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Upgrading of bio-gas into bio-methane by regenerative activated carbon

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Anaerobic digestion (AD) industry in the UK has experienced rapid growth in recent years. Over 130 operational AD plants in the UK outside the sewage treatment sector and more than 340 further projects are under development. Thus, there is an increasing demand for upgraded biogas to be used as vehicle fuel or injected to the natural gas grid. Since a typical biogas contains 1000 - 10,000 ppm hydrogen sulphide, its removal below 5ppm is required for uses beyond combined heat and power (CHP). Although a number of established methods exist for removal of hydrogen sulphide they tend to be costly for an average sized AD facility. A common industrial alternative to large-scale water-scrubbing is to adsorb hydrogen sulphide using a granular activated carbon (GAC) bed which is subsequently disposed as hazard waste. Accordingly, this research will focus on regeneration of activated carbon using an electric potential. The driving force is a high capacity system that is regenerative, inexpensive and leaves no waste. A 1% hydrogen sulphide / 99% nitrogen gas mixture is used as a benchmarked against an industrial activated carbon specifically used for hydrogen sulphide removal. Several electric conductive activated carbons (ECAC) then reported for their adsorption/ desorption potential. It is envisioned that this method can transform the production of bio-methane where early estimates have calculated that a regenerative system could save up to 50% of running costs.

Biography

Muhammad Farooq is 2nd year PhD Mechanical Engineering student at Heriot-Watt University, Edinburgh UK. Currently, he is working on the Regenerative activated carbon adsorption for low lost Bio-methane production from Bio-gas. He is author of number of publications in the area of energy generation. In 2014, he presented his research findings at various conferences including Super-gen Bio-Energy Hub Annual Conference Birmingham, UK Energy Storage Conference, Coventry & 1st Energy Academy Conference Edinburgh. Energy Storage Research Network (ESRN) awarded him travel grant to attend UKES Conference. He has been selected as exchange research scholar for the Clean Coal Energy Generation at Zhejiang University China. In 2015, he presented his PhD research at UK AD & Bio-gas Conference Birmingham and 2nd IMPEE Conference Edinburgh.

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