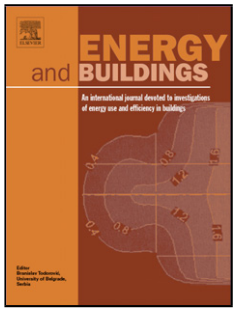

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Ecological sanitation, organic animal farm, and cogeneration: Closing the loop in achieving sustainable development-A concept study with on-site biogas fueled trigeneration retrofit in a 900-bed university hospital

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HIGHLIGHTS

- In this paper the overall environmental and economic problems that may be associated especially with large university hospitals are addressed.
- The aim was to show a rational methodology to convert their energy and environmental disadvantages by applying ecological sanitation and developing an energy, water, food, and education nexus
- For this purpose on-site biogas possibilities and potential were investigated for a 900-bed existing hospital to be retrofitted by a trigeneration system.
- Optimum fuel share and optimum trigeneration system cascading and optimum sizing methodology shown.
- The concept study comprised two scenarios and three stages. These were namely the base scenario, which utilizes three trigeneration engines 1,25 MW_e, and two 2,2 MW_e capacity each, all running on natural gas with a total capacity of 5,65 MW_e.
- The first stage of the second scenario mixes biogas produced on-site with natural gas for driving the 1,25 MW_e engine, which satisfies the constant base load of the hospital for 24 hours a day.
- The second stage of this scenario produces biogas on the large surrounding free premises in a new eco-farm and replaces the fuel input of the 2,2 MW_e engine, which operates 16 hours per day.