

## **Modelling and analysis of green energy production from sewage sludge using Aspen Plus**

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### **Abstract:**

Sewage sludge from conventional wastewater treatment plants (WWTPs) is a mixture of organic and inorganic components which might contain microbes, heavy metals, and contaminants. The management of sewage sludge in an appropriate manner is necessary to reduce the likelihood of adverse effects on human health and the surrounding environment. Additionally, WWTPs consume a high amount of electricity to process the wastewater. One of the by-products of WWTPs is sewage sludge, which can be converted into energy. There are many different sewage sludge processing techniques, and each has its benefits and drawbacks; as a result, selecting the process best suited to the situation requires careful study. The authors have created models using Aspen Plus software of several distinct processes, such as anaerobic digestion, gasification, and pyrolysis, to evaluate the potential energy generation from different possible approaches. The study has been performed considering the necessity to manage sewage sludge and apply waste-to-energy technology. Based on the analysis, the study's outcomes show that anaerobic digestion has the highest potential for energy generation, followed by gasification and pyrolysis. The power that can be produced through anaerobic digestion, gasification, and pyrolysis is 778.26 kW, 656.31 kW, and 189.95 kW, respectively. However, there is a further need to study these processes to understand their environmental impact and economic aspect.