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Advancing anaerobic digestion of sugarcane vinasse: Current development, struggles and future trends on production and end-uses of biogas in Brazil

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ABSTRACT

Anaerobic digestion (AD) is a multipurpose technology. One of the AD outcomes is biogas that can be used to supply a local thermal demand, electricity generation or upgraded to fuel vehicle. Brazil has the largest potential for producing biogas, due to its extensive agroindustrial production plus the fact that the country has a population of over 210 million inhabitants. The Brazilian Association of Biogas and Biomethane (ABiogás) reports a potential biogas production of 41.4 billion m3 per year in the sugar-energy sector. However, less than 2% of this is achieved, indicating that the biogas is still chemically, economically, and politically invisible. The current technologies for the production, purification and end-use of biogas/biomethane were reviewed and presented in the context of sugarcane biorefineries. One of the major findings has indicated a thermal efficiency of 85% and a national grid surplus of 74–121 kWh.ton−1 sugarcane when steam boilers connected to electricity generators are used. Alternatively, a quarter of the vinasse generated by a medium-size sugarcane mill (600 m3 d−1) would be enough to supply the diesel consumption of on agricultural operations. The motivation of this review came from the fact that normally renewable energy does not reach its potential due to the lack of references on technological, regulatory and management in their productive arrangements: essential aspects to make them feasible. Therefore, it is expected to strengthen the panorama of research in the biogas system to properly.