

Announcing the Final Examination of Mousa Maimoun for the degree of Master of Science

Time & Location: November 3, 2011 at 10:00 AM in HEC 101

Title: ENVIRONMENTAL STUDY OF SOLID WASTE COLLETION

The growing municipal solid waste generation rates have necessitated more efficient, optimized waste collection facilities. The majority of the US collection fleet is composed of diesel-fueled vehicles which contribute significant atmospheric emissions including greenhouse gases. In order to reduce emissions to the atmosphere, more collection agencies are investigating alternative fuel technologies such as natural gas, biofuels (bio-gas and bio-diesel), and hybrid electric technology. This research is an in-depth environmental analysis of potential alternative fuel technologies for waste collection vehicles.

This study will evaluate the use of alternative fuels by waste collection vehicles. Life-cycle emissions, cost, fuel and energy consumption were evaluated for a wide range of fossil and bio-fuel technologies. Moreover, the energy consumption and the tail-pipe emissions of diesel-fueled waste collection vehicles were estimated using MOVESa software. Emission factors were calculated for a typical waste collection driving cycle as well as constant speed. Finally, the selection of fuel type by the waste collection industry requires consideration of environmental, security, financial, operational, and safety issues. In this study, a qualitative comparison between alternative fuels was performed; a multifactorial assessment of these factors was conducted taking into account the opinion of the waste collection industry of the importance of each factor.

Liquid-petroleum fuels have higher life-cycle emissions compared to natural gas; however landfill natural gas has the lowest life-cycle emissions compared to all other fuel categories. Compressed natural gas waste collection vehicles have the lowest fuel cost per collection vehicle mile travel compared to other fuel categories. Moreover, the actual driving cycle of waste collection vehicles consists of repetitive stops and starts during waste collection; this generates more emissions than constant speed driving. Finally, the multifactorial assessment indicates that natural gas and landfill gas have better environmental, economical, and energy security performance than current liquid-petroleum fuels.

Major: Environmental Engineering

Educational Career:

Bachelor's of Civil Engineering, 2009, University of Jordan

Committee in Charge:

Dr. Debra Reinhart, Chair, Civil, Environmental, and Construction Engineering

Dr. Pamela McCauley Bush , Industrial Engineering and Management Systems

Dr. C. David Cooper , Civil, Environmental, and Construction Engineering

Approved for distribution by Dr. Debra Reinhart, Committee Chair, on October 6, 2011.

The public is welcome to attend.