



## INNOVATIVE TECHNOLOGIES FOR SUSTAINABLE MANAGEMENT OF URBAN AND INDUSTRIAL WASTE STREAMS

Wet oxidation for the removal of high organic load waste.

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# Introduction

- What is a High Organic Load Waste (HOLW)?
- What is its composition? What are its problems?
- What is the current treatment?
- What do we propose?



Secondary

Primary



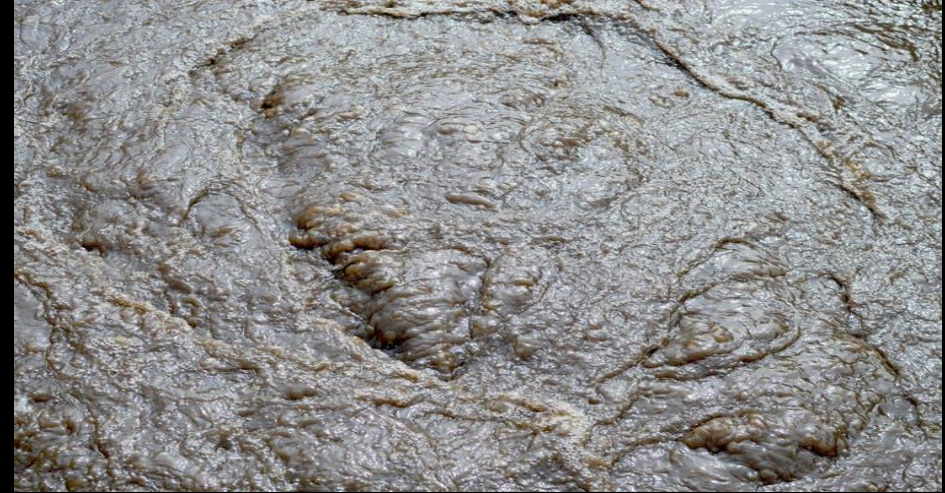
Toxic compounds(PFCs, PCAs, etc.)

Heavy metals(Zn, Cu, Cd, Pb, Hg, etc.)

Microplastics

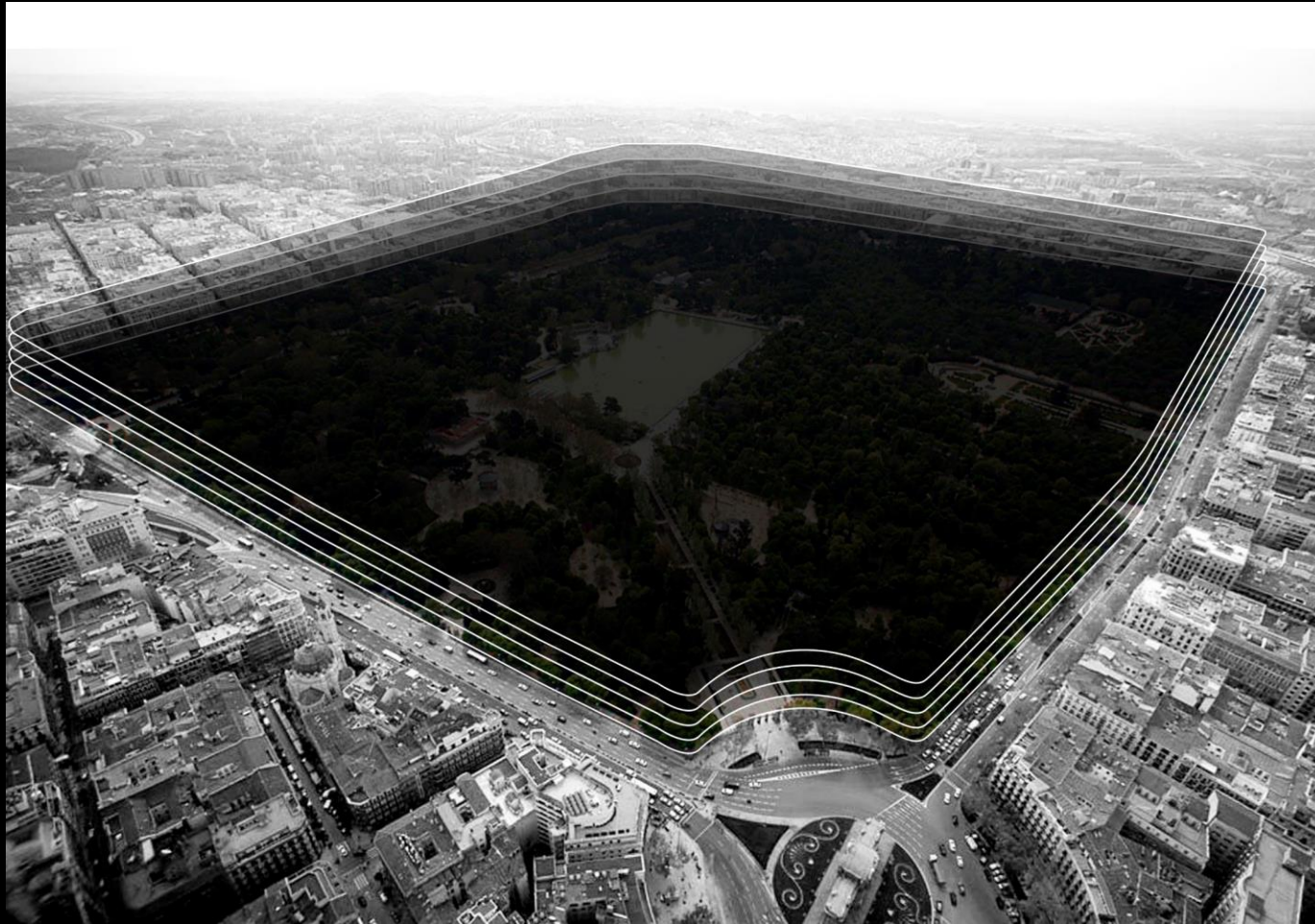
Pathogens (Escherichia coli, Giardia lamblia, Candida, etc.)

