

FIRST RECLAMATION FACILITY BY SOLAR PHOTO-FENTON AT DEMONSTRATIVE SCALE

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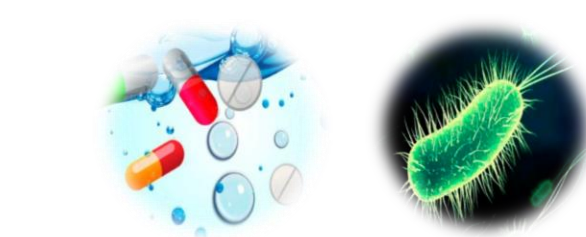
INTRODUCTION



SUSTAINABLE DEVELOPMENT GOALS [1]



WATER TREATMENT

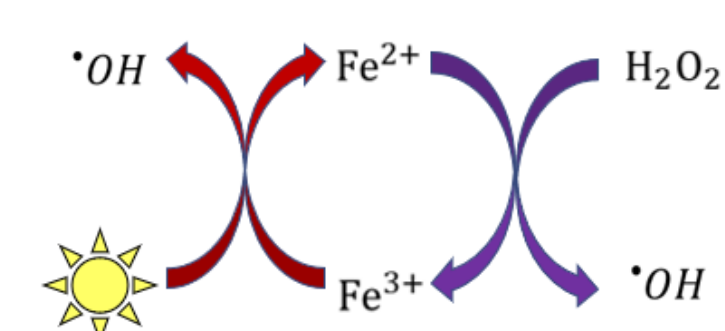


WATER RECLAMATION



NEW REGULATION
(EU) 2020/741

PHOTO-FENTON PROCESS

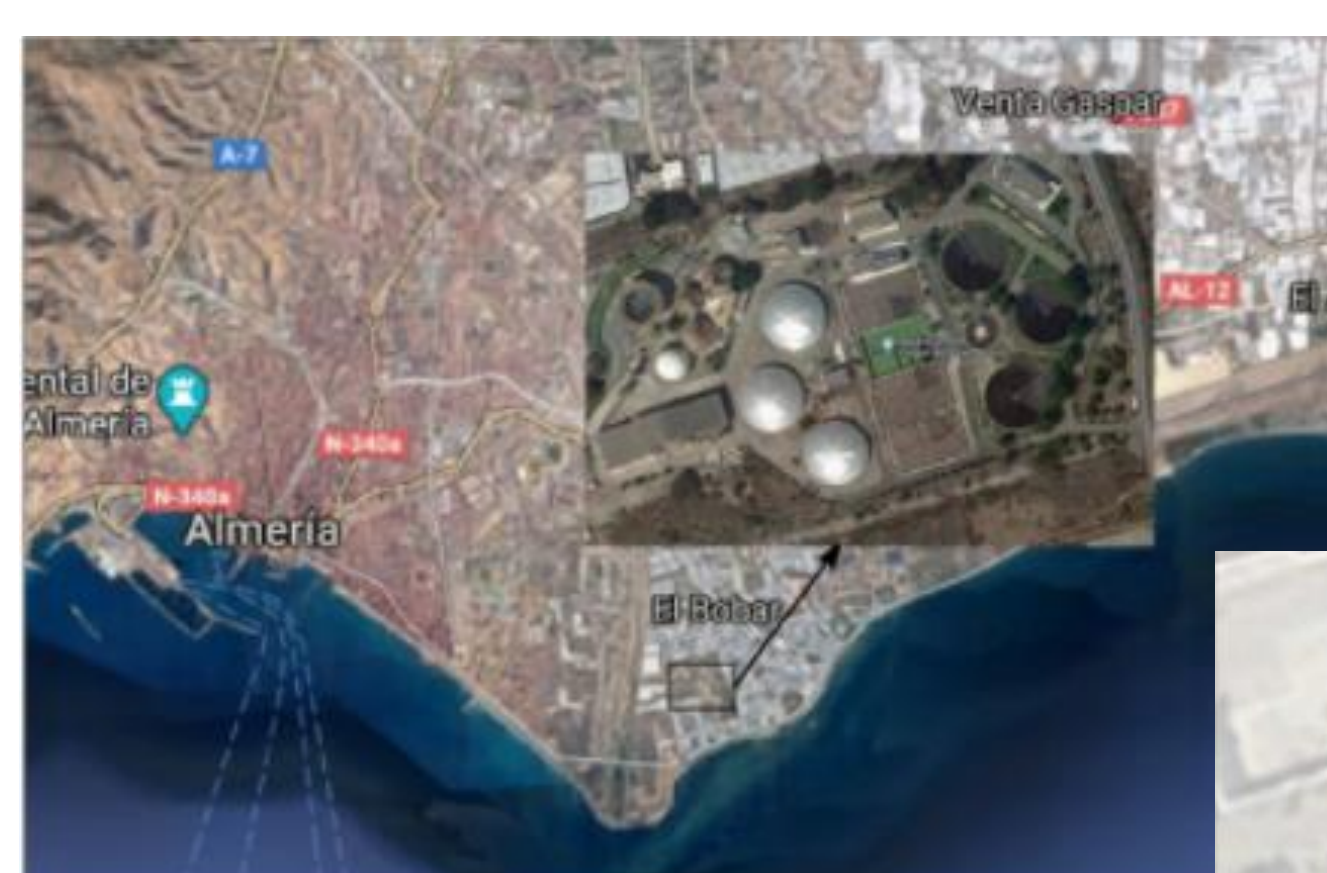


OBJECTIVE

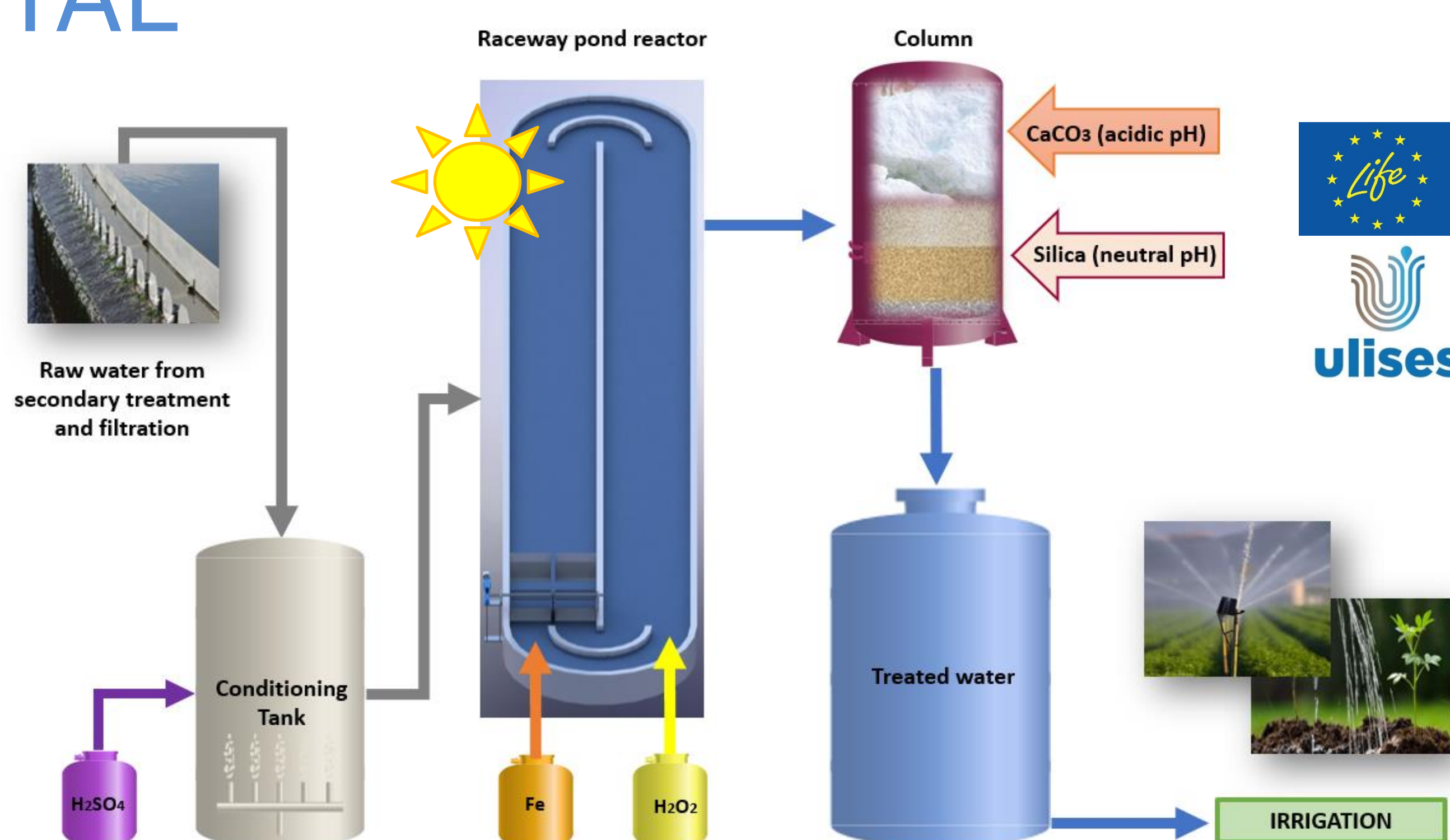
