

Development of an efficient and sustainable methodology for Emerging Pollutants Removal in Waste Water Treatment Plants

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**LIFE
EMPORE**

Life is water.





Accreditations and Certifications



Recent Projects

- Development of an efficient and sustainable methodology for the elimination of emerging pollutants from EDAR's (EMPORE) (LIFE15 ENV/ES/000598).
- Removal of emerging micropollutants and faecal contamination using MBR and Solar Photocatalysis technologies.
- Developing of a novel genomic tool for the identification of European freshwater macroinvertebrates. EUREKA-EUROSTARS, 2018.

Introduction

The Life-EMPORE Project aims at designing a technical and cost-efficient solution for removing emerging pollutants (EPs) from Waste Water Treatment Plants (WWTPs) all over Europe.



AIMS



- To demonstrate that the selected combination of technologies is able to reduce:
 - a) the concentration below Directive 2013/39/UE threshold of the following priority ECs: chlorpyrifos, trifluralin, Di(2-ethylhexyl)phthalate (DEHP) and 4-t-octylphenol,
 - b) the concentration in a 99% of their original concentration of the following ECs included in the watch list of DIRECTIVE 2013/39/UE: diclofenac, 17-a-ethinylestradiol and 17-b-estradiol and
 - c) the concentration of the following pharmaceutical pollutants in 99% of their original concentration: carbamazepine, ibuprofen, fluoxetine and chloramphenicol and estrone.
- To evaluate the occurrence of ECs in Europe.
- To design, construct and set-up a mobile DEMO plant able to reduce the listed ECs.
- To characterize the ECs and their yearly variability for the Benidorm WWTP, henceforth BWWTP.
- To analyze the feasibility of the technologies for the ECs removal.
- To assess the environmental state before and after treatment in BWWTP according to different organoleptic, physical and chemical parameters.
- To assess the socio-economic impact of the implementation of the demonstration plant for EC removal in the local economy and also in other European regions with similar pollution problems.
- To transfer the project results to other identified Europe places with a similar situation regarding ECs.
- To disseminate between stakeholders the benefits of using EMPORE technologies for the reduction of ECs presence in European WWTPs.

RESULTS. *European Emerging Pollutants Characterization*

Substance	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Rep.	Denmark	Finland	France	Germany	Greece	Hungary	Int. Waters	Italy	Netherlands	Norway	Portugal	Romania	Serbia	Slovakia	Slovenia	Spain	Sweden	Switzerland	Ukraine	UK
Diclofenac	Red	Red	Red	Red		Red			Red	Red		Red		Red	Red		Red	Red	Red	Red	Red	Red	Red	Red		
Ibuprofen	Red	Red	Red	Red		Red			Red		Red	Red		Red	Red		Red	Red	Red	Red	Red	Red	Red	Red		
Chloramphenicol	Red		Red	Red						Red		Red			Red			Red					Red			
Carbamazepine	Red	Red	Red	Red		Red			Red	Red		Red		Red	Red		Red	Red	Red	Red	Red	Red	Red	Red		
Fluoxetine									Red	Red					Red		Red					Red	Red	Red		
Estradiol	Red		Red	Red					Red	Red		Red			Red			Red		Red	Red		Red	Red		
Estrone	Red	Red	Red	Red		Red			Red	Red		Red		Red	Red			Red	Red	Red	Red				Red	
Ethinylestradiol		Red							Red	Red				Red	Red						Red		Red		Red	

Table 1 European mapping of ECs. Red: ECs evaluated and detected at environmentally relevant concentrations. Green: ECs evaluated and non-detected at environmentally relevant concentrations. White: no available data. Source: Network Norman.

- *WWTPs are not specifically designed for the removal of emerging contaminants.*
- *Wastewater treatment technologies exhibited a different removal effect on certain ECs.*
“A particularly technology could be linked to the Physical/chemical properties of the target EC”
- *There is **NOT** a single wastewater treatment technology capable of removing the entire range of ECs. Thus, a combination of technologies is required.*

RESULTS. *Characterization of Water Samples.*

- **MAIN GOAL:** to quantify the pre-selected pollutants present at the inlet and output of BWWTP. In addition, the action aims to study the seasonal variability of the concentration of ECs in the wastewater received by BWWTP.

- **METHODOLOGY:**

- a) Obtain the needed acreditations to access Benidorm Waste Water treatment Plant (BWWTP).
- b) Annual analytical campaign of the influent and effluent of BWWTP (54 samples from the influent and effluent).

