

Comparison Of Biogas Upgrading Technologies As A General Approach: An Upgrading Case Study With Msw Using Biogas Plant From Turkiye

Biogas primarily consists of methane and carbon dioxide, serves as renewable energy, and plays a vital role in the development of a circular economy by offering an effective approach to mitigate environmental impacts since it is capable of being utilized either as fuel or raw material in chemical manufacturing. Nevertheless, the specific composition of biogas can vary based on its origin (sludge, animal manure, food waste, municipal solid waste, etc.), potentially including contaminants such as hydrogen sulfide, water vapor, nitrogen, and halogenated volatile organic compounds. With the application of biogas upgrading technologies, biogas can serve as an alternative for the production of electricity, vehicle fuel, and heat production, replacing traditional fossil fuels. In the field of biomethane production, a variety of upgrading technologies exist to transform biogas into biomethane. These methods are scrubbing (water scrubbing, scrubbing with organic solvents, and chemical scrubbing), adsorption processes, cryogenic separation, hydrogenation processes, and membrane separation. Through the application of upgrading technologies, biomethane (methane content of 97-99 %vol) is obtained by the removal of the aforementioned impurities. In developed countries, converting biogas from anaerobic digestion of agricultural waste into biomethane through upgrading processes is a widespread practice. On the other hand, municipal solid waste (MSW) with an estimation of 3.4 billion tonnes by

2050 has garnered interest to produce biogas among countries like Turkiye. This study conducts a comparative evaluation of biogas upgrading technologies with a general approach to develop a suggestion for MSW using a biogas plant from Turkiye as a case study.

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