



1 International Conference on Water and Sustainability

Barcelona-Terrassa 26 & 27 June

ECUVAL PROJECT: a feasible system to recover salts and reduce water consumption in textile industry



Co-funded by the Eco-innovation Initiative of the European Union

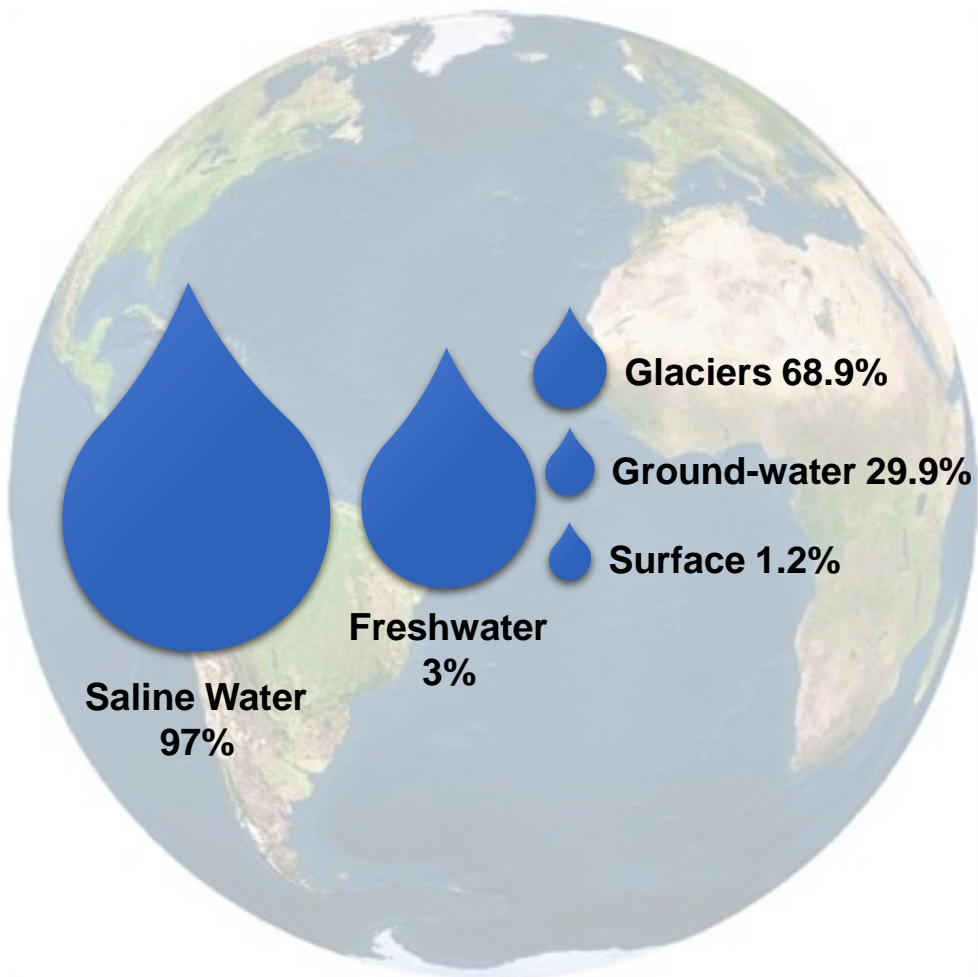
Valentina Buscio Olivera





Introduction

WATER DISTRIBUTION



Drawback



+ 80 millions/year



+ 64 millions m³/year



2030: 47% of the world's population will live in areas with water stress





Introduction

USES OF WATER



World: 69%
Spain: 75%
Catalonia: 72%

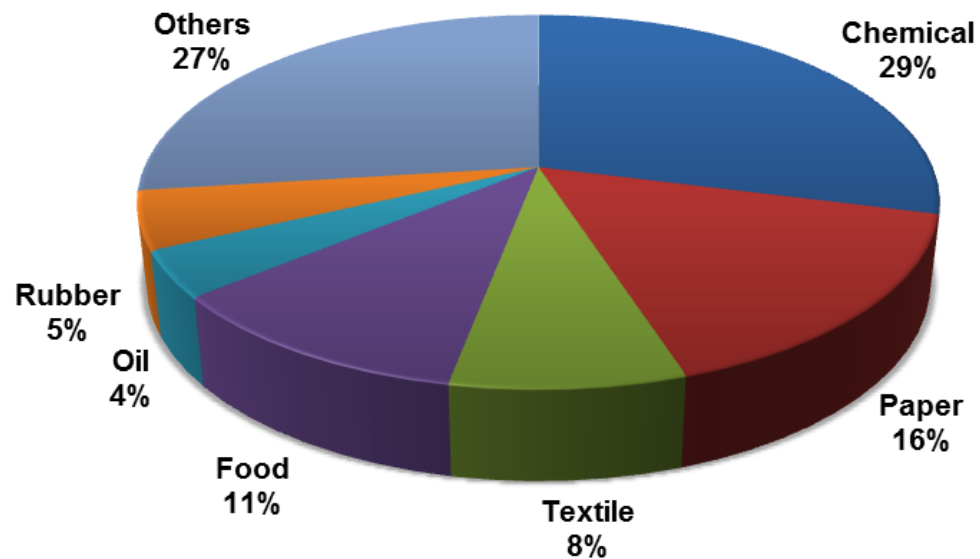


World: 19%
Spain: 10%
Catalonia: 9%

For cooling, steam generation, as raw material or as part of the final product



World: 12%
Spain: 15%
Catalonia: 19%



