

Goran Boskovic¹⁾
Nebojsa Jovicic¹⁾
Marko Milasinovic¹⁾
Gordana Jovicic¹⁾
Dobrica Milovanovic¹⁾

1) University of Kragujevac,
Faculty of Engineering

METHODOLOGY FOR REDUCTION OF GHG EMISSIONS FROM MUNICIPAL SOLID WASTE COLLECTION AND TRANSPORT

Abstract: Collection and transport of municipal solid waste (MSW), as a part of solid waste management, have a great environmental impact due to exhaust emissions from fuel combustion. Distance traveled appears as one of the most influencing parameter in total fuel consumed. This paper presents a general methodology for route optimization using Geographic Information System (GIS). The necessary databases were created and established methodology was applied to waste collection and transport system in the city of Kragujevac. Using GIS software one typical route was optimized. Furthermore, fuel consumption and associated exhaust emissions vary in different waste collection and transport stages. Waste collection and transport circuit was divided into four different stages. The estimation of Greenhouse Gas (GHG) emissions for optimized route was made and compared to estimated emissions of current route. Calculations, which also include vehicle speed as very important parameter, indicated great savings in GHG emissions.

Keywords: MSW, collection and transport, GHG emissions, GIS, route optimization

1. INTRODUCTION

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. This proportion is higher at landfill-based management where waste is directly landfilling without any treatment. This is very common in developing countries. Collection and transport of waste is usually made by heavy-duty trucks that have a great environmental impact due to diesel fuel consumption and pollutants emission. There can be found numerous

researches on fuel consumption and pollutants emission during waste collection and transport. Sonesson [1] presented a general approach to calculate fuel consumption and time 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 fuel consumed, as well as variable fuel rates for different collection stages. Zsigraiova [3] combined vehicle route optimization and waste collection scheduling with historical data of filling rate of each container to estimate

