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## Analysis of MSW to Energy Conversion Process for Sustainable Community

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### Abstract

Municipal solid waste witnessed an exponential increase globally due to plastic, paper and organic material high production without considering appropriate recycling strategies. Pyrolysis and gasification is considered the most promising chemical recycling techniques, which can help prevent incineration and landfilling. Both processes have low environmental impacts, high product value, ability of electricity generation illustrated in this work. The paper discusses the major process units in industrial chemical recycling plants, life cycle assessment (LCA) in terms of GHG emissions, process stages and system design and justifies gasification and pyrolysis over other thermal treatment methods. Pyrolysis and gasification produce hydrocarbon gaseous and liquid products which can be utilized for energy production or chemicals synthesis while only incineration produce thermal energy. Both processes also produce the highest electrical production per ton in comparison with incineration with higher carbon dioxide emissions than incineration but lower dioxins, NO<sub>x</sub>, HCl, CO emissions.

**Keywords:** Sustainable engineering, clean energy, global warming, pyrolysis, gasification, incineration

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