CHAPTER 8

Life cycle assessment of waste-to-bioenergy processes: a review

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8.1 Introduction

The major problems faced by the world today include depleting nonrenewable sources of energy, increasing global energy demand, and the need to solve the problem of climate change (CC). Based on estimations made, the world energy consumption is expected to rise by 44% from 497 EJ in 2006 to 715 EJ in 2030. Carbon dioxide (CO_2) emissions are also predicted to increase by 39% from 29 billion tons to 40.4 billion between 2006 and 2030 [1,2]. It is nearly impossible to attain sustainability based on the current fossil fuel-based energy system. Therefore there is renewed interest in alternative energy resources such as bioenergy, which looks quite prospective in solving the global problems of energy security and CC.

Along with the issue of finding a sustainable source of energy, a major challenge faced by many developing countries in particular is the problem of waste management. Waste is commonly perceived as something that has ceased having utility. However, the high organic content in waste makes it appropriate for recovering energy from it, thereby helping in solving the problems of waste management, finding an alternative energy source, and reducing environmental pollution. The Ministry of New and Renewable Energy, of the government of India, predicted that for the year 2013 there was a potential of 1700 MW of energy generation from urban organic solid waste (1500 MW from municipal solid waste and 225 MW from sewage) and 1300 MW of energy from industrial waste [3]. Hence the ever-increasing waste should be seen as a resource to be used to recover materials and energy, particularly in developing countries where waste-to-energy (WtE) projects are still in the nascent stage. With

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