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Adsorption analysis of regenerative activated carbon for low cost bio-methane production

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An alternative type of a renewable, carbonless fuel is biogas produced by anaerobic digestion of organic matters and has the current potential to replace up to 50% of the UK's natural gas need. There is an increasing demand for production of bio-methane, to be used as vehicle fuel or injected to the natural gas grid. Since a typical biogas contains 50-65% methane, 30-45% carbon dioxide, 1000-10,000 ppm hydrogen sulphide, the removal of carbon di-oxide and hydrogen sulphide is required for the production of bio-methane. A number of methods exist for the removal of these gases, including water scrubbing, membrane separation, chemical absorption, cryogenic separation and physical adsorption. Among these, adsorption by activated carbons is considered as an efficient and economical approach. The uniqueness of the activated carbon as adsorbents is due to high surface area, developed pore volume and surface properties. The current industry practice is to adsorb gases by using activated carbon which is subsequently disposed as hazard waste. The present research is focused on regeneration of activated carbon using electric potential for the production of low cost bio-methane. An activated carbon rig has been designed and installed. Standard carbon di-oxide and nitrogen with 10,000 ppm hydrogen sulphide gas mixture passed through the rig and benchmarked against the industry standard achieved carbon. It is envisioned that this method can transform the production of bio-methane. Since the replacement of activated carbon can be up to 20% of the OPEX of a bio-gas to bio-methane plant. The results obtained from the current research could be utilized as a guide for the further design and operation of the industrial system.

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Renewable energy matrix based in the biomass: Proposal of territorial potential from the University of Sancti Spiritus

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This paper shows the potential of biomass to contribute a change in Cuba's energy matrix, based on results achieved by Sancti Spíritus University "José Martí Pérez", UNISS, identifying potential for power generation using renewable energy sources in the province, in order to change the current energy structure for a matrix based largely on renewable sources to increase quality and stability of energy supply, reduce oil imports and environmental impacts of energy sector, financial performance and greater energy sovereignty. A work exposed from an energy diagnosis in 2014 contributed implementation of renewable energy potentials of available biomass to the energy matrix of Sancti Spíritus province, which have been identified by researches, conducted to increase cogeneration in sugar industry, biogas production by biodigestión of different waste and biomass torrefaction of Marabú; also considering other projects promoted by the Cuban government. As results, the implementation of biomass as energy resource through potential identified by UNISS and projects promoted by the Cuban government in the consumption of 2014, would have helped to transform the renewable contribution from 6% to 55% in the matrix and generate more than 100% of the power consumption, biomass would provide around 98% of renewable, showing its importance for the Cuban energy matrix transformation; by a growth of 4% annual of energy consumption, could be covered from renewable more than 50% of whole demand and 90% of electricity consumption until 2020 and Sancti Spíritus could achieve energy indicators comparable with developed countries.

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