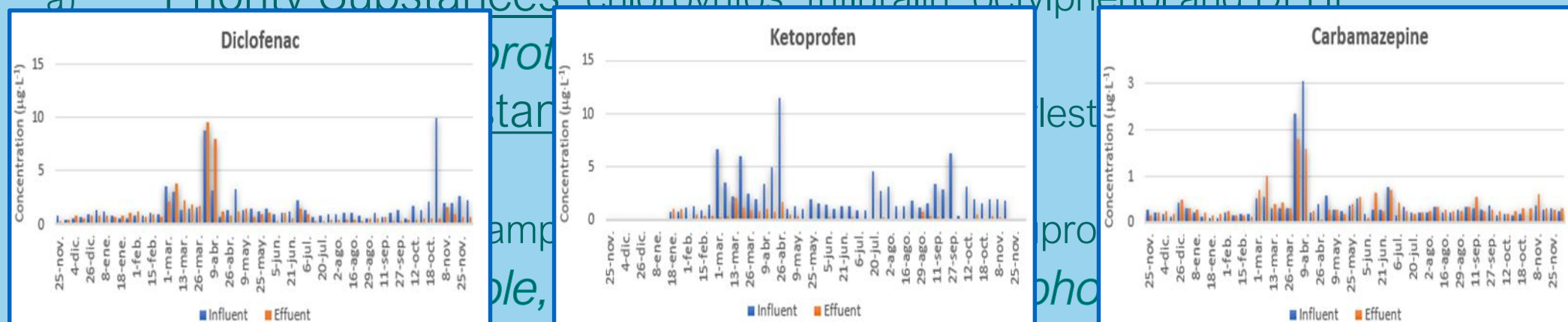
Analytical techniques: GC-MS/MS and HPCL-MS/MS

- c) BWWTP Database gathering analytical results.

- **LIST OF**

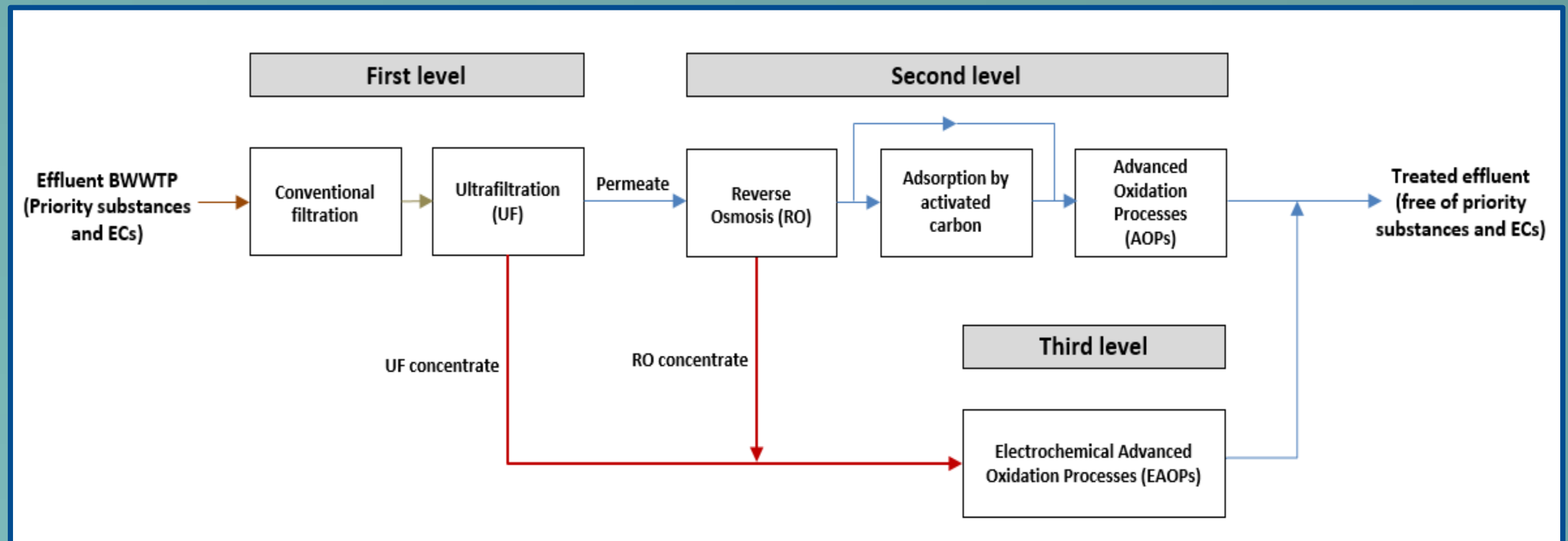
EPS SEASONAL VARIABILITY

- a) Priority Substances: chloroxybis, trimethin, ocypiphenol and DEHP



RESULTS. *Design and implementation of the pilot plant.*

Conceptual Scheme



THE WHOLE PLANT

DEMO PLANT FRONT



PREFILTRATION



AOPs (O₃)



