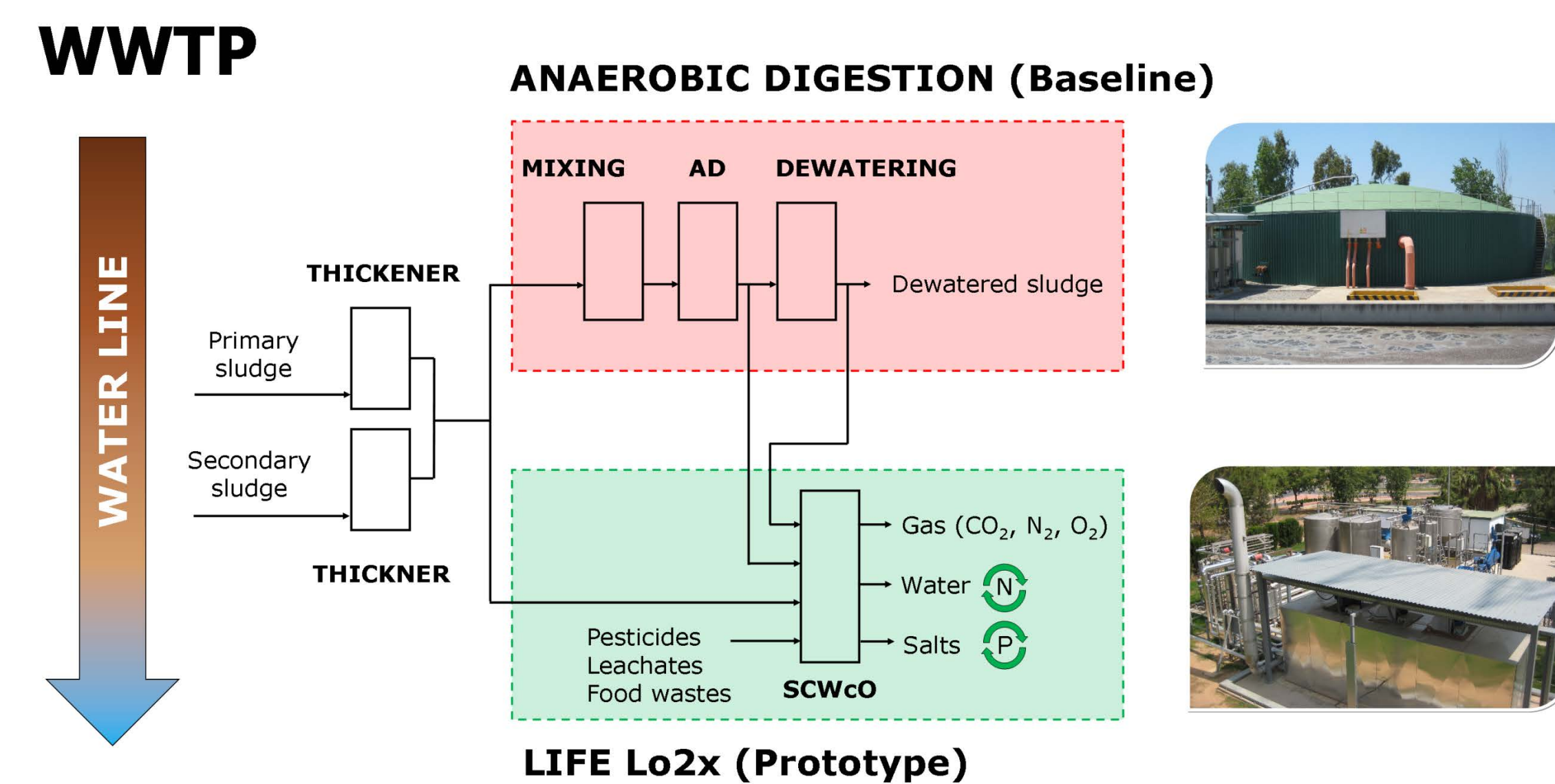


# Supercritical water co-oxidation (SCWcO) of urban sewage sludge and wastes

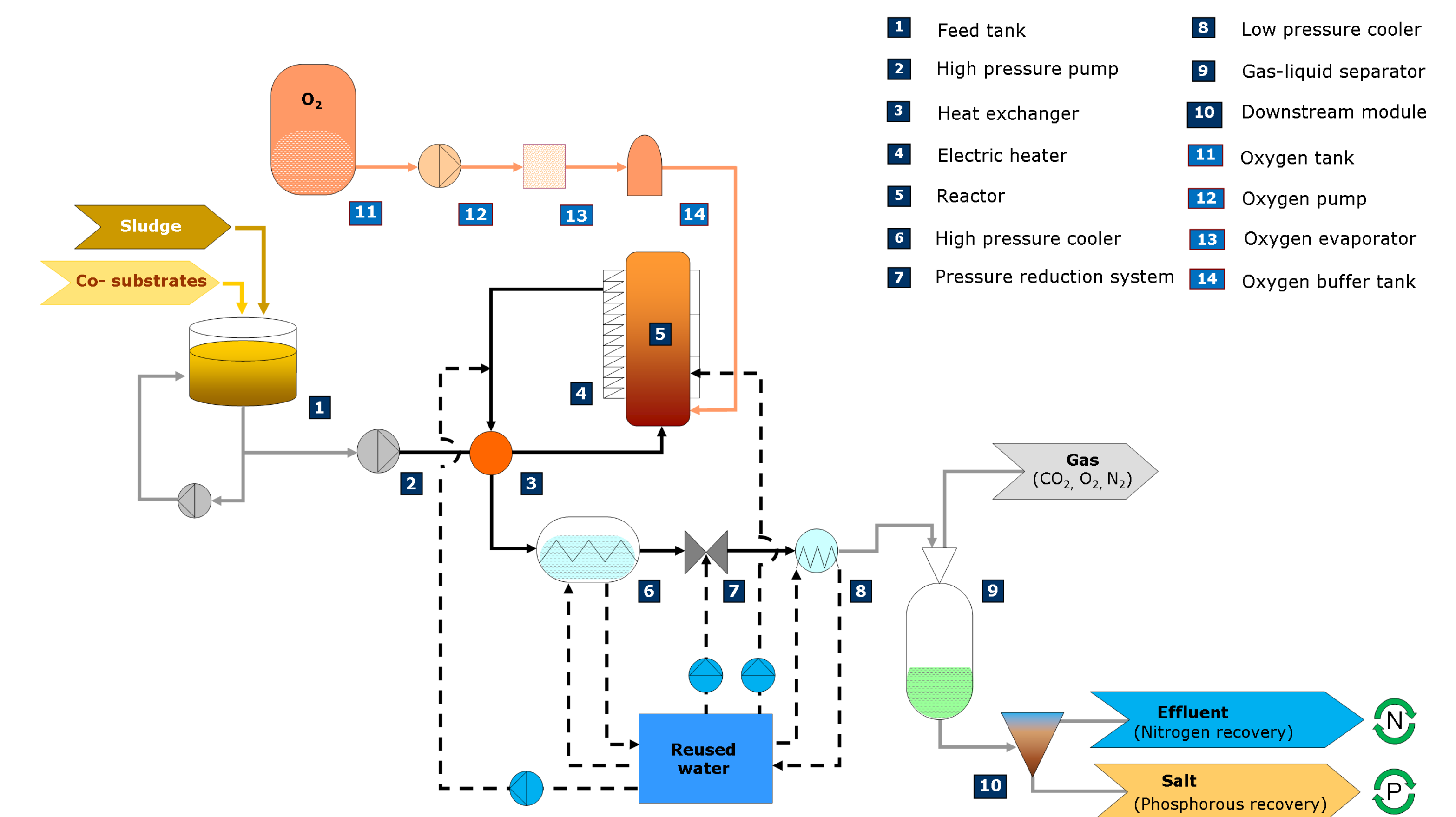
## OBJECTIVE

To demonstrate the environmental and socio-economic benefits of a **synergic co-treatment of sewage sludge and wastes** (olive mill wastewater, drencher wastewater, landfill leachates...) with energy and phosphorus recovery through **supercritical water co-oxidation (SCWcO)**.



