Grazia Leonzio, J Fundam Renewable Energy App 2016, 6:5(Suppl)
http://dx.doi.org/10.4172/2090-4541.C1.018

Energy conversion of municipal solid wastes: Economical and technical feasibility

Grazia Leonzio
University of L'Aquila, Italy

As a result of the increasing global energy demand and the negative environmental effects associated to the use of fossil fuels, the interest in alternative and more sustainable energy sources is growing. This research study processes of energetic conversion of municipal solid wastes to produce electrical and thermal energy or biomethane. A technical and economical analysis of anaerobic digestion plant is carried out after the characterization of wastes through the measures of total solids and organic substances. Municipal solid wastes such as, with wood cellulosic with biocell are analyzed, obtaining values of total solids equal to 37.81±9.66 g, 59.26±9.07 g, 50.13±18.24 g respectively; values of organic substances are respectively equal to 87.62±4.43 g, 89.74±0.82 g, 83.03±12.03 g. Pro II software simulation is used: The anaerobic digestion occurs at 328 K with a volume equal to 1300 m^3 and a residence time of 24 days. Results suggest that with 20000 t/year of feed the plant can produce 2660 MWh/year of electrical energy, 1670 MWh/year of thermal energy and 2136000 m^3/year of biogas at 62% of CH_4. The VAN is 1690000 € and ROI of 6 years: Due to the economical incentives the plant is economical feasibility. Removing the CO_2 from biogas, the plant can produce 695200 kg/year of biomethane for the immission in the network at the same condition. The VAN is 2960000 € and ROI of 5 years. Future researches should be about the study of new configurations of the plant to optimize the production of biogas and biomethane.

grazia.leonzio@graduate.univaq.it

Suitable refrigeration system for bacterial deactivation

Grazia Leonzio
University of L'Aquila, Italy

The energy consumption of refrigeration systems in food industry is growing due to the increasing production of food and the requirements imposed by quality, hygiene and food safety standards. In this research a sustainable and innovative refrigeration system for lattuge is developed, integrating biogas, trigeneration system and a refrigeration chambre that uses nozzles to spray cooling water to food. The cold produced by the generator of absorption heat pump, moved by biogas, is used to produce cooling water. A design of the system is carried out, developing a mathematical model for the deactivation of Escherichia Coli O157:H7 bacteria. The semi-logarithmic Weibull equation is used to describe the survival biphasic model. By current legislation the microbiological contamination limit for Escherichia coli is equal to 100 cfu/g; the temperature of refrigeration is set to 278 K. Two steps are present. During the non-isothermal process, decribed by Arrhenius kinetic, the initial temperature decreases from 303 K to 278 K. In 30 minuts the concentration of bacteria varies from 300 cfu/g to 241 cfu/g. The activation energy is equal to 85000 J/mol while the pre-exponential factor 2.5·1011 s1. In the second isothermal step, described by Weibull model, 190 minutes are necessary to eliminate bacteria; the required cooling water flow rate is 190 kg/h while the pressure and volume are respectively equal to 0.5 bar and 50 m3. The energy saving respect to traditional system is equal to 30%. Future researches should be conducted about the enviromental analysis in order to have energetic and enviromental advantages of the integrated system.

Biography

Grazia Leonzio is currently a PhD student from L'Aquila University, Italy. She has published several articles and participated to several international and national congresses about environmental and energy aspect of chemical processes. She wrote an article about waste management in Italian regions and published in Columbia University website. She has participated to M.U.N conferences and she is a Member of several associations like A.I.D.I.C. (Italian Association of Chemical Engineering), S.C.I. (Italian Chemical Society), I.S.S.N.A.F. (Italian Scientists and Scholars in North America) and E.C.A.S. (European Commission Authentication Service). She is a Referee of several journals.

grazia.leonzio@graduate.univaq.it