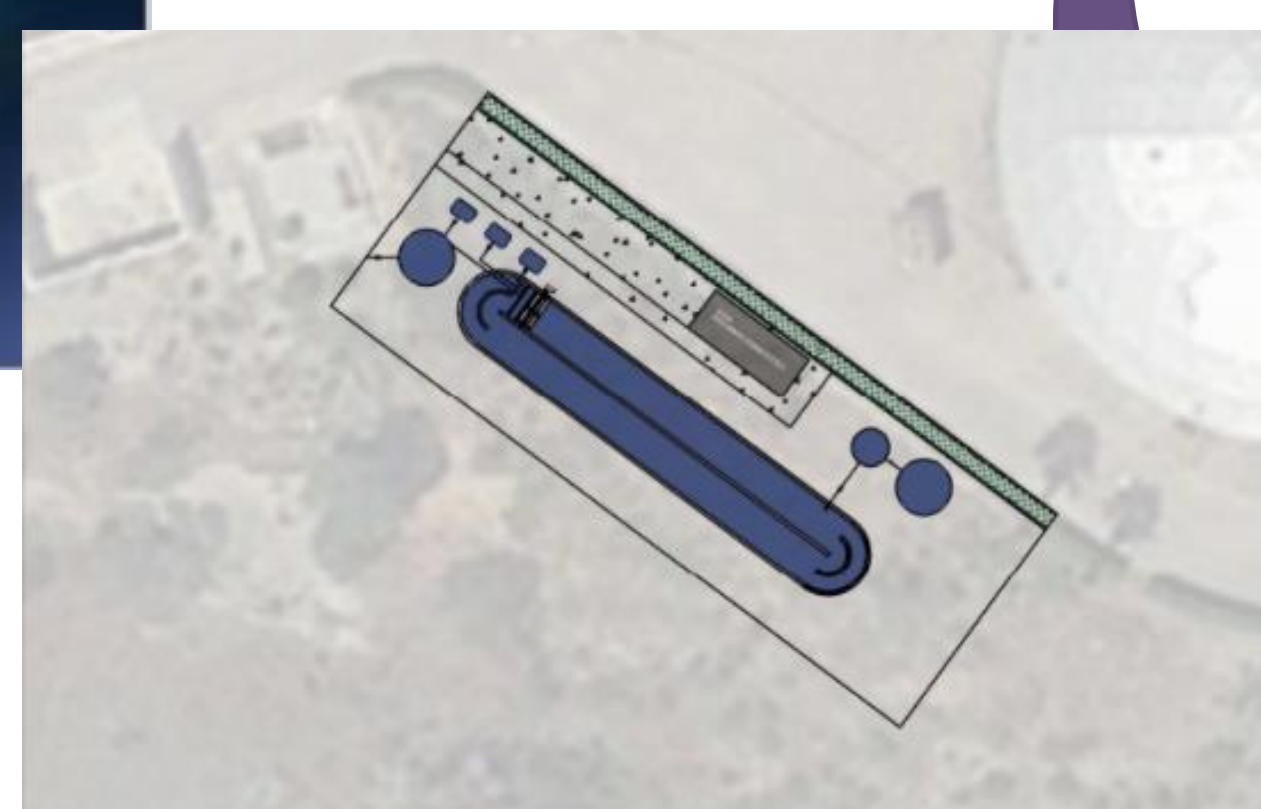
For the first time, the solar photo-Fenton process has been implemented as a tertiary treatment at demonstrative scale, in the Wastewater Treatment Plan ('El Bobar' WWTP), for wastewater reuse.

