

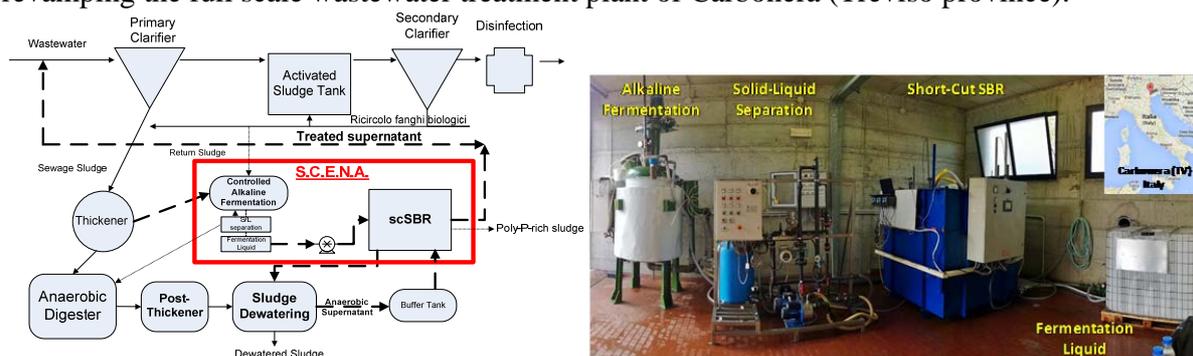
## VALORIZATION OF SEWAGE SLUDGE VIA NITRITE NUTRIENTS REMOVAL FROM ANAEROBIC EFFLUENTS

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**Key Words:** Nitritation-denitritation; via nitrite enhanced phosphorus uptake, anaerobic supernatant

Ammonium and phosphorus rich reject water from the dewatering of anaerobic digested sludge must be properly managed to recover resources and optimize the sustainability of biological nutrient removal in wastewater treatment plants. This work investigated the integrated scheme of nitritation/denitritation and via nitrite enhanced phosphorus removal coupled to alkaline fermentation liquid of sewage sludge as an in situ best available carbon source. Despite the problematic characteristics of the influent, the via nitrite bioprocesses were stable in the pilot scale plant. Using the alkaline silicate mineral of wollastonite to buffer pH in the fermenter, the conversion rates for external carbon source were  $0.30 \pm 0.4$  gSCVFA/gTVS, while the propionate and butyrate contents were optimized. The via nitrite nutrient removal rates were  $15 \pm 2$  mgN-NH<sub>4</sub>oxidized/gMLVSS·h;  $40 \pm 10$  mgN-NO<sub>2</sub>reduced/ gMLVSS·h;  $10 \pm 3$  mgP-PO<sub>4</sub>bioaccumulated/gMLVSS·h. According to the overview recently published by Desloover et al. (2012), the N<sub>2</sub>O mitigation strategies were implemented. In addition, promotion of the mineral CO<sub>2</sub> sequestration is achieved by the use of alkaline silicates for pH buffering in the acidogenic fermentation (Salek et al., 2013). The cost comparison between conventional scheme and Short-Cut Enhanced Nutrients Abatement (SCENA) estimated a potential annual net income of approximately 25-45000 euros for an actual treatment potential of 50000 PE. So, the water utility Alto Trevigiano Servizi srl granted the development and first full scale application of the SCENA system for revamping the full scale wastewater treatment plant of Carbonera (Treviso province).



**Figure 1.** a) Integration of SCENA system in the conventional WWTP; b) SCENA pilot scale plant

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