



Waste Management and Packaging Waste

in Developing Countries in SEE,
Middle East and Mediterranean Region
30th November - 2nd December 2011.
Serbia - Novi Sad

PROCEEDINGS



FACULTY OF TECHNICAL SCIENCES



DEPARTMENT OF ENVIRONMENTAL ENGINEERING
AND OCCUPATIONAL SAFETY AND HEALTH



REPUBLIC OF SERBIA
MINISTRY OF ENVIRONMENT
AND SPATIAL PLANNING



Global
Methane Initiative



**ISWA Beacon Conference 2011
Waste to Energy and Packaging Waste
in developing countries
in South Eastern European, Middle East and
Mediterranean Region**

PROCEEDINGS

EDITOR
Doc. Dr. Goran Vujić

Novi Sad, November 2011.

SCIENTIFIC COMMITTEE

Doc. Dr. Goran Vujic, SeSWA, University of Novi Sad
Prof. Dr. Anđelka Mihajlov, SeSWA, University of Novi Sad
Prof. Dr. Günay Kocasoy, Boğaziçi University, Istanbul
Prof. Dr. Iona Ionel, Politehnica University of Timisoara
Dr. Efstratios Kalogirou, Synergia Greece
Prof. Dr. Atanasko Tuneski, Ss Cyril and Methodius University, Skopje

ORGANIZING COMMITTEE

Dušan Milovanović
Mr. Dejan Ubavin
Bojana Tot
Aleksandra Gak
Miodrag Živančev
Zoran Đukić
Nemanja Stanisavljević

Address:
Dr. Goran Vujić
Faculty of Technical Sciences
Trg Dositeja Obradovica 6
21000 Novi Sad, Serbia
Tel: + 381 21 485 2458
Fax: + 381 21 475 0048
E-mail: contact@iswabeacon.rs

SESSION 4

SSW USAGE IN LAFARGE BEOCIN CEMENT PLANT IN SERBIA

S.Fenjac, C.Lampl

CASE STUDY: DESIGN AND CONSTRUCTION OF REGIONAL SANITARY LANDFILL "MOŽURA", BAR, MONTENEGRO

M. Stanković, G. Vujić, Zeljko Tmusić and Aleksandar Milovanović

MINE WATERS AND THEIR ENVIRONMENTAL IMPACT—THE CASE STUDY OF BOR

Grozdanika D. Bogdanović, Milan Ž. Trumić, Maja S. Trumić

WASTE MANAGEMENT WITH ENERGY RECOVERY (MBO) IN THE DUBROVNIK- NERETVA COUNTY

Danko Fundurulja, Sandra Novak Mujanović, Martina Cvjetičanin, Goran Pašalić

COMPARATIVE QUALITY ANALYSES OF LEACHATE WATERS FROM TWO LANDFILLS OF RESIDUAL MUNICIPAL WASTE ALONG WITH PROPOSAL OF POSSIBLE TREATMENT METHODS

Nebojša Knežević, Ljiljana Vukić

REMEDIATION AND CLOSURE OF MUNICIPAL WASTE LANDFILL "DUDARA" OF SABAC

Doc. Dr Goran Vujić, T. Obradović, D. Milutinović, D. Miković

GIS BASED METHOD FOR OPTIMIZATION OF MUNICIPAL WASTE COLLECTION AT THE CITY LEVEL

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

EMERGING SUBSTANCES AND CHEMICAL REACTIONS IN AQUATIC PHASE OF LANDFILL SYSTEM

Srđan Kovačević, Mirjana Vojinović-Miloradov, Dušan Milovanović, Zoran Đukić, Zorica Miroslavljević, Maja Stupavski

GIS BASED METHOD FOR OPTIMIZATION OF MUNICIPAL WASTE COLLECTION AT THE CITY LEVEL

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, e-mail: njovicic@kg.ac.rs

^b Faculty of Technical Science, Department of Environmental Engineering, Trg Dositeja Obradovića 6, Novi Sad, Serbia, goranvujic@uns.ac.rs

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

Abstract

The optimization of system for solid waste management can reduce management costs and negative impacts on the environment. Due to fact that collection and transport of solid waste is responsible for a large fraction of total costs, the aim of this research is optimization of current communal vehicle's routes. General methodology of route optimization for solid waste collection is presented. As a prerequisite all necessary data were collected and appropriate database was created. All vehicle's routes were optimized using GIS software, and the results of the research show that same collecting process could be done with the 14% less of total travelled distance. The benefit is a great full savings and also associated exhaust emissions.

Keywords: GIS, Solid waste collection, route optimization, energy efficiency.

Introduction

Environmental pollution is one of the greatest problems in every urban area and it is the result of increased solid waste generation. In order to find a solution for a real municipal problem at a local community level there are different functional elements (sub-systems) and each of them is part of one system known as municipal system for solid waste management. Furthermore, the main goal in solid waste management is optimization of the system with minimization of costs and increasing of energy efficiency in order to establish more efficient and economical sustainable municipal system for solid waste management.

Techno-economical analyze of the system shows that collection and transport of solid waste may account more than 60% of total costs, therefore improvement in these elements of the system is more than necessary. Optimization at the local level should be a permanent task for each municipal company and it should be carried out every 5 years [1].

Improvement and optimization of the municipal system for solid waste management is issue of interest and research worldwide. Special emphasis is placed on routing optimization and optimization of locations of waste bins loading spots.

The routing optimization problem belongs to model known as Vehicle Routing Problem (VRP). Application of VRP model leads to feature of many new models which include most of constraints from the real life waste collection [2]. Geographical Information System (GIS) also plays a vital role in finding the "cheapest"/shortest routes for communal vehicles [3, 4]. There is no universal solution for optimization of system for solid waste management and each problem is unique and has to be taken into consideration as unique.