EXPERIMENTAL

'El Bobar' WWTP



Solar photo-Fenton process in continuous flow operation



RESULTS

PILOT SCALE [2,3]

❖ Removal of Contaminant of Emerging Concern

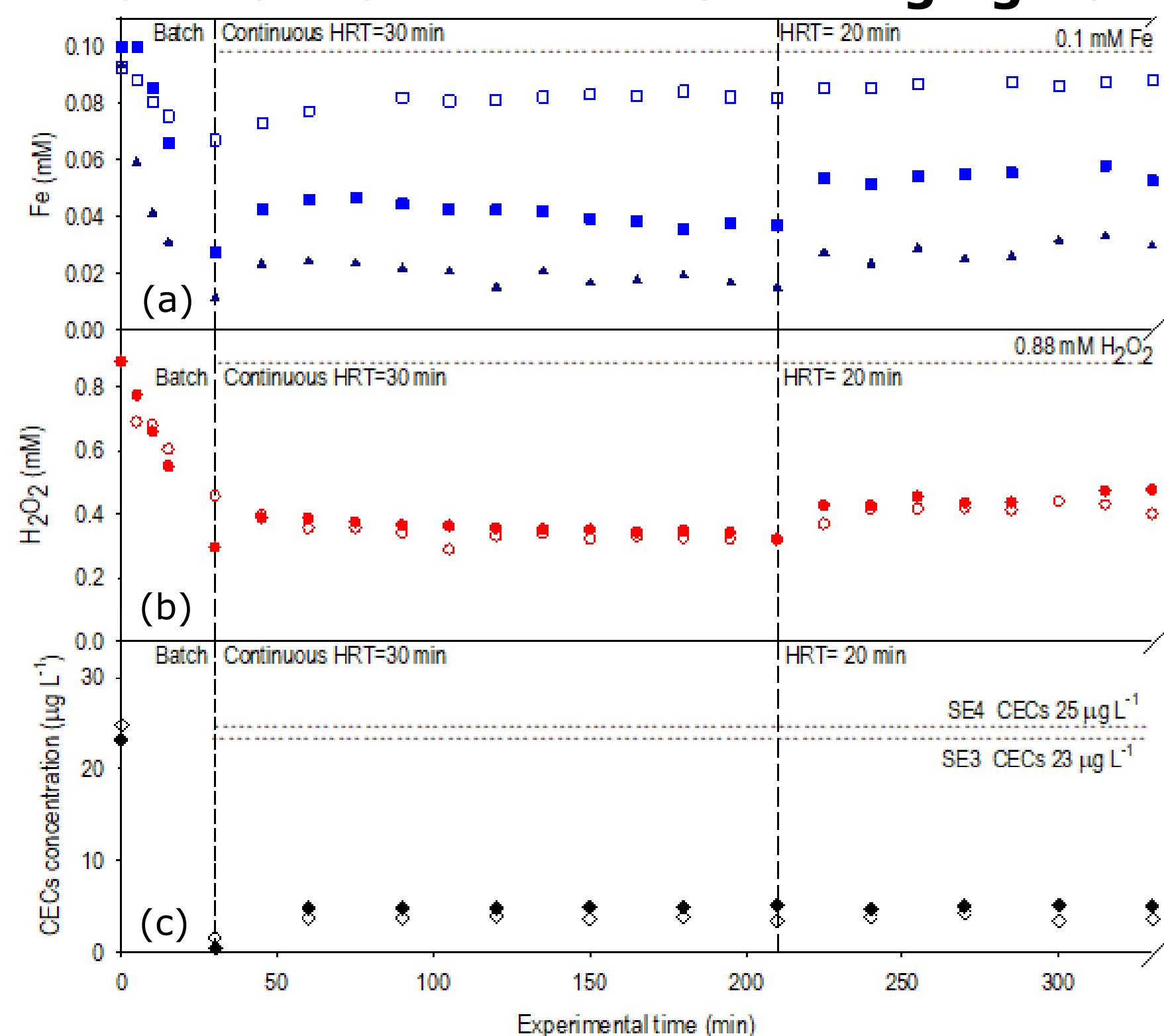


Fig. 1. (a) Concentration profiles of total dissolved iron (Fe_0), (a) Fe^{3+} -EDDS, (b) H_2O_2 , (c) and CECs during the continuous solar photo-Fenton process. Open symbols for acidic pH and closed symbols for neutral pH.