Emerging pollutants



Sewage sludge generated in Spain:  
24 millions m<sup>3</sup>/year





Sewage sludge generated in Spain:  
24 millions m<sup>3</sup>/year

Europe = 260 millions m<sup>3</sup>/year

EE.UU. = 140 millions m<sup>3</sup>/year

China = 1.570 millions m<sup>3</sup>/year



Landfilling



Agricultural application



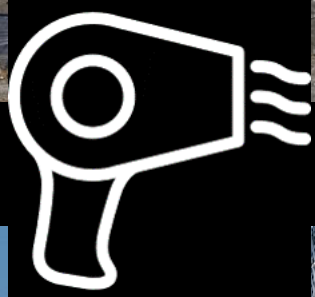
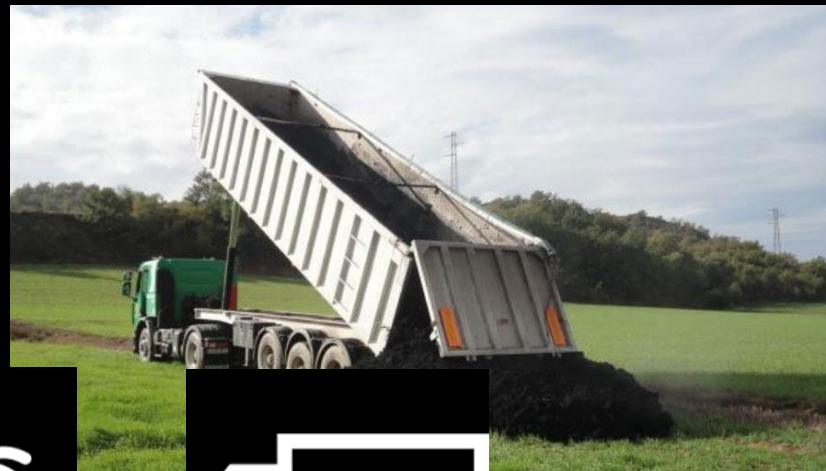
Incineration



