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The sustainability of beach-cast seaweed biomass for biorefinery processes: calorific power heating studies with macroalgae

Abstract: Alternative renewable energy technologies offer the opportunity to move towards more sustainable systems in which natural resources are conserved through their own perennial cycles. Macroalgae as a marine substrate for the biomass energy sector is a natural resource of inexhaustible abundance in the oceans, growing three to four times longer than terrestrial plants. The aim of this work was to assess the sustainability of macroalgal biomass for biorefinery processes. Two studies were therefore carried out. In the first, the natural deposition of macroalgae was evaluated in 28 collections carried out in seven beaches on the Maceió coast over a period of 2 years. Samples were taken using the zigzag method and covered a deposition area of 135,000 m². The results obtained of 5.08 tons/ha for dry biomass by daily collection means that it is the only type of biomass that can be collected daily, with an efficiency 35 times greater than sugarcane biomass production. The second study evaluated the calorific value of the biomass and, as a result, the low calorific value of 8.82 MJ/kg in 13 species analysed was similar to the main biomass used in Brazil, sugarcane bagasse, evaluated at 8,91 MJ/kg. Aggregated macroalgae biomass in condensed pellets as energetic composites, obtained a value of 20.19 MJ/Kg, 11.46% more than the average of terrestrial biomass pellets with an average of 17.61 MJ/Kg. Based on the results obtained, it is observed that macroalgae biomass has potential for biorefinery.

Key words: biomass, coral reefs, energy, sampling studies, seaweed, sustainability.