Water consumption in Spain by industrial sectors





Introduction

TEXTILE INDUSTRY



- ❖ High water consumption (up to 100L/kg textile product)
- ❖ Complexity and variability of wastewater



Main characteristics of dye effluents

Organic matter

Alkaline pH

High salinity

Strong colouration

Between 1 and 15% of the dyes are discharged in the wastewater





Introduction

REACTIVE DYES

The most used dye in the dyeing of cellulosic fibre. It reacts chemically with cellulosic fibre.

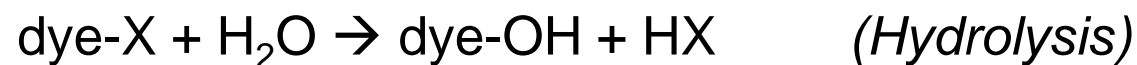


Advantages

- Water soluble
- High wash and light fastness
- Wide range of shades

Disadvantages

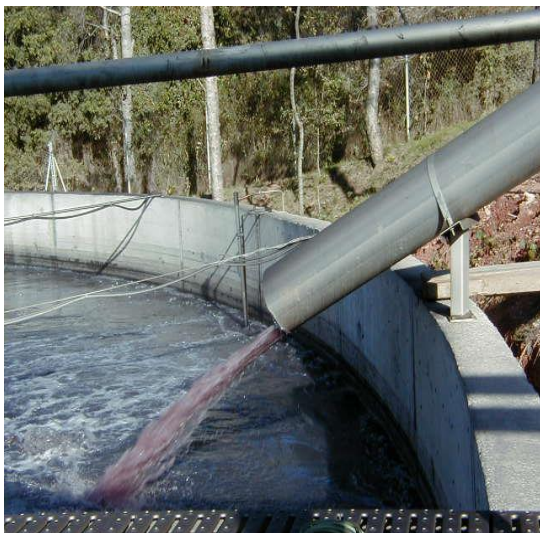
- Low fixation
- Alkaline conditions and high amount of salt are required to fix the dye on the fibre
- Dye react with water → hydrolysis