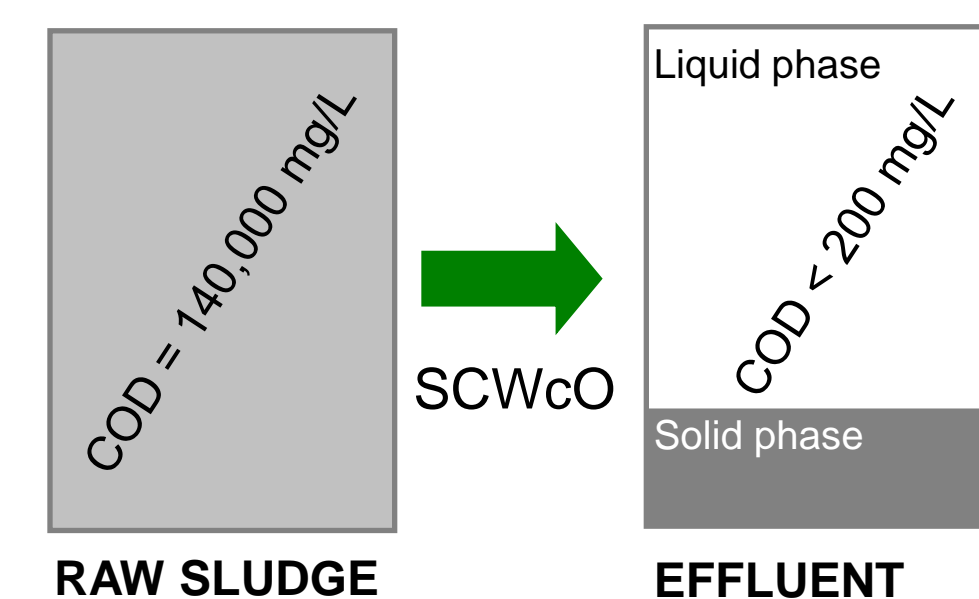
## SCWcO

Technology based on the particular properties of **water at temperature and pressure conditions above its critical point** ( $T > 374^\circ\text{C}$  and  $p > 221 \text{ bar}$ ) in presence of **oxygen**. Prototype with a treatment capacity up to 1 ton dm/day.

