

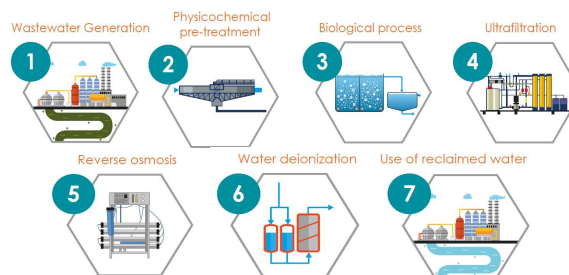
INTRODUCTION: WHY?

Water scarcity affects 11% of European population and 17% of territory

Water consumption of EU industries accounts for **22%** of total freshwater in the world

REWATCH Project aims at increasing **water efficiency** through **water recycling** by means of biological and separation processes

LCA aims to demonstrate increasing **water efficiency** through **water recycling** by means of biological and separation processes brings a net environmental gain



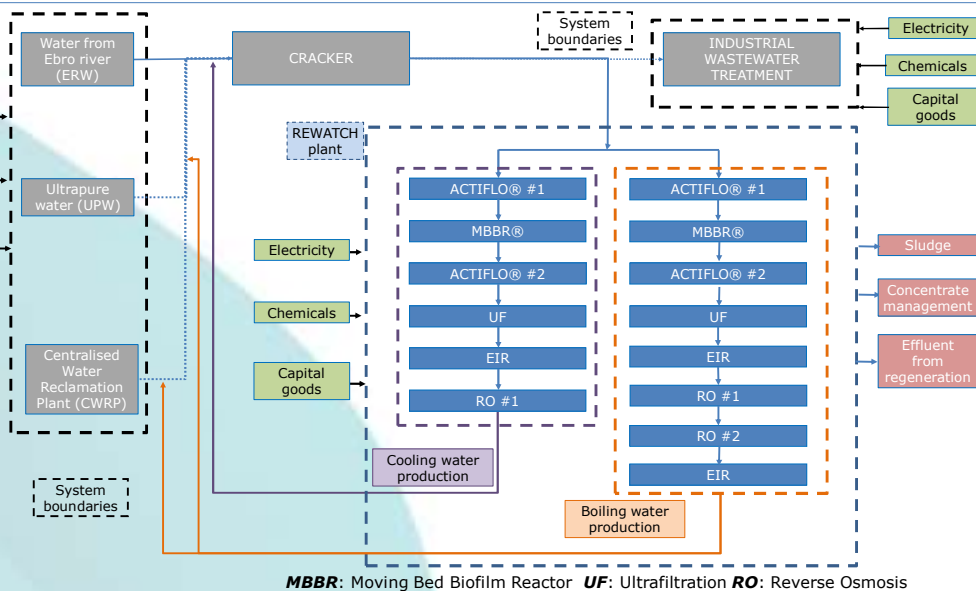
GOAL AND SCOPE: HOW?

Study based in the PCR UN CPC 9411 & CPC 9423 "Wastewater collection and treatment services"

Functional Unit (FU): 1m³ of water consumed by PCI (Petrochemical industry) at the entrance of the cracker

LCA study applied to an industrial adaptation of a pilot plant

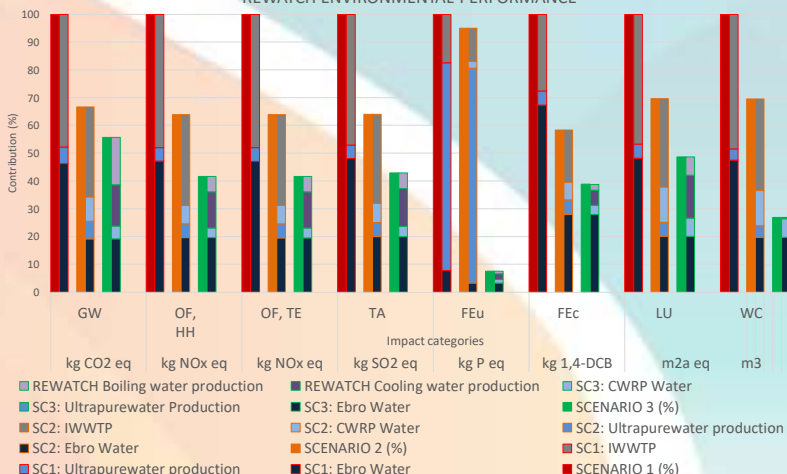
| SCENARIOS | | WATER INPUT | | | | REWATCH Water |
|---------------------|-----------------------------------|-------------|-----|------|-------|---------------|
| | | ERW | UPW | CRWP | IWWTP | |
| 1. Initial scenario | No water reuse | 92% | 8% | - | 36% | - |
| 2. CWRP scenario | Water reuse through CWRP | 67% | 8% | 25% | 36% | - |
| 3. REWATCH Scenario | REWATCH full scale implementation | 67% | - | 11% | - | 22% |



MBBR: Moving Bed Biofilm Reactor UF: Ultrafiltration RO: Reverse Osmosis

RESULTS: HOW MUCH?

REWATCH ENVIRONMENTAL PERFORMANCE



RCW: REWATCH Cooling Water RBW: REWATCH Boiling Water

| SCENARIOS | IMPACT CATEGORY | Unit | TOTAL | RCW | | | | RBW | |
|---------------------|-----------------|------------------------|-------|------|------|------|-------|------|----------|
| | | | | ERW | UPW | CRWP | IWWTP | RCW | RBW |
| 1. Initial scenario | GW | kg CO ₂ eq. | 1,37 | 0,63 | 0,08 | - | 0,66 | - | - |
| | WC | m ³ | 1,95 | 0,93 | 0,08 | - | 0,95 | - | - |
| 2. CWRP scenario | GW | kg CO ₂ eq. | 0,92 | 0,26 | 0,09 | 0,12 | 0,45 | - | - |
| | WC | m ³ | 1,36 | 0,39 | 0,08 | 0,25 | 0,64 | - | - |
| 3. REWATCH Scenario | GW | kg CO ₂ eq. | 0,77 | 0,26 | - | 0,06 | - | 0,20 | 0,24 |
| | WC | m ³ | 0,53 | 0,39 | - | 0,13 | - | 0,01 | 2,64E-03 |

GW: Global Warming
OF, HH: Ozone Formation, Human Health
OF, TE: Ozone Formation, terrestrial Ecosystems
FEu: Freshwater Eutrophication
FEc: Freshwater ecotoxicity
LU: Land use
WC: Water consumption

SCENARIO 1:

Hotspots: Ebro Water intake (transport) + IWWTP

- Water transport (Ebro): Pumping Energy
- Wastewater treatment: Energy consumption

SCENARIO 2:

CWRP allows to decrease overall impact

- Water transport (Ebro): Impact decrease (30%)
- Regenerated water increase cracker water efficiency
- Benefits from CRWP > CWRP impacts

SCENARIO 3:

REWATCH technology reduces water consumption and wastewaters production

- Avoiding IWWTP+UPW: Relevant impact decrease
- Benefits from REWATCH > REWATCH impacts

CONCLUSIONS: KEEPERS

1. Has been proved that **REWATCH** is an **environmentally feasible technology** which allows to **reduce all environmental impacts**, including global warming potential.
2. **REWATCH and reuse of water proposed** decrease pressure over hydric systems from **PCI**
3. Modularity of **REWATCH** technology and environmental benefits correlated are foreseen to be applied to **different PCI's**