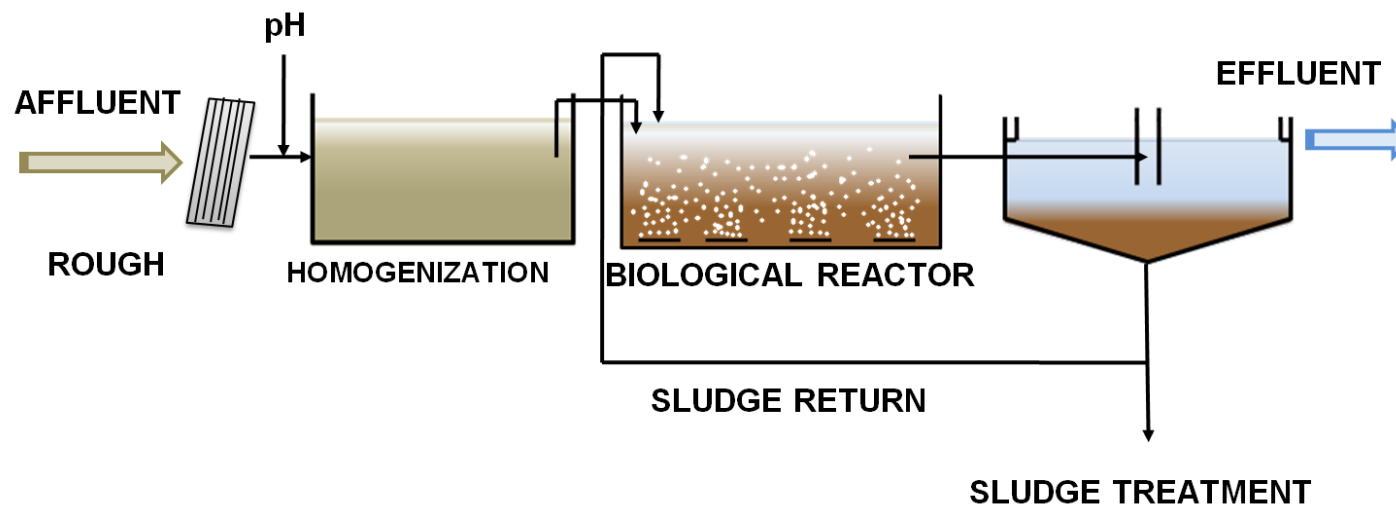


Introduction

TEXTILE WASTEWATER TREATMENT



Current method: Biological process



Discharge of textile effluent
in the biological plant



