Distributed Power Generation from Waste Material Employing Internal Combustion Engines

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Abstract

In Japan, about 40 million tons of municipal solid wastes (MSW) are incinerated each year. Among them, about 20 million tons MSW/year are used for power generation and totally about 1000MW of electric power is produced from MSW. Most of Waste-to-Energy (WTE) plants are installed for large-scale MSW treatment exceeding 200tons/day scale and nearly half of the total MSW is already used for power generation. But the cost of WTE is so high that developing countries can hardly adopt this option, and even in developed countries, small municipalities and companies who are producing industrial solid wastes are also hardly adopting this option due to low economic feasibility.

Tokyo Institute of Technology is developing and commercializing total technologies to convert unutilized resources such as solid wastes and biomass into high value added green products (solid fuel, gaseous fuel, liquid fuel, electric power and fertlizer) by combining various technologies which have been jointly developed with many companies. This presentation focuses on the following technologies for small-scale distributed power generation from waste material using internal combustion engines.

- Liquid Fuel Production Technologies : Gasoline or diesel equivalent fuel oils can be produced from waste plastics by employing the pyrolytic reforming oil production technology and from waste cooking oils or plant oils by employing the bio-diesel production technology.
- Gasification and Power Generation Technology : The gasification technologies can produce gaseous fuel as well as bio-char (fertilizer) from biomass wastes. Electric power can be generated from this gaseous fuel by employing internal combustion engines.