LIFE SOuRCE is a European project focusing on the demonstration and evaluation of sustainable on-site remediation technologies for PFAS-contaminated groundwater.

### THE TREATMENT TECHNOLOGIES OF LIFE SOuRCE



#### THE PROJECT PARTNERS ARE

Fundació Eurecat (project coordinator)

Envytech Solutions AB

ESOLVE Consultoría e Ingeniería Medioambiental S.L.

Laqua Treatment AB

Nova Diamant AB

Swedish Geotechnical Institute (SGI)

Swedish University of Agricultural Sciences (SLU)

Uppsala Vatten och Avfall AB (UVA)

#### Funding

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



The project started in September 2021 and has a duration of four years.





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## LIFE SOuRCE

Demonstration and evaluation of Sustainable On-site Remediation technologies for PFAS-ContaminatEd groundwater.



# PFAS – A threat to human health and ecosystems

Per- and polyfluoroalkyl substances (PFAS) are a group of more than 5,000 anthropogenic chemicals that pose known risks to human health and the environment. They are called "forever chemicals" because of their persistence in the environment. In addition, they are mobile and thereby easily transported in soils, groundwaters and surface waters.

There is toxicological evidence that PFAS have adverse reproductive, developmental, and immunological effects in animals and humans. Humans are mainly exposed to PFAS by intake of contaminated food and drinking water.

Two known major sources of PFAS contamination are firefighting training areas, where fluorinated fire-fighting foams (AFFF) have been used, and landfills. The number of sites potentially emitting PFAS has been estimated to be approximately 100,000 in Europe.



## What we do

A combination of remediation methods for PFAS contaminated groundwater is being tested and demonstrated at two demo sites. One is a site in Spain where AFFF products have been used. The other site is a landfill site (Hovgården) operated by Uppsala Vatten och Avfall AB in Uppsala, Sweden.

In Uppsala, surface active foam fractionation (**SAFF**) is being combined with phytoremediation (**PHYTO**) and electrochemical oxidation (**EO**), while a combination of SAFF, anion exchange filters (**AEX**) and EO and is being used at the Spanish site.



Perfluorooctanesulfonic acid is one type of PFAS commonly found in natural waters. The "tail" of carbon (grey) and fluorine (green) atoms gives the molecule lipophilic properties, whereas the "head" of sulfur (yellow) and oxygen (red) atoms gives it hydrophilic ones.

# The technologies tested

**SAFF** utilizes the physiochemical properties of PFAS compounds to attach to fine air bubbles. When bubbles are introduced and allowed to rise in a narrow column, the bubbles become exceptionally effective in collecting PFAS compounds. Once at the surface, PFAS can easily be removed by separation.

**PHYTO** can be used as a polishing step of SAFF treated water, since the SAFF method might be less efficient for short-chain PFAS (<C7). Plants can extract and accumulate PFAS, in particular the short-chain ones.

**AEX** is an alternative polishing step of SAFF treated water. Water is passing a column with anion exchange resin and the negatively charged PFAS are retained. The AEX resin can be regenerated on-site.

**EO** is using boron doped diamond electrodes to destruct the PFAS compounds, either enriched in the foam produced by the SAFF method or eluted from the anion exchange resin. The method is versatile and can be used on-site.