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Towards harmonisation of biogas research: A comprehensive systematic review of anaerobic digestion parameters and processes

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Abstract

Anaerobic digestion is an important renewable energy technology that has the potential to reduce greenhouse gas emissions and contribute to the development of a sustainable energy system. However, research on anaerobic digestion is extensive and fragmented, making it difficult to gain a comprehensive understanding of the technology. Therefore, this systematic review, based on the PRISMA protocol, aims to provide a comprehensive overview of the anaerobic digestion process, from pretreatment to gas utilisation, and the research conducted in each step. The review involved analysing 4745 articles and identified the following research parameters: pre-treatment (1291), reactor design (949), temperature (918), H_2S cleaning (894), and biogas upgrading (693). These parameters were chosen as they are requirement to conduct anaerobic digestion and need to be planned and cannot really be changed during process, like, for example, mixing regime can. For each parameter, the review identified in each article the processes used. This information will serve as a basis for future standardisation of work to increase the efficiency of biogas research. It is important to note that the objective of this review is not to provide an analysis of the benefits or drawbacks of each listed method. This information should be covered in specific systematic reviews. However, this review will facilitate the identification of knowledge gaps or new innovative research. This research can help gain a better understanding of technology in general and help new researchers understand the field. This also highlights the urgent need for harmonisation of research to facilitate knowledge transfer and avoid redundant work or the overlooking of potential breakthrough research, while also indicating to researchers where focus should be orientated. A better harmonisation can help automatise research findings to compare results faster while avoiding tedious and long review work.

Keywords: Biogas technology, PRISMA protocol, research harmonisation, systematic review

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