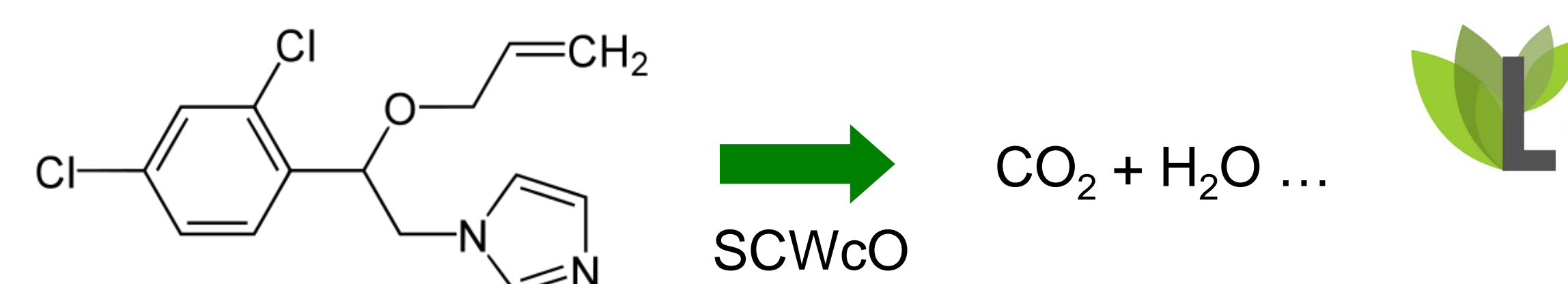


## BENEFITS

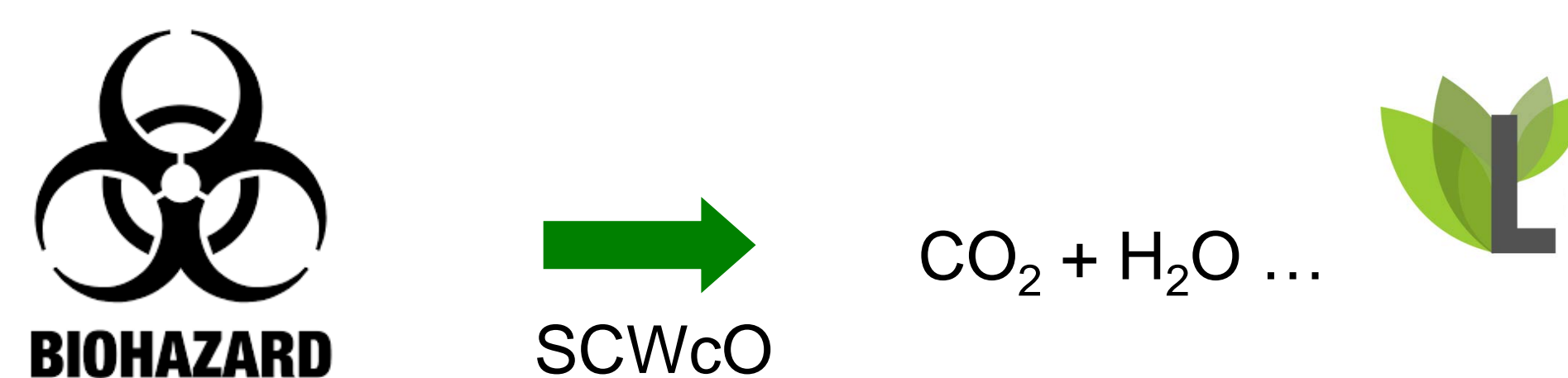
**>99% elimination of organic matter.** The COD of SCWcO effluent is in average lower than 200 mg/L, reaching lower values than 25 mg/L.



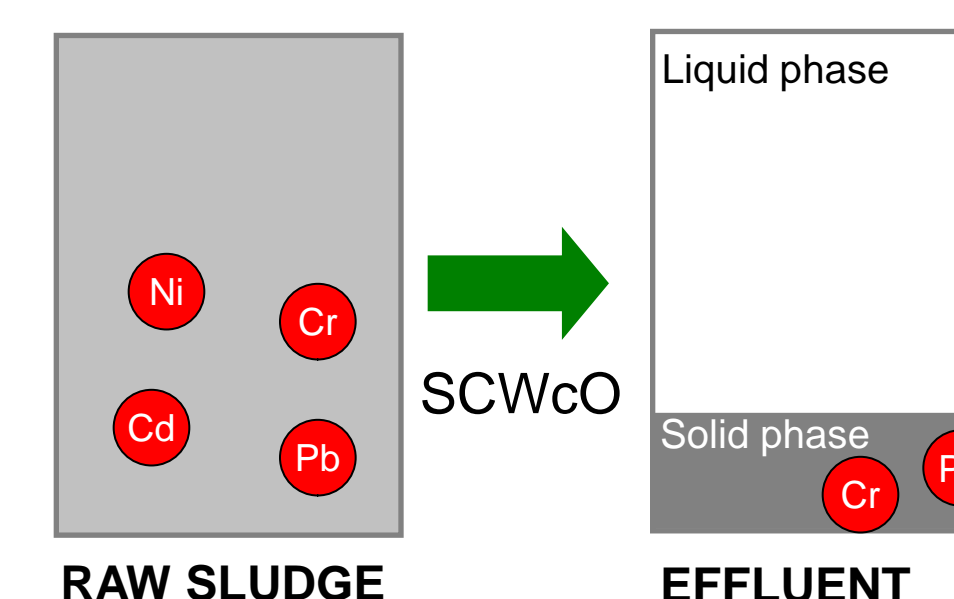
**100% elimination of pesticides.** Imazalil is degraded up to 350 mg/kg, four orders of magnitude higher than anaerobic digestion.