❖ Inactivation of microorganisms

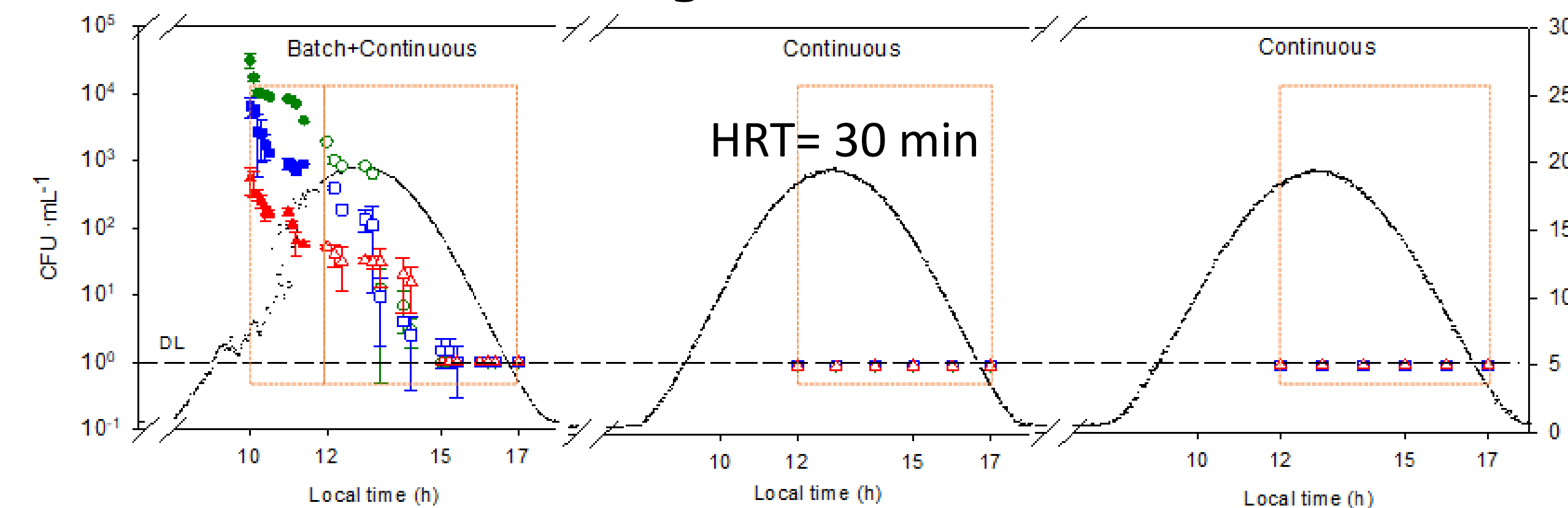
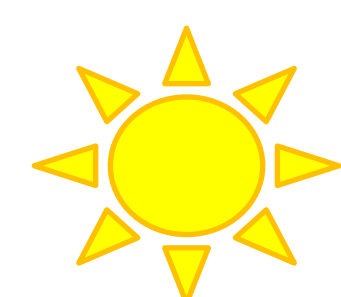


Fig. 2. Total coliforms (\bullet), *E. coli* (\blacksquare) and *Enterococcus* sp. (\blacktriangle) inactivation by solar photo-Fenton process in batch (closed symbols; 50 mg L⁻¹ H_2O_2 , 5.6 mg L⁻¹ Fe^{2+}) and continuous flow (open symbols; 50 mg L⁻¹ H_2O_2 , 5.6 mg L⁻¹ Fe^{2+}).



Irradiance = 20 W m⁻²

DEMONSTRATIVE SCALE



CONCLUSIONS

- ✓ Simultaneous disinfection and decontamination of secondary WWTP effluents is achieved, with hydraulic residence times of 30 min, using low concentrations of reagents (5.6 mg L⁻¹ of Fe and 50 mg L⁻¹ of H_2O_2).
- ✓ These results have established the basis for the implementation in 'El Bobar' WWTP of a 100 m² raceway pond reactor, estimating a treatment capacity to 3500 L m⁻² d⁻¹.

REFERENCES

- [1] <https://www.agenda2030.gob.es/>
- [2] J.A. Sánchez Pérez, S. Arzate, P. Soriano-Molina, J.L. García Sánchez, J.L. Casas López, P. Plaza-Bolaños. Science of The Total Environment. 2020, 736, 139681.
- [3] I. De la Obra Jiménez, B. Esteban García, G. Rivas Ibáñez, J.L. Casas López, J.A. Sánchez Pérez. Applied Catalysis B: Environmental. 2019, 247, 115-123.

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