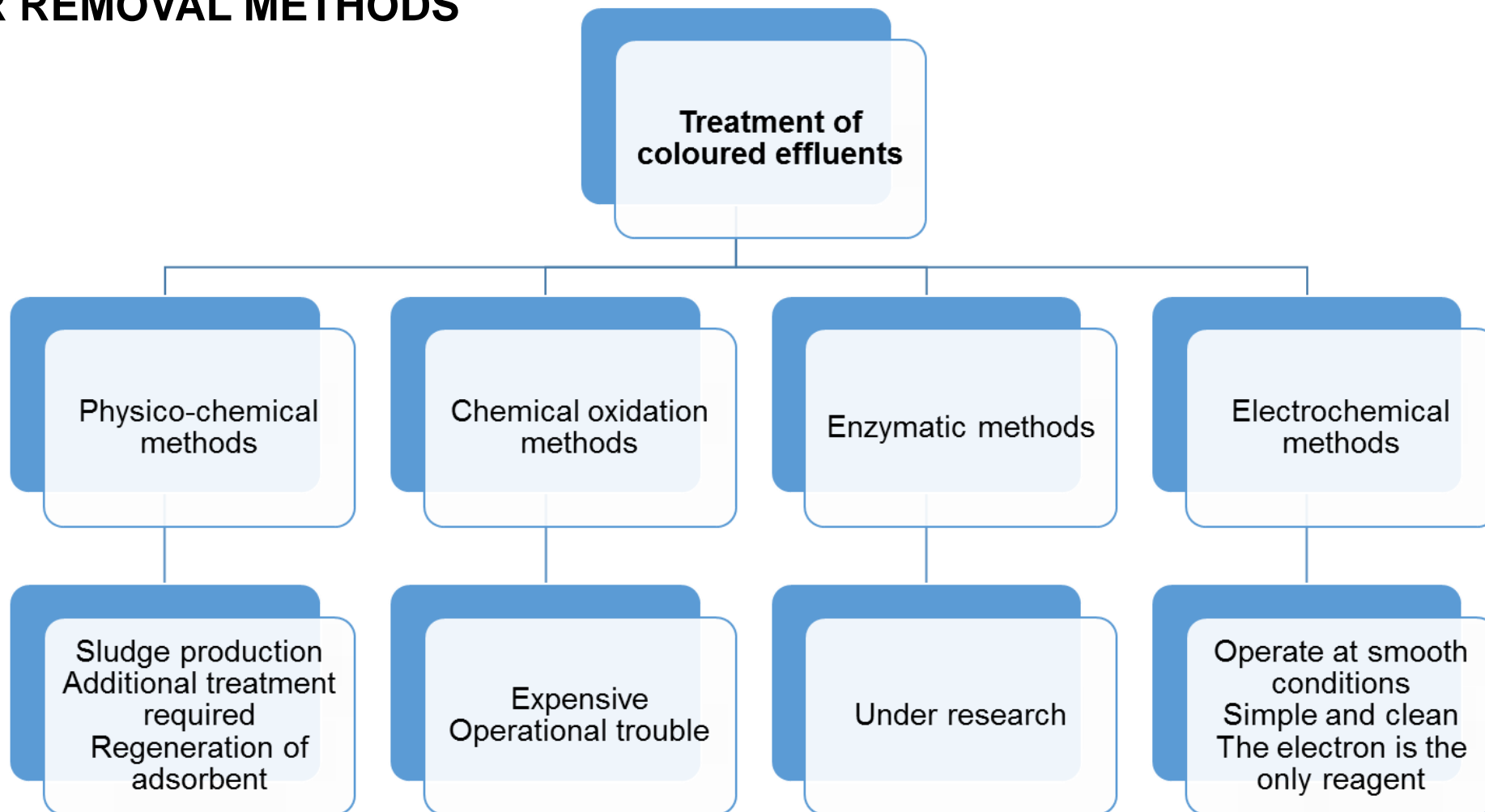
**Tertiary treatments are
required**





Introduction

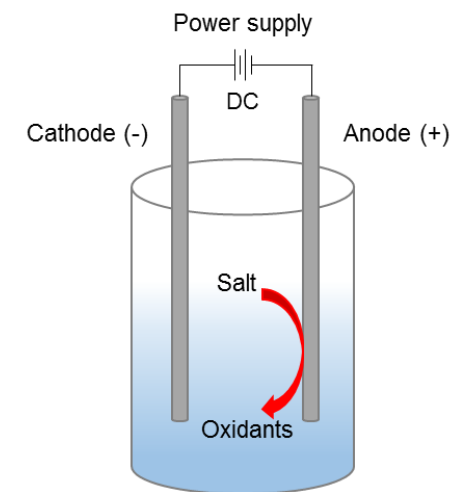
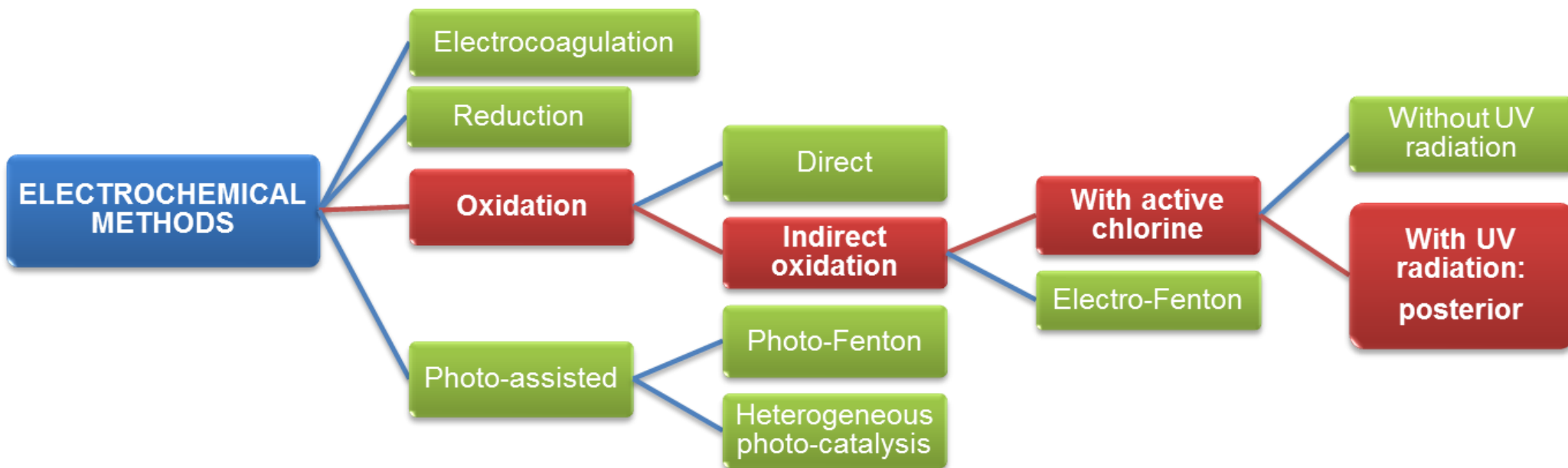
COLOUR REMOVAL METHODS





