

INTEGRATED SCENARIOS FOR URBAN WASTEWATER TREATMENT USING CONSTRUCTED WETLANDS: A LIFE CYCLE ASSESMENT ANALYSIS

Gustavo Stolzenberg Colares - UNISC

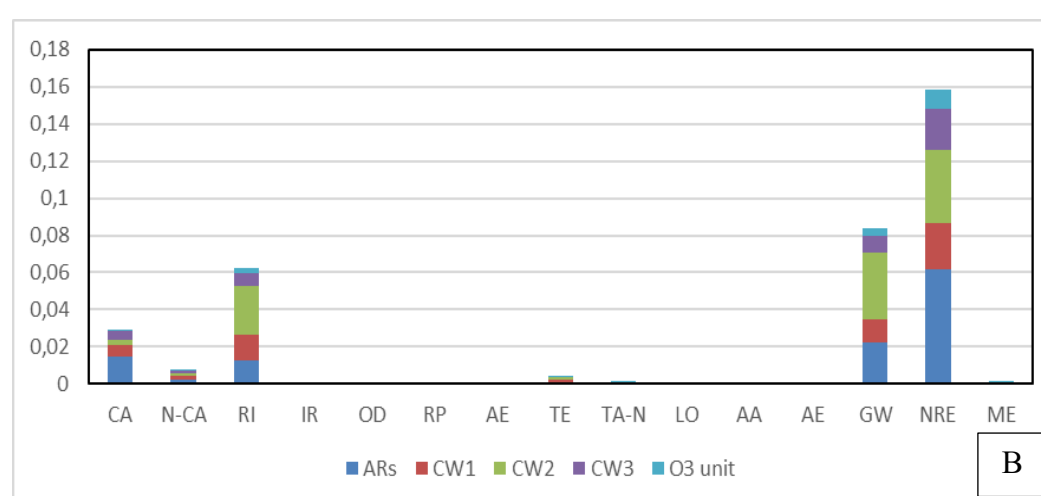
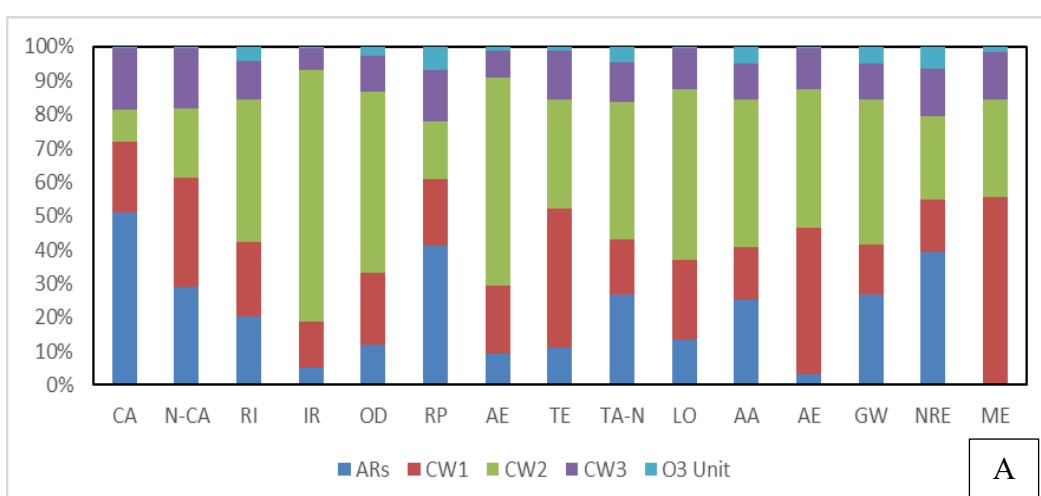
Carine Baggio - UNISC

