



Decentralised Grey-water Treatment System Based On Electrochemical Oxidation

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Pressure on water supply will increase during the following years



Economic development



Contamination of fresh water



Population growth



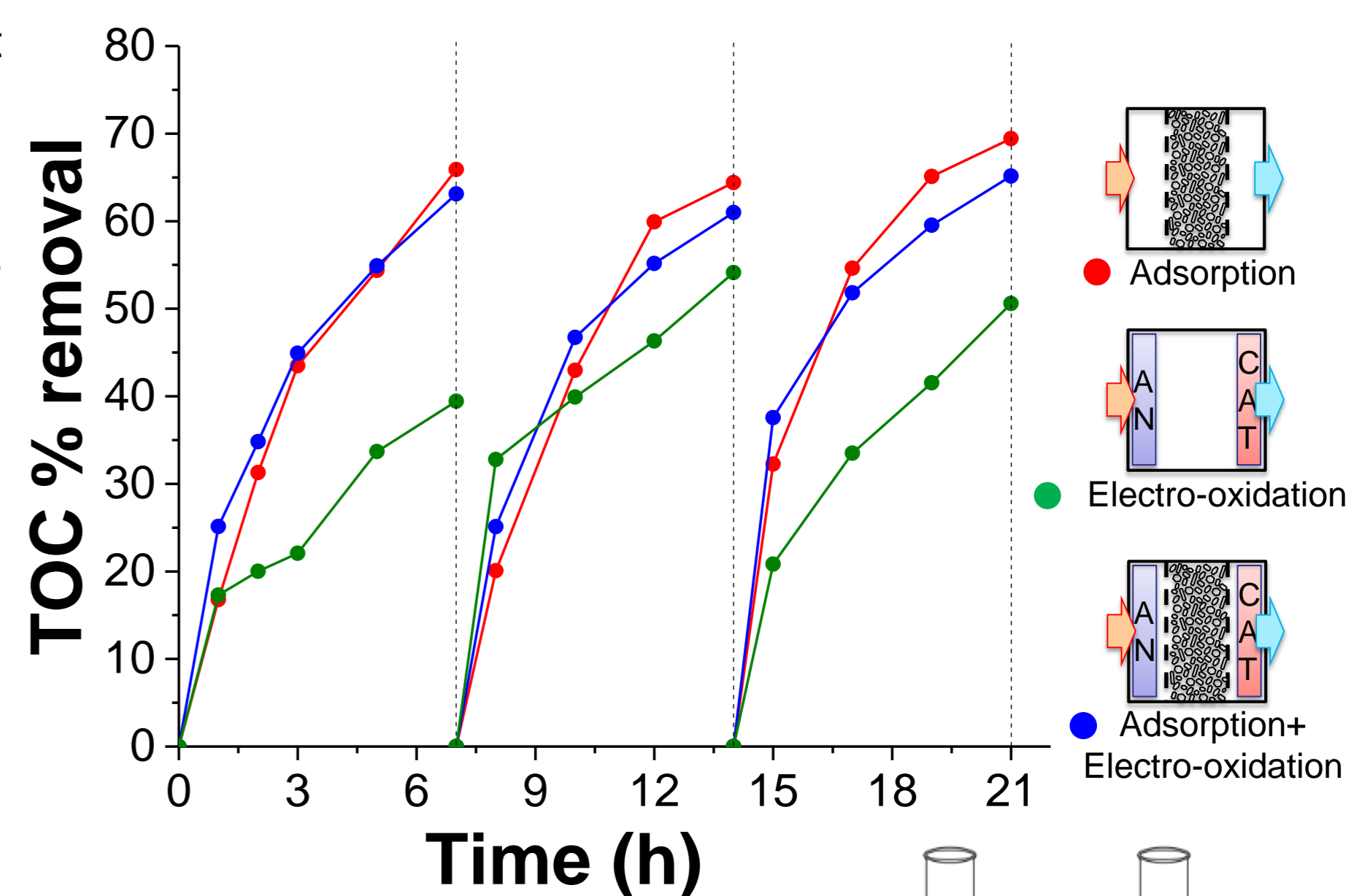
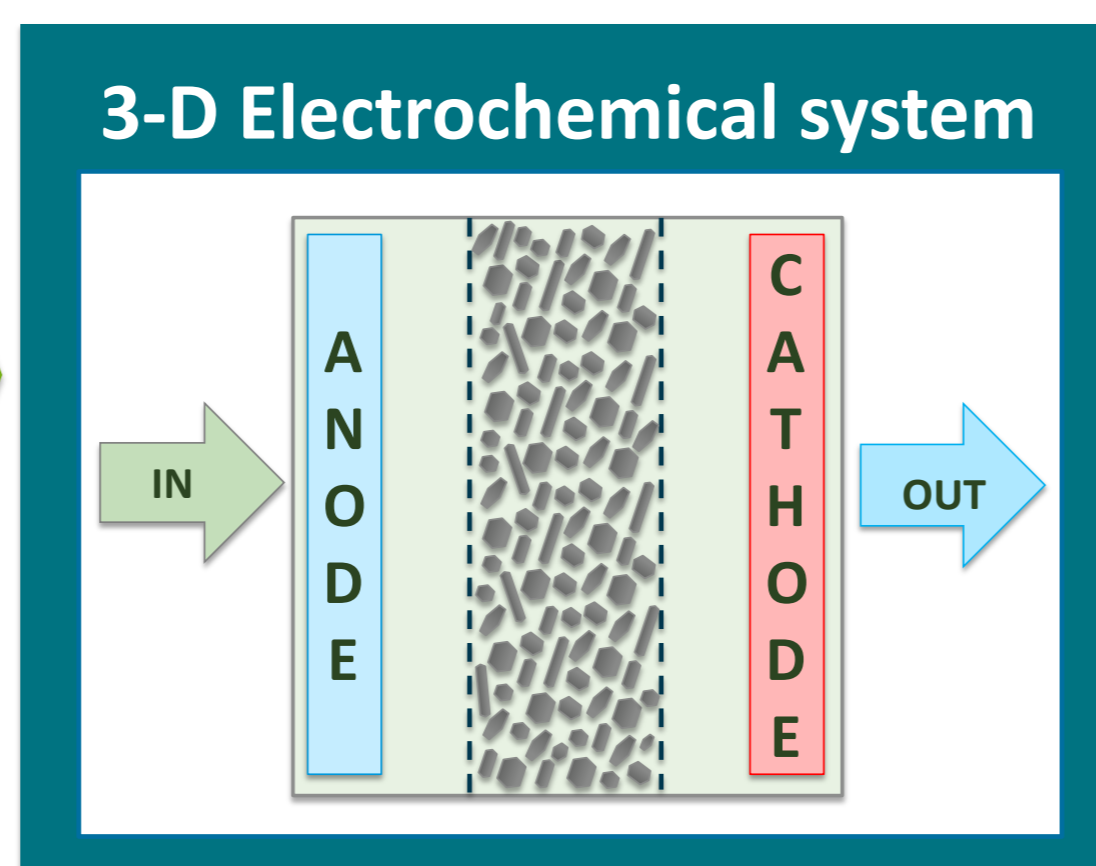
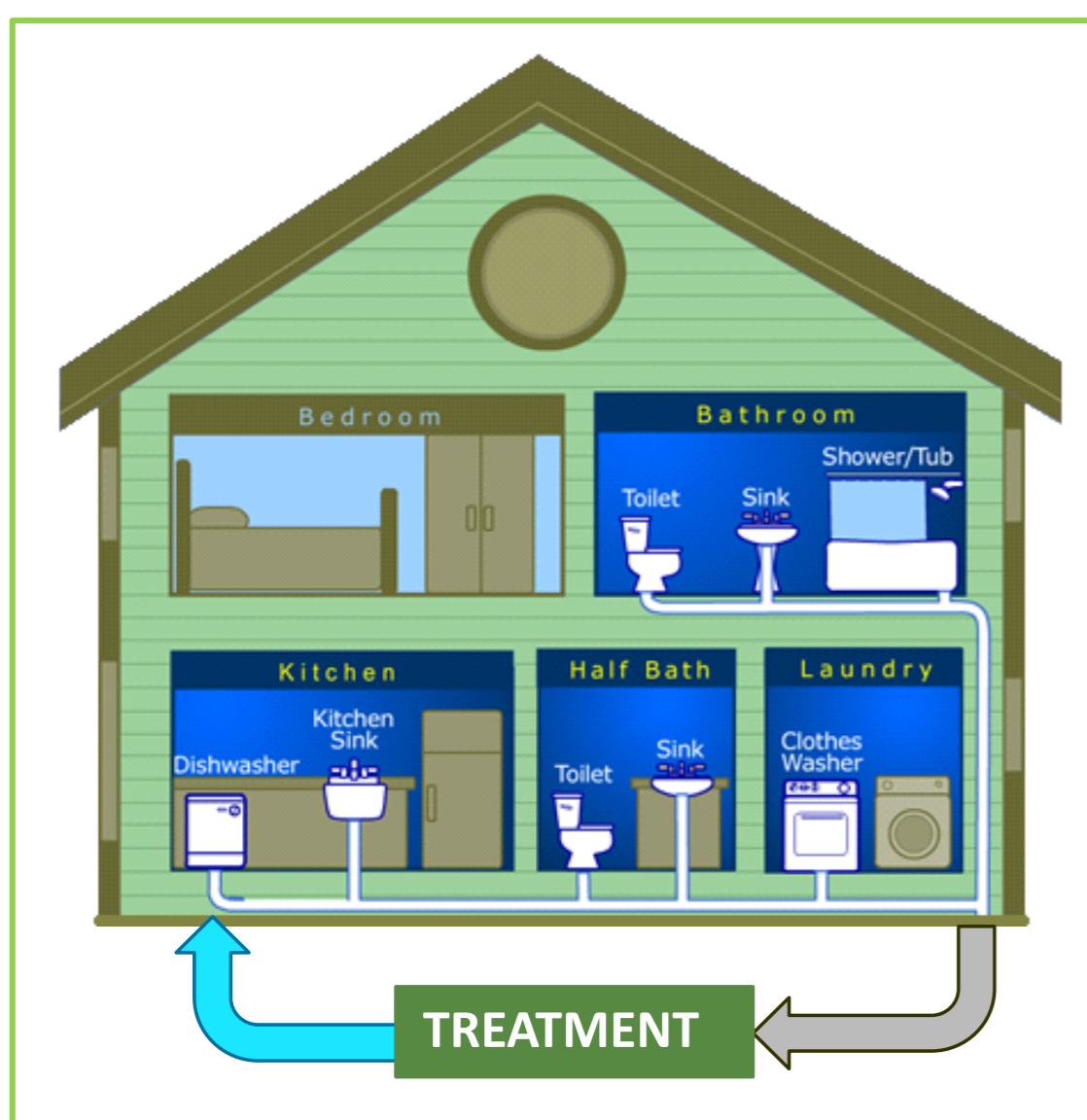
Climate change