Introduction

ELECTROCHEMICAL TREATMENT





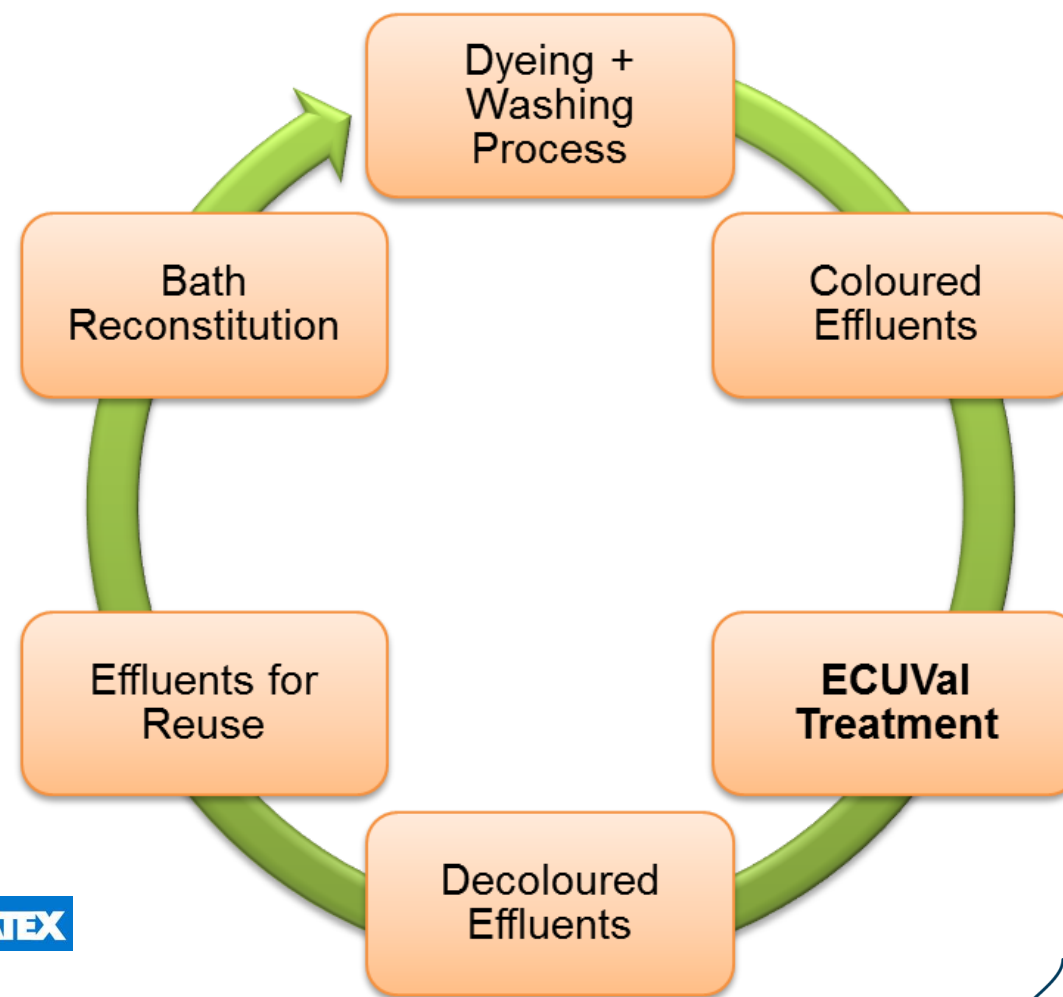
ECUVaI Project

OBJECTIVES

New system to treat textile wastewater and to reuse of treated effluents and salts

