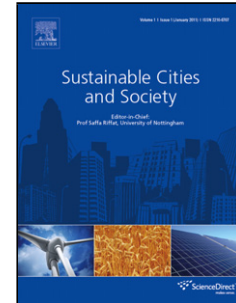


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# THE SIMPLIFIED METHOD FOR THE ASSESSMENT OF THE POTENTIAL FOR THERMAL ENERGY RECOVERY FROM THE MANUFACTURING PROCESSES OF MUSHROOMS COMPOST

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## Abstract

This study deals with the manufacturing process of compost production, followed by the release of large amounts of heat. The wheat straw and manure of broilers were the basic components of the raw mixture, monitored during the 80 hours period. The simplified assessment method was developed along with suitable mathematical model. The potential for recovery of the heat released to the surroundings was evaluated indirectly based on compost temperature measurements during the one full production cycle. Temperature-time mathematical model was developed and used as time indicator for the analysis of distribution of energy that was generated in exothermic processes. The emissions of N (<1% dry basis) and C through CO<sub>2</sub> (~3% dry basis) was neglected in mass balances. During composting treatment material temperatures were in range 80±2°C, making it a reliable heat source of constant temperature. The amount of total generated heat during the 80 hour time period was calculated to be 1325 KJ•10<sup>6</sup>, of which 76.4% was released to surroundings. The specific value of generated heat was 1.32 KJ•g<sup>-1</sup> of raw mixture, of which 1.01 KJ•g<sup>-1</sup> was available for recovery. The results pointed to the existence of significant amounts of released energy available for recovering.

Keywords: thermal energy, heat recovery, temperature model, compost, mushrooms.

## 1. INTRODUCTION

According to the European Union (EU) targets for 2020, at least 20% of the energy need in EU must come from renewable energy. The energy content of waste and sustainability of industrial and agricultural processes will be in focus in 21<sup>st</sup> century (Brebbia et al., 2014). The development of energy recovering technologies became highly desirable (Stehlík, 2009), especially in agricultural production (Shu et al., 2015). The modern agricultural production is energy challenging and in recent years increasingly relies on use of the different forms of renewable energies (Esen and Yuksel, 2013) and wastewater heat recovery potentials (Kretschamer et al., 2016).

Composting of solid poultry manure, by creating mixture of secretions and wheat straws, significantly simplifies the care of manure and represents an efficient solution for various manure problems. Composting is the process of creating a nutritionally and ecologically organic

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