

Sureepun Wannasawang 2010: Waste to Energy for Recycle Paper Industry. Master of Science (Environmental Technology and Management), Major Field: Environmental Technology and Management, Department of Environmental Science. Thesis Advisor: Assistant Professor Tunlawit Satapanajaru, Ph.D. 86 pages.

The waste from recycle paper industry, for example, waste water treatment sludges and rejected material waste from the product in line (plastic waste) could be potential in process of waste to energy. Three wastes, waste water treatment sludges, plastic waste and plastic waste mixed jathropa seed cake were gasified by a small-scale up-draft gasification system. Gas flow rates at 91.3, 100.8, 108.41 and 135.8 m<sup>3</sup>/hr were studied. The results indicated that suitable flow rates for plastic waste and plastic waste mixed jathropa seed cake were 108.41 and 91.30 m<sup>3</sup>/hr, respectively. Carbon monoxide, hydrogen and methane from plastic waste gasifying were 11.66%, 11.42% and 1.81%, respectively and plastic waste mixed jathropa's shell were 15.77%, 12.67% and 2.35%, respectively. Average high heating values of both fuels were 3.76 and 4.58 MJ/m<sup>3</sup>, respectively. Sludges were not suitable for gasification system but they can be used to produce heat energy by the direct combustion system. Concentrations of heavy metals analyzed from ash were below the national standard except for lead in plastic waste and cadmium and selenium in plastic waste mixed jathropa seed cake. It is depend on the raw materials of the fuel. Economical evaluation by net present value, internal rate of return and payback period in using plastic waste and plastic waste mixed jathropa seed cake for waste to energy production were analyzed. It found that plastic waste mixed jathropa seed cake was more suitable than plastic waste for energy. Net present value was 102.5 million baht, internal rate of return was 38 % and payback period was 2 month 18 days.

---

Student's signature

---

Thesis Advisor's signature