***AOPs (H₂O₂)
EAOPs***

THE WHOLE PLANT

DEMO PLANT BACK



ULTRAFILTRATION



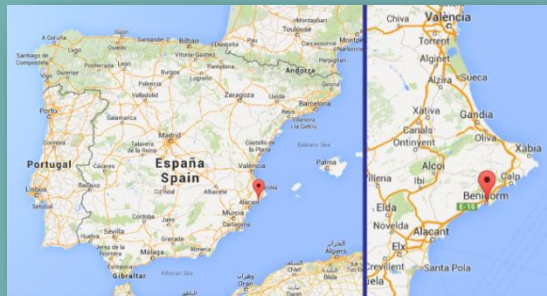
***REVERSED
OSMOSIS***



AOPs (UV)

PILOT PLANT LOCATION.

Benidorm (Alicante, Spain)



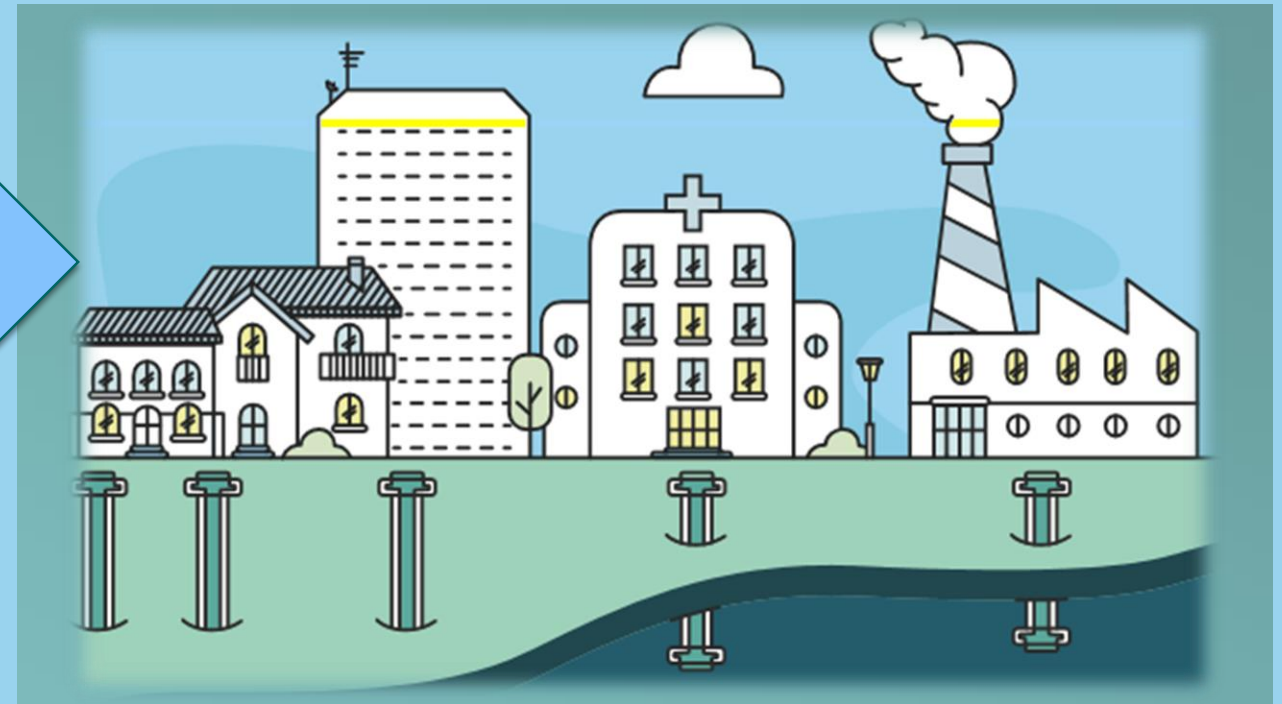
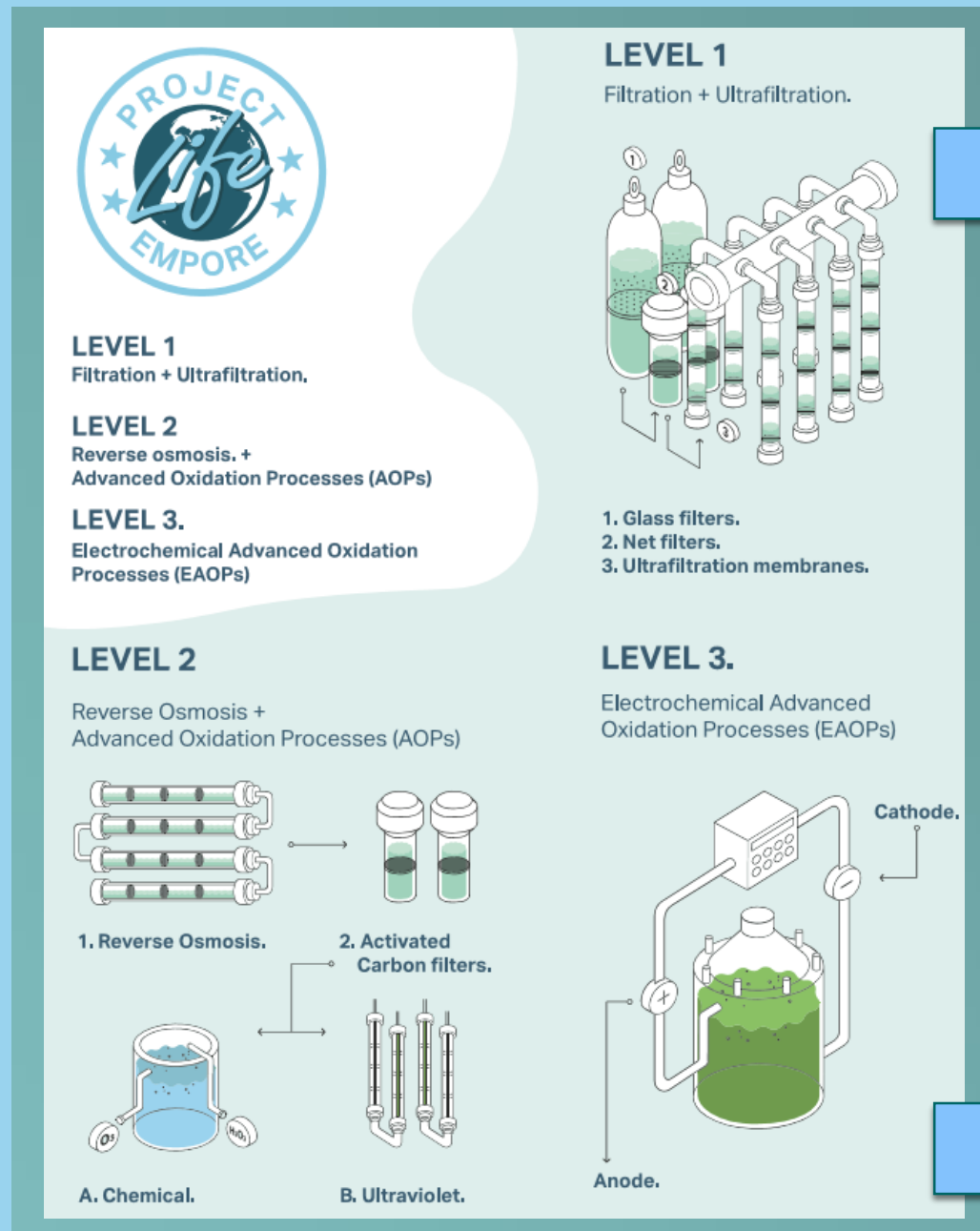
The location chosen for this project is Benidorm (Alicante, Comunidad Valenciana), one of Spain's main tourist destinations.

The proposed methodology will be validated at the Benidorm WWTP.



The results will then be relayed to other European regions with similar problems.

EMPORE Concept





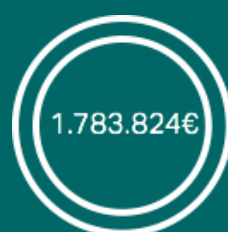
Duration.



Partners.



Budget.



EU financial
contribution 1.030.407 €

Financial contribution.

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www.life-empore.org

