Camacho-Villan Erik Oswaldo et al., Expert Opin Environ Biol 2016, 5:3(Suppl)
http://dx.doi.org/10.4172/2325-9655.C1.011

Design and construction of a crushing machine for organic waste management in Mexico

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A biogas plant at semi-industrial level was installed to one of the 23 restaurants of University City. The biogas substitutes 6% of the total heat energy consumption of the restaurant. The crushing machine investment represented 80% of the total investment cost of the biogas plant. The efficiency of the anaerobic degradation process depends on an efficient system of crushing. For the operation of the biogas plant, 3 people are needed as the crushing of organic waste could take up to 3 hours. 50 kg/day of organic matter are processed to reduce their size from 25 to 3cm. The crushing time represented around of 90% of work in the plant. In Mexico, the crushing machine must to be imported and the high cost reduces the economic viability of the plant, so we decided to design and construct a prototype of crushing machine with the following characteristics: size reduction by cutting with engine power of 1.5 Hp, speed of 425 rpm, manufacture material of stainless steel 304, 3 rotors and 3 blades coupled to the rotor; and 2 fixed blades in the crushing chamber. This new crushing machine decreased its investment by 95% of the cost of an imported machine. This crushing machine and its components are in the process of obtaining a patent. The optimum operation of the crushing machine reduced the hydraulic residence time in the hydrolysis and methanogenesis process from 30 to 18 days. Therefore also helps to reduce the size of the digester reactor for future designs for organic waste anaerobic treatment of a restaurant.

Biography

Camacho-Villan Erik Oswaldo is a Mechanical Engineer at the Engineering Faculty of National Autonomous University of Mexico. This work presents the results of his Master's thesis in the field of Energy. He is an expert in Mechanical Design for end users and real applications.

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