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Biogas production as a promoter for rural development

Maria Eugenia Sanz Smachetti[1], Javier Maiorano[1], Luis Méndez [1], Santiago Lenzi[3], Lucas Zubiaurre[3], Elisa Erbetta[1,2], Nadia Gabbanelli[1], Ignacio Durruty[4], Mercedes Echarte[1,2]

[1]Instituto de Innovación para la Producción Agropecuaria y el Desarrollo Sostenible (IPADS, Estación Experimental Agropecuaria Balcarce, Instituto Nacional de Tecnología Agropecuaria – Consejo Nacional de Investigaciones Científicas y Técnicas), CC 276, 7620 Balcarce, Argentina
[2]Facultad de Ciencias Agrarias, Universidad Nacional de Mar del Plata, CC 276, 7620 Balcarce, Argentina
[3]Departamento de Producción Sustentable. Región Pampeana. Instituto Nacional de Tecnología Industrial
[4]Grupo de Ingeniería Bioquímica, INCITAA-CIC, Facultad de Ingeniería, Universidad Nacional de Mar del Plata, 7602, Mar del Plata, Argentina
Corresponding author's e-mail: echarte.maria@inta.gob.ar

Like many other small rural communities, Los Pinos (Buenos Aires province, Argentina) is surrounded by agricultural and livestock premises. These activities generate large amounts of waste which are normally disposed with little to no treatment. The resulting air, soil, and water pollution has created social conflicts throughout the years. Simultaneously, electric supply is unreliable and expensive, and there is no natural gas supply network; hence, cooking and heating systems are mainly based on firewood. Anaerobic digestion (AD) of livestock and agricultural wastes emerges as an appropriate technology to simultaneously solve the problems of environmental pollution and access to energy in rural areas, contributing to closing the water-nutrient-energy cycle [1]. The objective of this work is to design a transdisciplinary strategy to provide an integral solution to the social and environmental problems by adding value to waste and promoting the diversification of the rural energetic supply. A Biogas Production Demonstration Unit (UDB) was built to this aim and includes: i) a continuously stirred tank reactor (CSTR) to be operated under a mesophilic regime, ii) a half-buried plug flow reactor (PFR) operating under seasonal soil temperature (10°-20° C), iii) a digestate drying area, iv) a biogas conditioning system, and v) an electric energy generation unit. Both reactors will be operated in series. The PFR was seeded with active sludge from a potato-industry biodigester operating under mesophilic regime and left to acclimate to ambient temperature 6 months ago. The CSTR will be seeded when operations begin. The biogas conditioning system consists of a biological filter followed by an activated carbon filter. The biogas filter uses the liquid fraction of the digestate sprinkled periodically over wood chip to immobilize sulfur-oxidizing bacteria [2]. All the modules have been designed to be easily replicated at a relatively low cost, with little technification. The operation and management of the UDB will be oversee by a cooperative created by the residents of Los Pinos specifically for this purpose. Once operations start, the biogas will be conditioned and transformed into electricity to power the town's water pump. Additionally, the digestate will be dried and composted to obtain an agricultural-grade soil amendment, an additional income for the cooperative.

References

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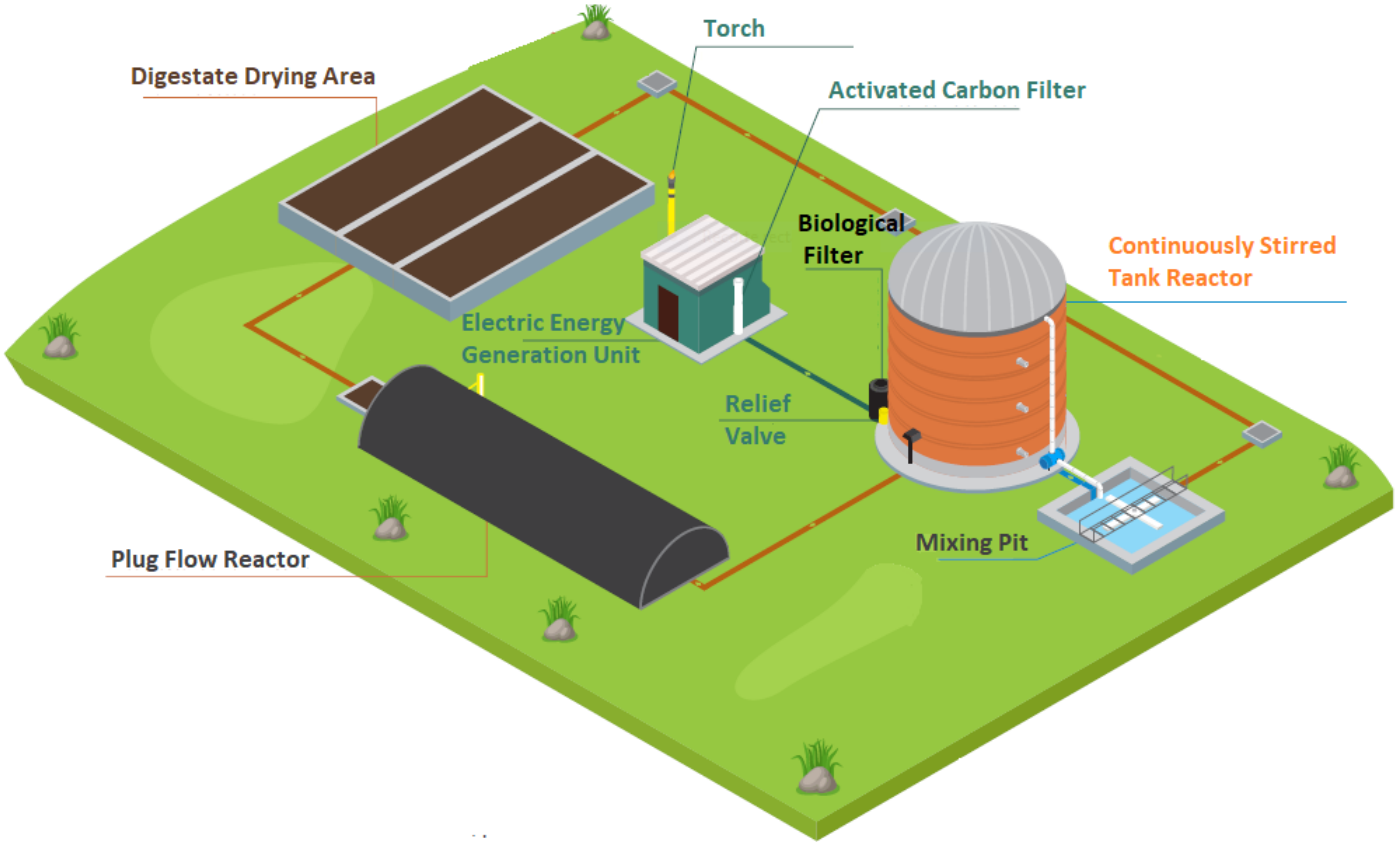

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