Andréia Moura Bernardes – UFRGS

Adriane de Assis Lawisch Rodriguez – UNISC

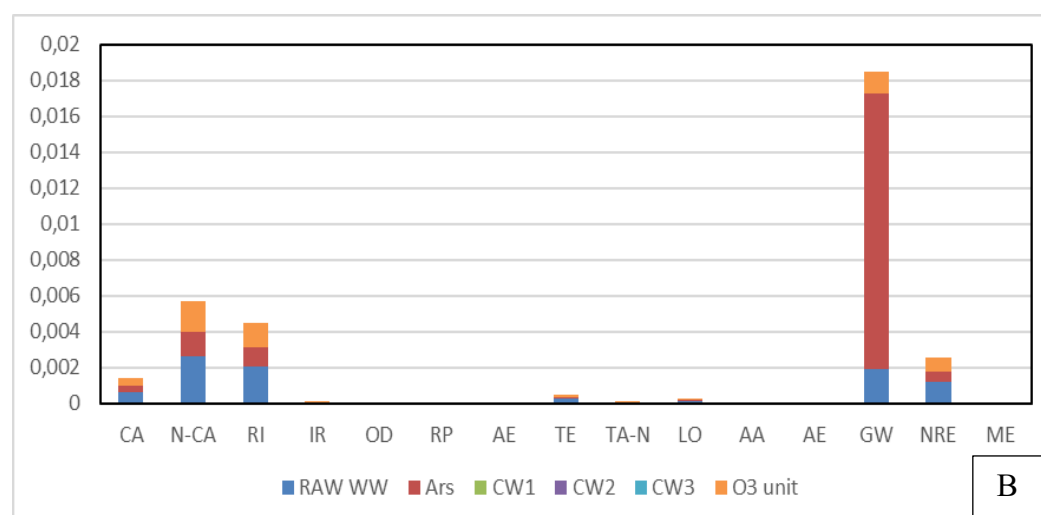
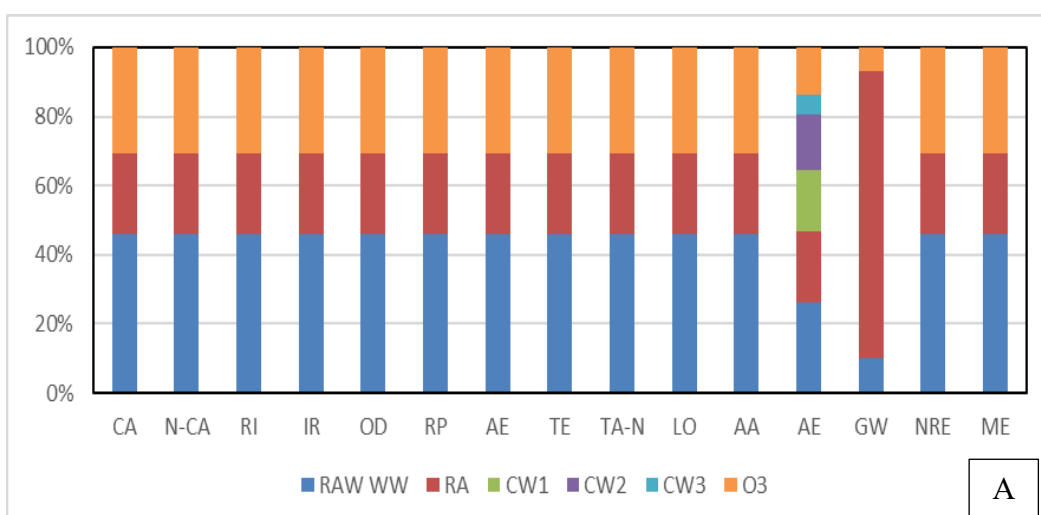
Ênio Leandro Machado – UNISC

Life Cycle Assessment impacts from the system construction stage using IMPACT 2002+
(A) Characterization and (B) Normalization.



From the obtained data, it was verified that ARs were the most impactful unit in the categories of CA (37.4 kg from the 733.4 C₂H₃Cl from the system total) and non-renewable energy (9,424 of 24,062 MJ primary). On the other hand, the CW2 unit was responsible for the highest environmental impacts in the categories of RI (0.268 of 0.632 kg PM 2.5 eq) and Global warming (356 of 832 kg CO₂ eq). Regarding the N-CA category, the CW1 stage was responsible for the highest impacts, with 6.01 of the total system - 18.79 kg C₂H₃Cl eq., followed by the AR, with 5.47 kg C₂H₃Cl eq.

Impacts of the AR + CW + OG. (A) Impacts characterization and (B) Impact's normalization



As shown in the impact's characterization graph, for almost all impact categories (with exception to global warming) the discharge without treatment of the raw wastewater (Raw WW) was the most significant, followed by the ozonation treatment stage. In relation to the global warming (GW), the raw ARs treatment stage would be the most important, due to the energy consumption for wastewater feeding, considering the Brazilian energy matrix, and due to the biogas production and thus methane emission from the anaerobic digestion process present in this stage.

When analyzing the normalization results, one can observe that seven different categories were the most impacted categories: CA, N-Ca, RI, TE, LO, GW and NRE. As already mentioned, the OG was the most impactful unit of the integrated system because of the high energy demands.