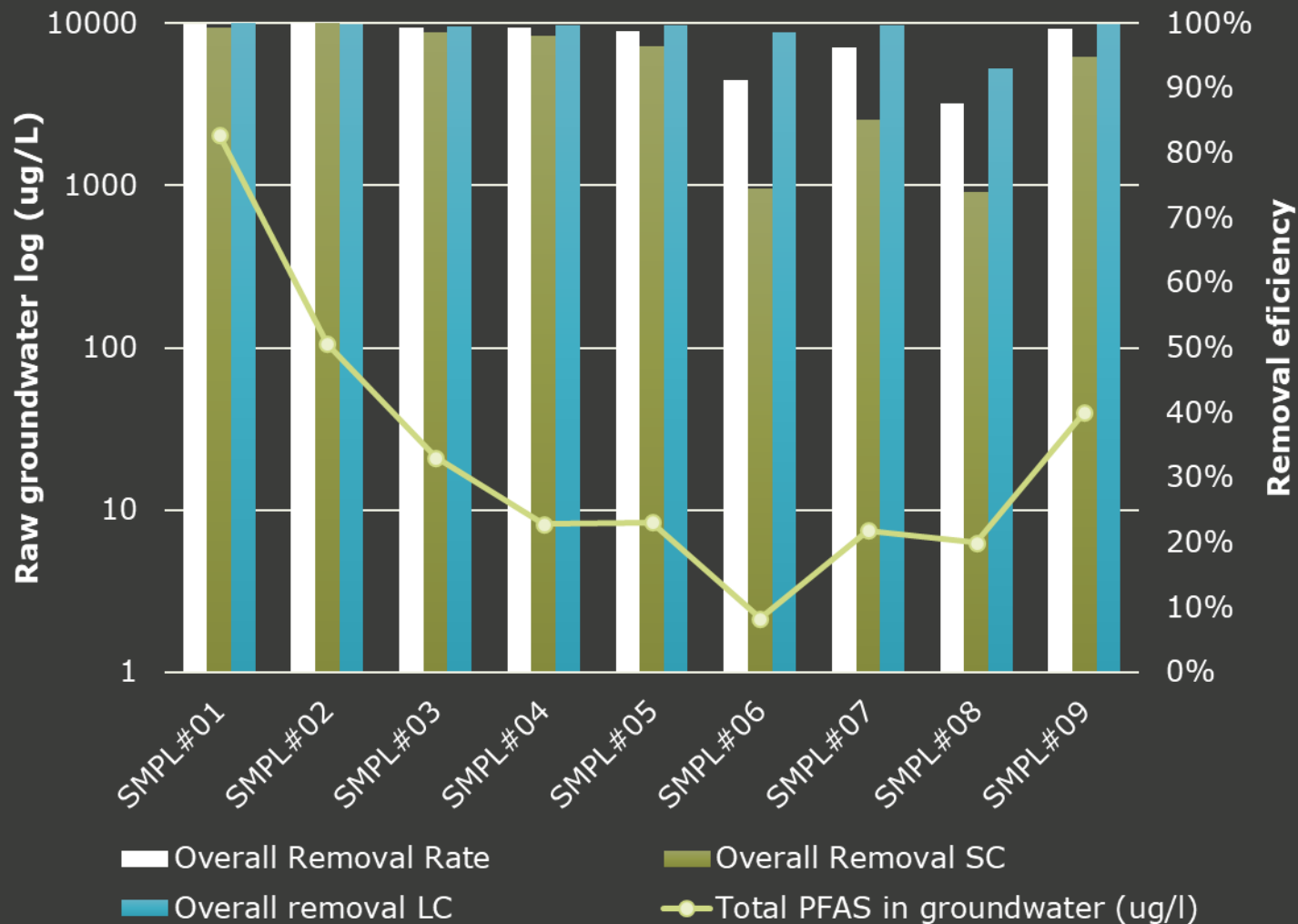
# Pre-Pilot scale tests with Phytoremediation – Set-up Sweden



Tests performed to choose among:

- *C. Sativa*
- *Salix*
- *C. Elata*

# Pilot scale implementation in Spain





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# Thank you! Tack! ¡Gracias!