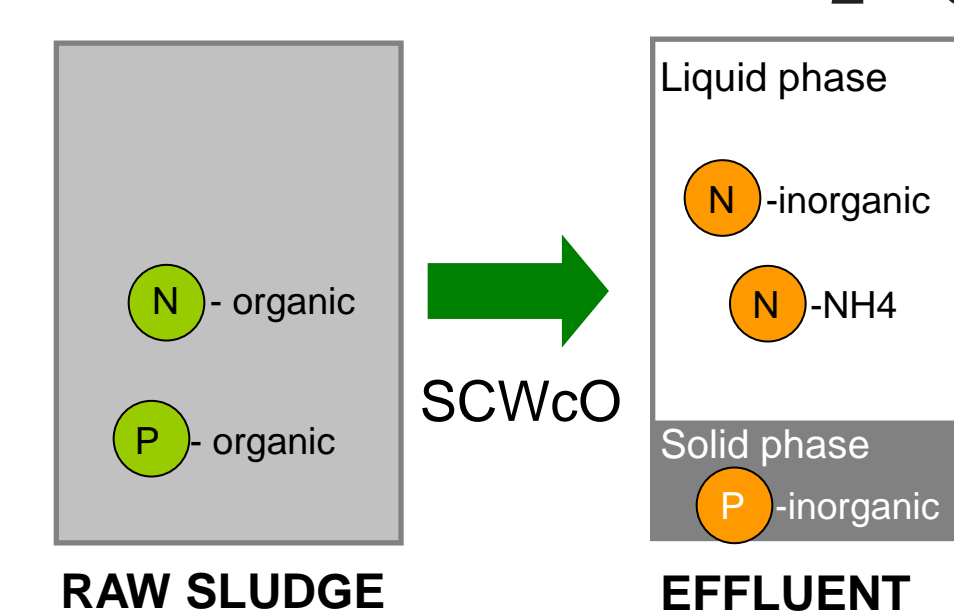
**100% elimination of pathogens.** *Escherichia coli*, *Clostridium perfringens* and *Salmonella spp.* are completely eliminated. SCWcO leads to complete hygienization.



**>85% heavy metals are recaptured for safe handling.** Heavy metals are mainly detected in inert solid of the SCWcO effluent.



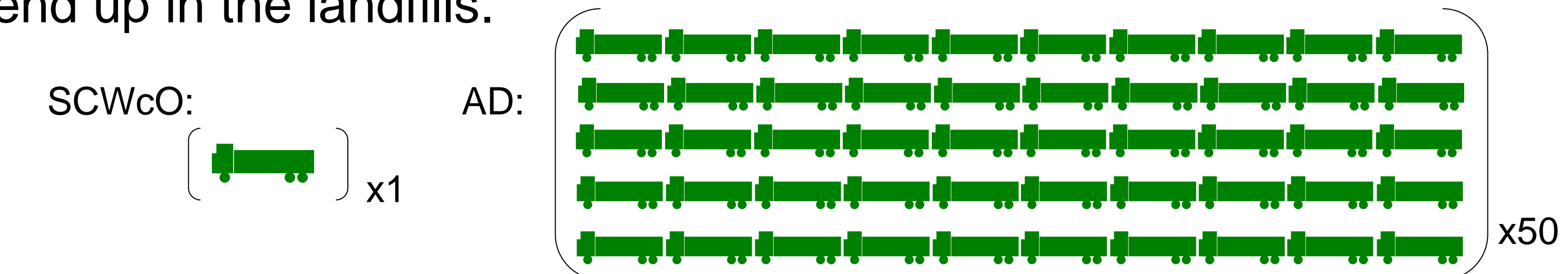
**Recovery of nutrients.** Mineralization of nitrogen and phosphorus facilitates the nutrient recovery in order to be used as fertilizers. Nitrogen occurs in the liquid ( $\text{NH}_4 \sim 2 \text{ g/L}$ ) while phosphorus is present in the solid phase ( $\text{P}_2\text{O}_5 \sim 25\%$ ).