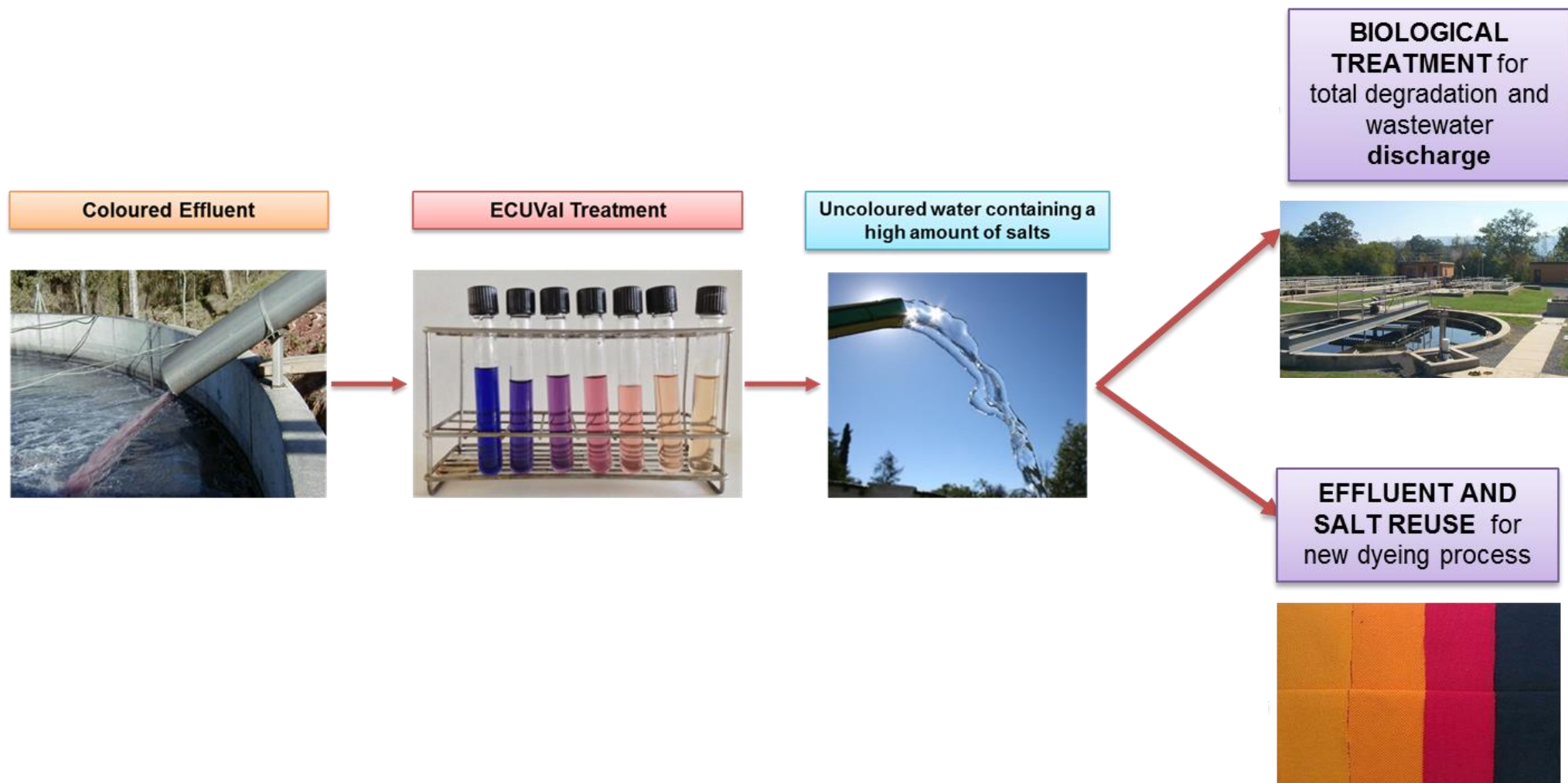


- 100% colour removal
- Reuse of 70% treated effluent
- Reuse between 20-75% of salt
- Reduction of effluent salinity and wastewater discharge rates



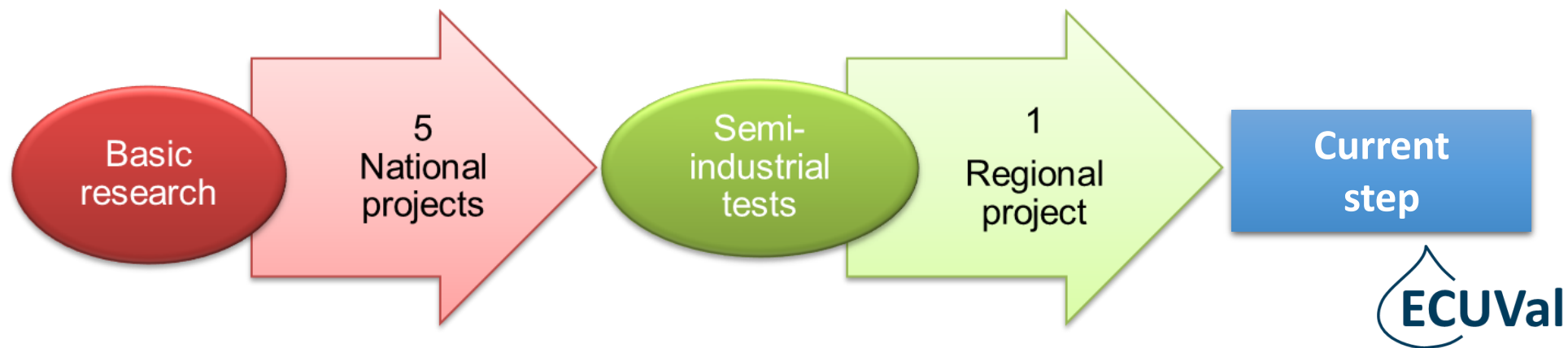


ECUVaI Project





ECUVal Project



Lab. Pilot 2 L



Semi-Industrial Pilot 400 L

Good correlation between lab and semi-industrial pilots



2 patents
UPC





ECUVaI Project

CURRENT STATUS OF THE PROJECT



- An industrial prototype (4m³/h) has been built and installed in a mill.
- The optimisation of wastewater treatment conditions in the textile industry are being carried out to demonstrate the viability of the technique.





