Emergy Evaluation of a Refuse-Derived Fuel Processing Facility in Wonju, Korea

Jina Im and Daeseok Kang

ABSTRACT

Solid wastes are among the most pressing environmental and resource concerns in Korea. The Korean government has been implementing various management alternatives to reduce the production of solid wastes and recover valuable resources from them. Refuse-derived fuel (RDF) manufacturing facilities are one of projects that aim at recovering energy from solid wastes. This study used the emergy evaluation procedure to assess the feasibility of an RDF manufacturing facility in Wonju, Korea. By converting 10,442.6 tons of combustible solid wastes into 5,801 tons of solid fuel in 2007, this facility prevented the loss of useful resources with an emergy quantity of 3.70×10¹⁹ sej/yr. This amounted to a potential worth of 7.06 billion em₩/yr. Total emergy input required to produce 5,801 tons of RDF was 5.91×10¹⁹ sej/yr with an emvalue of 11.3 billion em₩/yr. The Wonju RDF manufacturing facility contributed more to the Korean economy beyond its investment cost as revealed by the emergy yield ratio of 2.67. Direct emergy benefits and costs of the RDF facility were calculated as 1.20×10¹⁰ em₩/yr and 3.32×10⁹ em₩/yr, respectively, resulting in the emergy net benefit/cost ratio of 2.63. This indicates that the RDF facility was a feasible option for managing solid wastes for the city of Wonju in Korea. This study demonstrated the usefulness of the emergy concept and methodology in evaluating management alternatives for solid wastes in Korea.

Citation
