



## **Integrated Food Waste Management with Renewable Energy Production**

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### **Abstract**

Approximately 3,600 tonnes of food waste is discarded in the three strategic landfills in Hong Kong every day, contributing 40% of the municipal solid waste (MSW) disposed. Food waste that cannot be avoided should be recycled and valorized to value-added products as far as possible. However, once food waste is mixed with other types of MSW, it will be contaminated and difficult to be recycled. A simple sorting process with less behavioral change of residents, therefore, is vital in order to encourage the residents to sort the food waste out from other MSW at source. In this presentation, a sustainable framework of food waste collection and recycling for food waste valorization is proposed. The framework consists of a simple food waste separation and collection process involving less behavioral change of residents and food waste recycling for renewable biogas fuel production. Food waste can be packed in an optic bag (i.e., green bag), while the residual municipal solid waste (MSW) can be packed in a common plastic bag. All the wastes are then sent to the refuse transfer stations, in which food waste is separated from the residual MSW using an optic sensor. The optic sensor can achieve a separation efficiency of food waste and residual MSW as high as 98%. The collected food waste is then sent to the proposed Organic Waste Treatment Facilities for biogas production via anaerobic digestion technology. The biogas (with methane content of 50-70% by volume) can be upgraded using water scrubbing technology and valorized as a biogas fuel for vehicle use (with methane content of 98% by volume). The application of biogas vehicle fuel from food waste has been widely adopted by some countries such as Sweden, Norway, and France. By converting 1,080 tonnes per day of food waste into biogas fuel as a petrol substitute for vehicle use in Hong Kong, it is estimated to fuel around 12,000 passenger cars per day, equivalent to about 2.6% of registered passenger cars in Hong Kong. In addition, it reduces about 1.9% of greenhouse gas (GHG) emissions in the transport sector. This percentage reduction is higher than the percentage reduction of GHG emissions for the transport sector in Hong Kong in 2010 with reference to the year 2005.