Composting





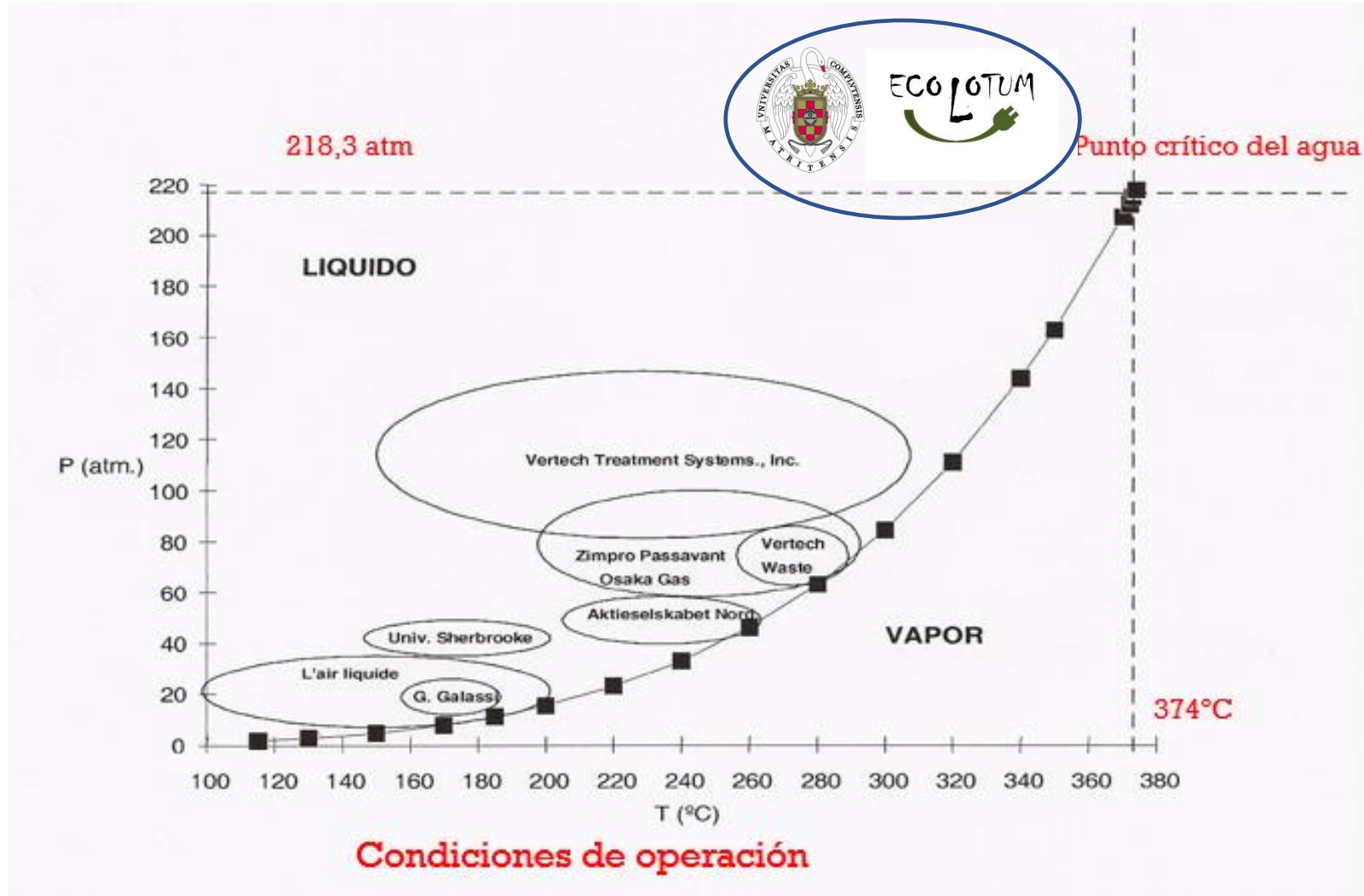




# OSCAR<sup>®</sup>

Subcritical wastewater oxidation  
(Oxidación Sub-Crítica de Aguas Residuales)







# Research prototypes



ALFA

BETA





# Research prototypes



## ALFA

- Subcritical water conditions
  - Flow rate = 1 L/h
  - Diluted Sludge
- 
- Manual operation
  - High versatility
  - Kinetic study
  - Investigation plant