The continued development of cities requires increasing the number and size of systems that collect, treat and distribute water. Considering that **water transportation represents 73% of the total energy consumption** in these systems^[1], this option will become inefficient. **Decentralised water production** provides an excellent opportunity for a sustainable water supply.

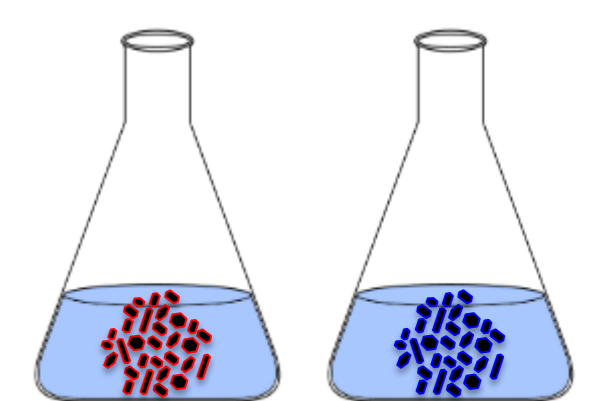
THE AIM OF THIS PROJECT IS THE DEVELOPMENT OF A NOVEL DECENTRALISED WATER TREATMENT SYSTEM, BASED ON ELECTROCHEMICAL OXIDATION, CAPABLE OF IN-SITU FIT-FOR-PURPOSE WATER PRODUCTION THROUGH TREATMENT OF GREY-WATER.

Electrochemical oxidation is an emerging technology for wastewater treatment that has been effectively used for water disinfection and organic pollutants removal^[2-4].

Combined electrochemical oxidation and activated carbon adsorption can provide efficient removal capabilities of organics.



After desorption experiments^[5]



| Parameter | Units | Adsorption | Adsorption+ Electro-oxidation |
|-----------|--------------------|------------|-------------------------------|
| TOC | mg L ⁻¹ | 48.80 | 7.31 |

- Racoviceanu, A., et al., Life-cycle energy use and greenhouse gas emissions inventory for water treatment systems. Journal of infrastructure systems, 2007. 13(4): p. 261-270.
- Cañizares, P., et al., Combined adsorption and electrochemical processes for the treatment of acidic aqueous phenol wastes. Journal of Applied Electrochemistry, 2004. 34(1): p. 111-117.
- Can, W., et al., Treatment of secondary effluent using a three-dimensional electrode system: COD removal, biotoxicity assessment, and disinfection effects. Chemical Engineering Journal, 2014. 243(0): p. 1-6.
- Zhou, M. and L. Lei, The role of activated carbon on the removal of p-nitrophenol in an integrated three-phase electrochemical reactor. Chemosphere, 2006. 65(7): p. 1197-1203.
- Zhu, X., et al., Synergies between electrochemical oxidation and activated carbon adsorption in three-dimensional boron-doped diamond anode system. Electrochimica Acta, 2011. 56(3): p. 1270-1274.