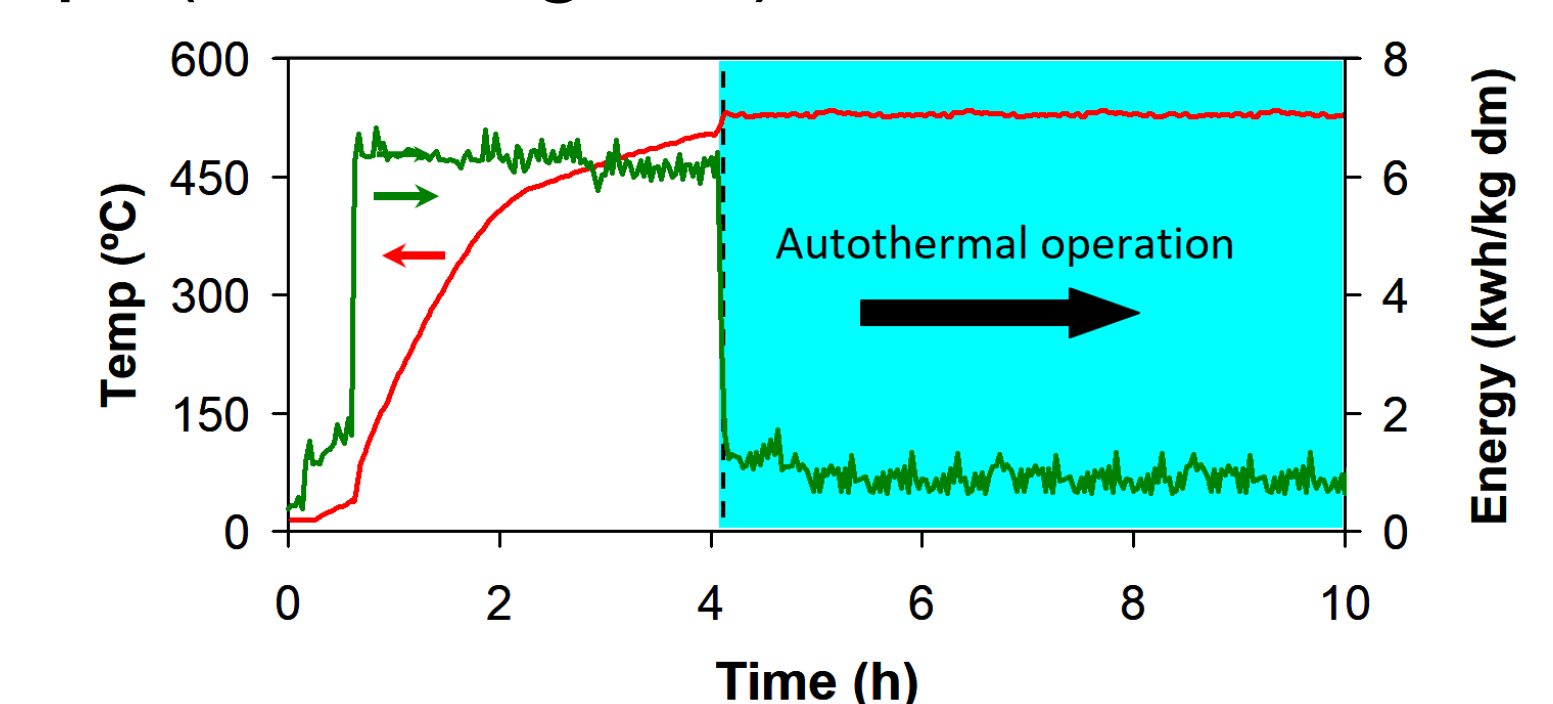
**Disposable clean gases are produced.**  $\text{CO}_2$  is the main gas generated by SCWcO.  $\text{NO}_x$  and  $\text{SO}_x$  gases, typical undesired by-products of combustion processes, are not formed



**98% reduction of sewage sludge leaving WWTP.** Total solid reduction higher than 90%. Inert solid from SCWcO is a resource for phosphorous industry whereas wastes from anaerobic digestion may end up in the landfills.



**Zero heat consumption.** The heat produced under supercritical conditions (exothermic reaction) makes pumping the only energy-consuming step (1 kWh/kg dm).



**>10% reduction in sludge treatment cost.** The gate fee of co-substrate treatment with SCWcO allows reducing the cost of sludge treatment below the cost of anaerobic digestion (AD).