Results

INITIAL TESTS AT LABORATORY SCALE

- 100% colour removal after 10 min. of treatment
- Dyeings with reuse of treated effluents into the acceptance criteria



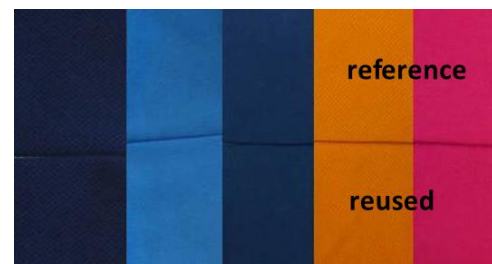
On basis initial tests



ECUVal system design



Lab. Pilot 2L





Results

TESTS AT INDUSTRIAL SCALE

- Tests at different intensities
- Colour removal between 65-100%
- Reuse up to 75% of salt
- Dyeings (monochromies and trichromies) with reuse of treated effluents into the acceptance criteria ($\Delta_{\text{cmc}(2:1)} < 1$)





Results

MARKET: POTENTIAL USERS

INDUSTRIAL SECTORS:

- Generation of non degradable compounds
- Receptors of green technologies (reuse of water...)

Validated



Textile Sector

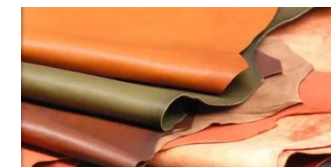
Market potential users



Chemical Sector



Pharma Sector



Leather Sector



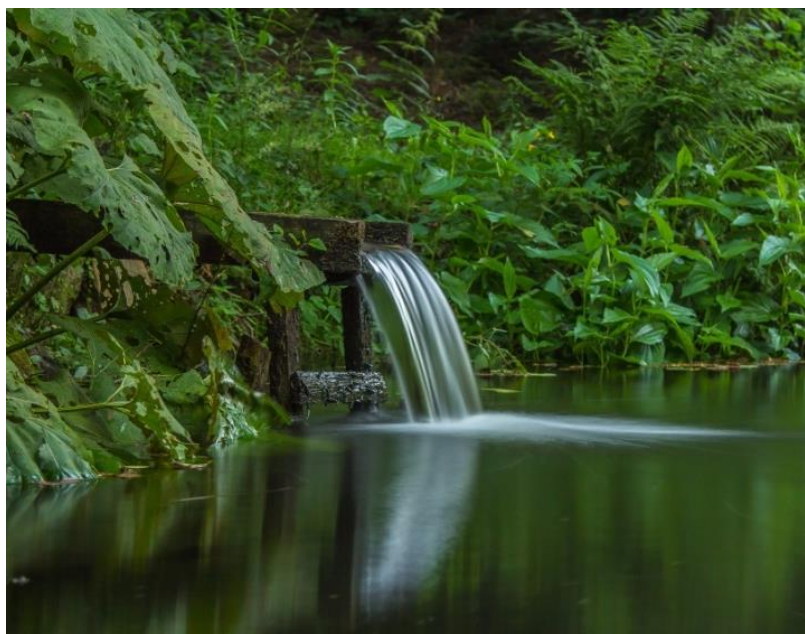
Paper Sector





Conclusions

ECUVaI is particularly efficient in the treatment and reuse of reactive dyeing and washing effluents.



Environmental and economic benefits

- No chemicals are required to remove colour.
- No residues are generated.
- Saving 70% dyeing water.
- Saving 20-75% dyeing electrolyte.
- Lower salinity of wastewater.
- Lower cost of the wastewater discharge.





1 International Conference on Water and Sustainability

Barcelona-Terrassa 26 & 27 June

**THANK YOU
FOR YOUR ATTENTION!!**



www.ecuval.eu

valentina.buscio-olivera@upc.edu



Co-funded by the Eco-innovation
Initiative of the European Union