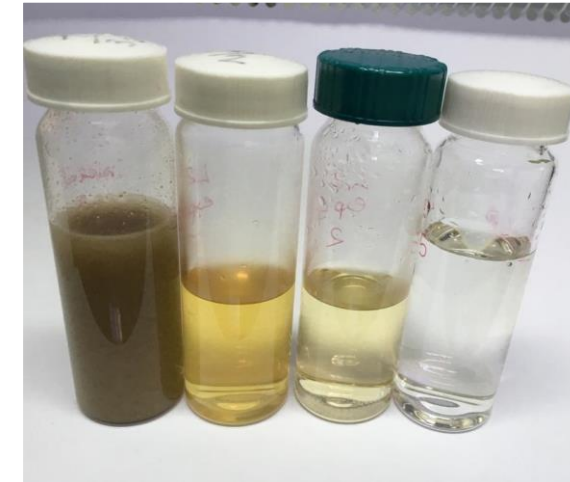
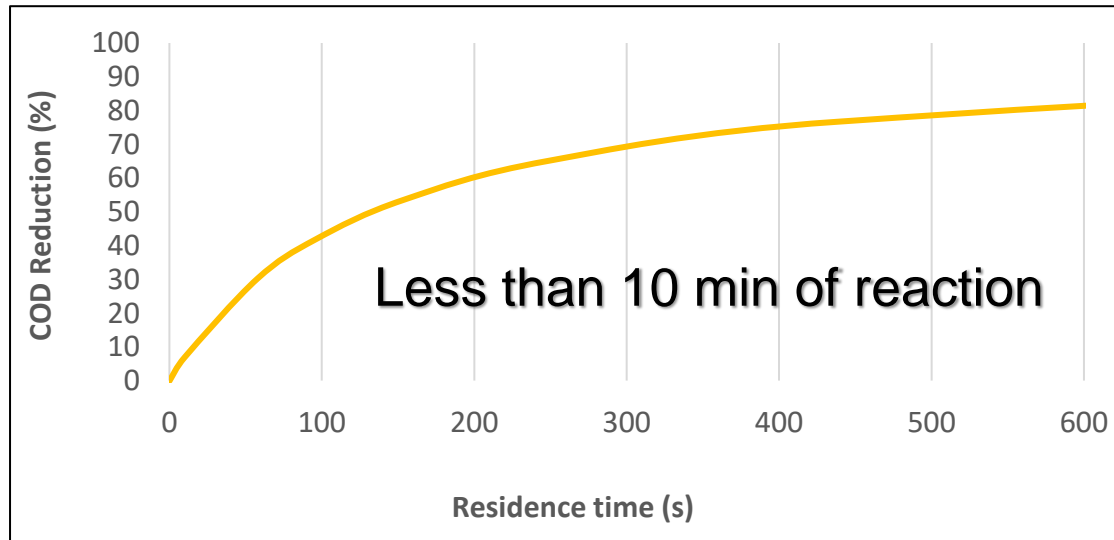




# ALFA Pilot plant



- ✓ Solids Reduction: **99%.**
- ✓ Reduction COD and TC: **>80%.**
- ✓ Pathogen removal: **100%.**
  
- ✓ Obtaining easily biodegradable products.
- ✓ Kinetic data and simulation process





