

2013 INTERNATIONAL CONFERENCE

Sustainable landfills and waste management

Novi Sad, Serbia

November 28-29, 2013.

PROCEEDINGS



International Conference 2013
Sustainable landfills and waste management
PROCEEDINGS
EDITOR
Doc. Dr. Goran Vujčić
 Novi Sad, November 2013.

SCIENTIFIC COMMITTEE

Prof. Dr. Goran Vujic, SeSWA, University of Novi Sad, Serbia
Prof. Dr. Anđelka Mihajlov, SeSWA, University of Novi Sad, Serbia
Prof. Dr. Günay Kocasoy, Boğaziçi University, Istanbul, Turkey
Dr. Alexei Atudorei, Romanian Association of Solid Waste Management, Romania
Dr. Antonis Mavropoulos, National Technical University of Athens, Greece
Prof. Dr. Atanasko Tuneski, Ss Cyril and Methodius University, Skopje, Macedonia
Doc. Dr. Aleksandra Anic Vucinic, University of Zagreb, Croatia

ORGANIZING COMMITTEE

Dušan Milovanović
Bojana Tot
Zoran Đukić
Miodrag Živančev
Nikola Maoduš
Svjetlana Jakanović
Maja Stupavski
Maja Sremački

Address:
Dr. Goran Vujic
Faculty of Technical Sciences
Trg Dositeja Obradovica 6
21000 Novi Sad, Serbia
Tel: + 381 21 485 2458
Fax: + 381 21 475 0048

TABLE OF CONTENTS

MFA and LCA as tools in waste management	3
Transposition of resource efficiency requests into analytical tools for waste management.....	15
LCA4Waste – evaluation of municipal solid waste treatment options	23
Mining waste management – the case study of Bor.....	26
A solution for increasing the volume of a landfill by reinforced slope: theory and real cases.....	41
Can incineration be a sustainable option for solid waste management in the City of Novi Sad?	51
A GIS based technique for determination of optimal number and spatial location of waste bins – case study of Kragujevac.....	67
Industrial landfills of roasted pyrite, phosphor gypsum and jarosit sludge - "black" ecological points in Sabac - possibility of using disposed materials by applying the concept "The End of Waste"	77
Municipal waste management in Romania	86
Waste management centers in Croatia (2013.).....	97
Research of biogas production in laboratory and pilot scale in order to develop the treatment process of brewery waste streams.....	104
Application of reverse osmosis RCDT modules for leachate treatment	113
Landfill mining Austria – pilot region Styria	124
Comparison of moisture content in MSW considering different collection systems.....	131
Waste management sustainability on the territory of Novi Pazar	140
Remediation of landfills in republic of Croatia and new Law on sustainable waste management.....	148
Regional system of waste management in the City of Subotica, and the municipalities of Backa Topola, Mali idjos, Senta, Kanjiza, Coka and Novi Knezevac	158
Rehabilitation project new regional landfill Pancevo	164
Anaerobic digestion of lignocellulosic materials – substrate pretreatment methods	170
MFA as a tool for waste and environmental management on a company level	179
Assesment of emissions in leachate from sanitary and unsanitary landfill of municipal waste by using life cycle assessment, Banjaluka, BIH.....	189
Estimation of sewage sludge quantities in the AP Vojvodina.....	195

A GIS BASED TECHNIQUE FOR DETERMINATION OF OPTIMAL NUMBER AND SPATIAL LOCATION OF WASTE BINS – CASE STUDY OF KRAGUJEVAC

G. Boskovic ^a, N. Jovicic ^a, M. Milasinovic ^a, G. Vujic ^b, G. Jovicic ^a
and D. Milovanovic ^a

^a Faculty of engineering, Sestre Janjic 6 Kragujevac, Serbia,

^b Faculty of Technical Science, Department of Environmental Engineering, Trg
Dositeja Obradovića 6, Novi Sad, Serbia

*Corresponding Author: gboskovic@ept.kg.ac.rs

Abstract

This paper concerns the development of a methodology aimed at determination of optimal number of waste bins as well as optimizing their spatial location. The methodology used was based on a Geographic Information system which handled different sets of information, such as street directions, spatial location of objects and number of inhabitants, location of waste bins and radius of coverage. The study was conducted on a district in a center of the City of Kragujevac. The results indicated reduction of 24% in number of collection points and 33.4% in number of waste bins, without reducing the quality of provided services. It has led to costs and time savings for waste collection and also to environmental benefits.

Keywords: waste collection, collection point locations, energy efficiency

Introduction

Urbanization, as one of the most evident global changes worldwide, leads to dramatic increase in urban solid waste generation with a great socio-economic and environmental impact. Therefore, solid waste management is one of the most complex tasks that city authorities are faced with. Municipal solid waste management is a multidisciplinary activity that includes generation, storage and collection, transport, treatment and waste disposal. Waste collection and transport account for 50% to 70% in total costs of the system. The share is higher at landfill-based management where waste is directly entering landfill without any treatment. This is very common in developing countries, as well as in Serbian cities.

Municipal companies are trying to make the best possible way to provide their services. Since such a service is very expensive many towns and cities are forced to reassess their solid waste collection plan and to optimize the system in order to make energy efficient and economic sustainable system. In recent years many optimization model have been proposed. Researchers seem to agree that an ideal collection system should be adapted to local conditions, and take into account cultural, demographic, geographic, economic and social factors. There can be found numerous researches on fuel consumption, time required and pollutants emission during waste collection and transport. Sonesson [1] presented a general approach to calculate fuel consumption and time taken for waste collection. According to this author, driven distance and number of stops are two parameters that have the greatest influence on fuel used and pollutants emission. Other parameters were not taken into account. Nguyen [2] showed a great influence of vehicle idling time on total

