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Locating Alternative-fuel Refueling Stations on a Multi-class Vehicle Transportation Network

Abstract: The existing literature regarding the location of alternative fuel (AF) refueling stations in transportation networks generally assumes that all vehicles are capable of traveling the same driving range and have similar levels of fuel in their tanks at the moment they enter the network and when they exist it. In this research, we relax these assumptions and introduce a multi-class vehicle transportation network in which vehicles have different driving ranges and fuel tank levels at their origins and destinations. A 0-1 linear programming model is proposed for locating a given number of refueling stations that maximize the total traffic flow covered (in round trips per time unit) by the stations on the network. Through numerical experiments with the 2011 medium- and heavy-duty truck traffic data in the Pennsylvania Turnpike, we identify the optimal sets of refueling stations for AF trucks considering multiple truck classes with different driving ranges and fuel tank levels at origins and destinations.

Biography: Dr. Jose A. Ventura received his B.S. in Industrial Engineering from Polytechnic University of Cataluña (Barcelona, Spain), and his M.E. in Operations Research and Ph.D. in Industrial and Systems Engineering both from University of Florida. Since 1989 he has been at Pennsylvania State University, where he is currently Professor of Industrial Engineering. He has also held faculty positions at Polytechnic University of Cataluña, University of Missouri, and Auckland University (New Zealand). Dr. Ventura teaches courses in operations research and logistics to undergraduate and graduate students. He specializes in supply chain management, energy logistics, infrastructure development and traffic equilibrium in transportation networks, and facility layout and location. His research has been published in a number of journals, including Mathematical Programming, Management Science, Discrete Applied Mathematics, Naval Research Logistics, and IIE Transactions. His research work has been funded by industry (General Electric, McDonnell Douglas Co., etc.) and government agencies (National Science Foundation, Pennsylvania Turnpike Commission, etc.). He has been an associate editor of several journals, including IIE Transactions and Journal of Manufacturing Systems. He is a fellow of the Institute of Industrial and Systems Engineers (IISE) and a former Chair of the IISE Council of Fellows.