# Research prototypes



BETA



- Subcritical water conditions
- Flow rate = 50 L/h
- Real Sludge

- Automated operation
- On-site treatment
- Economic study
- Demonstration plant

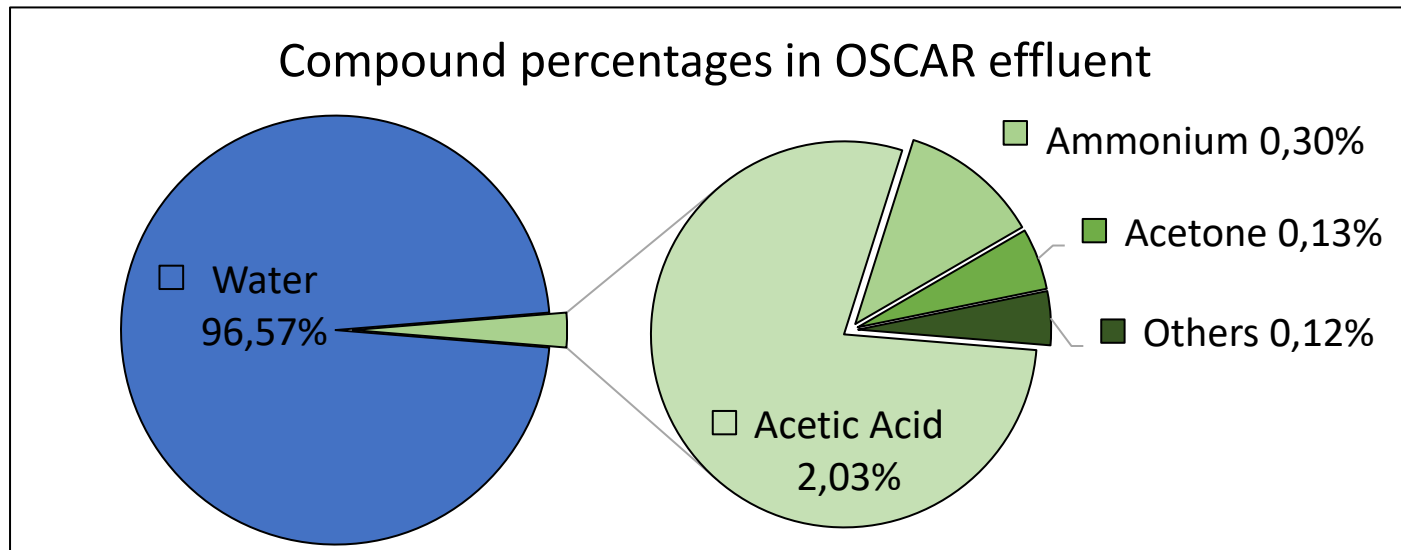




# BETA Pilot plant



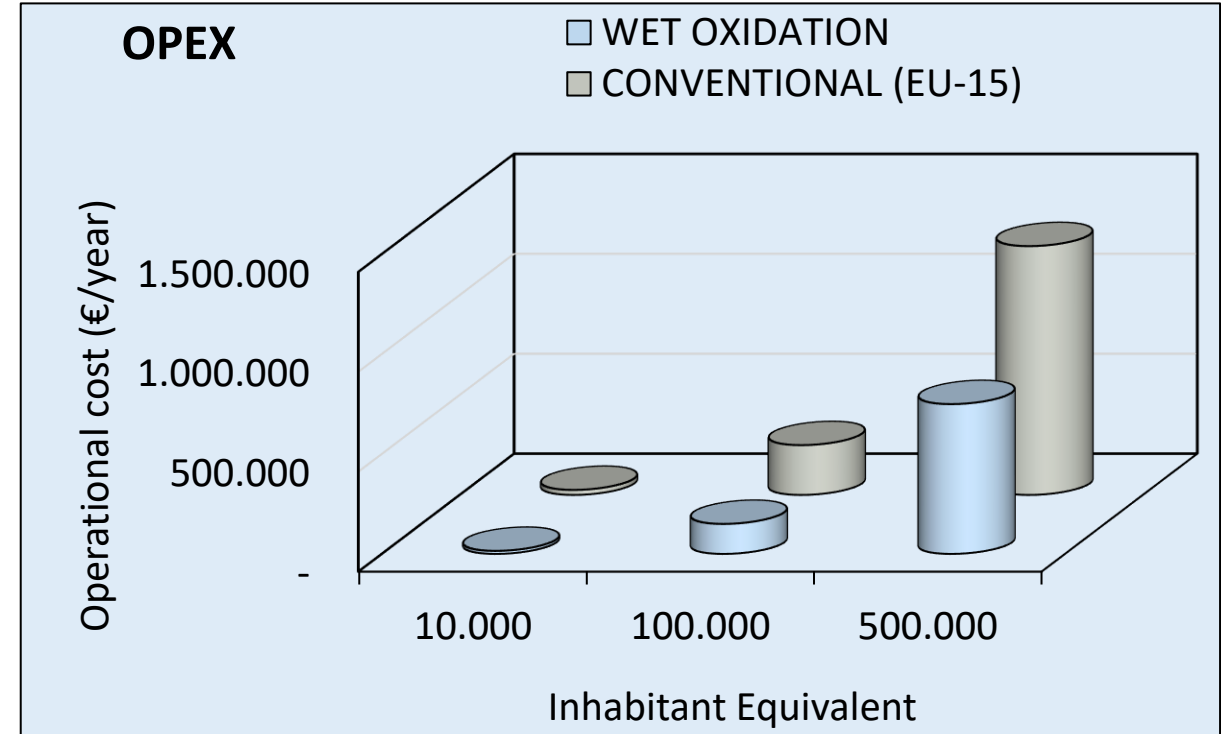
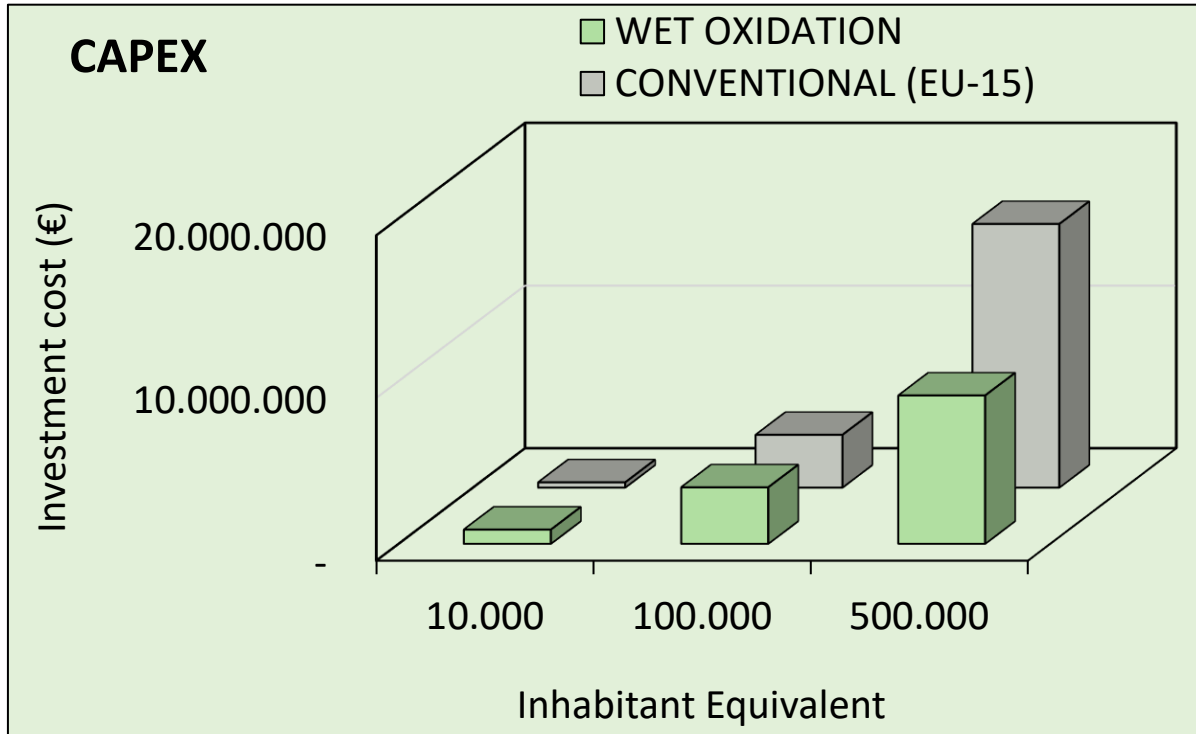
- ✓ Solids Reduction: **91%.**
- ✓ Reduction COD and TC: **>80%.**
- ✓ Pathogen removal: **100%.**
  
- ✓ Obtaining up to 5g/L acetic acid among others fatty acids
- ✓ Nutrient recovery through struvite precipitation







# Economic viability





# Conclusions



- ❖ OSCAR® is one of the most promising technologies for the treatment of HOLW.
- ❖ High organic matter removal. High solid content reduction.
- ❖ Cheaper than conventional technologies used in EU-15.
- ❖ Integrated into the circular economy. Do not separate, but eliminate the waste.
- ❖ Pathogen and toxic compounds removal due to extreme operating conditions.
- ❖ Self-sustainable, energy generation potential.
- ❖ Possibility of nutrient valorization. Fertilizer raw material.
- ❖ Optimum effluent for promoting aerobic and anaerobic treatments.





Thank you!

