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Combining Anaerobic Digestion and Waste-To-Energy

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Abstract

A large fraction of the municipal solid wastes (MSW) stream in the U.S. comprises of natural organic compounds (i.e., food and plant wastes) with high moisture content and low heating value. While these properties are undesirable during the combustion of MSW in waste-to-energy (WTE) plants, they are required for anaerobic digestion (AD). During AD, methane gas is produced that can be captured and used for energy generation. The required long residence times limit the throughput of an AD plant but further development may result in increasing the rates of bioreactions. This paper introduces current AD practices and identifies possible synergies between AD and WTE. It is suggested that co-siting of WTE and AD facilities may result in mutual benefits.

Introduction

The process of anaerobic digestion (AD) makes use of anaerobic bacteria to break down organic waste, converting it into a stable solid and biogas, which is a mixture of carbon dioxide and methane. One of the oldest types of processing, AD is used extensively in rural areas to process farm waste and generate biogas. In North America, AD is used on large farms to treat manure and control odor and at wastewater treatment plants, where anaerobic chambers reduce biological and chemical oxygen demand. European nations, on the other hand, employ AD to process various waste streams, including industrial and agricultural organic waste and the organic fraction of municipal solid waste (OFMSW). By doing so, these countries reduce the volume of waste being sent to landfill, and therefore decrease methane emissions produced from its decay. In addition, the biogas generated at the AD sites is used to produce electricity and heat that is then sold to utilities, making the facilities profitable.

The opportunity to use AD for the OFMSW exists for the United States and Canada, but there are several obstacles that first must be overcome. The first is simply public perceptions. AD treats putrescible waste and this produces highly unpleasant odors. The not-in-my-backyard (NIMBY) principle is strong for AD treatment plants, despite the fact that operating at negative pressures and using biofilters for fugitive gases can control odors. Another obstacle for AD is the lack of knowledge and of information dissemination in North America. There are very few