1. Title:
   DECISION-MAKING IN THE SELECTION OF FOOD WASTE DIVERSION SYSTEMS FOR BOONE, NC: COMPARING COMPOSTING AND ANAEROBIC DIGESTION BY LIFE CYCLE ASSESSMENT AND COST BENEFIT ANALYSIS

2. Research for thesis
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6. Abstract:
   In modern society, food waste is a big environmental issue in terms of greenhouse gas emission and contamination of local soil and groundwater. Food waste is the largest waste stream dumping into landfills. When food waste rots in landfills under anaerobic conditions, it generates methane and acid. Methane is a heat-trapping greenhouse gas that has 21 times greater global warming potential than carbon dioxide, and acid leaches into soil and groundwater causing soil and groundwater contamination in many old unlined landfills. In fact, food waste could be diverted into valuable resources through special treatment such as aerobic digestion (commonly called composting) and anaerobic digestion: compost and biogas. We can reduce environmental impacts of food waste by not dumping it into landfills and at the same time can generate valuable resources through food waste diversions. However, selecting an optimal diversion system for a specific site is not a simple process and varies depending on local conditions such as amount of food waste, market price of compost, electricity rate, and so on. The main purpose of this study is to gain a better understanding of the relative environmental burdens and economic benefits of alternative food waste diversion systems (i.e., aerobic and anaerobic digestions) and the current system (i.e., landfilling), and to provide baseline information for deciding the most appropriate food waste diversion system in Boone, North Carolina, USA. By conducting a life cycle assessment and cost-benefit analysis, quantified data of environmental impacts and economic benefits over the life cycle of all three options (i.e., landfill, aerobic and anaerobic digestions) were achieved. There have been storing indications that anaerobic digestion is the most environmentally beneficial food waste diversion system due to the avoidance of fossil fuel use for electricity and heat energy generation. However, aerobic digestion becomes more economically beneficial system when the total organic waste is 10,000 tons annually because of relatively cheaper capital cost and energy prices in the U.S. The results of this study can be beneficial for decision makers to select a rational food waste management system for their specific sites.

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