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NATIONAL CENTER FOR TRANSPORTATION SYSTEMS PRODUCTIVITY AND MANAGEMENT

TRANSPORTATION SPEAKER SERIES

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THURSDAY 11 AM | MASON BDG 1133

"Incorporating Environmental Sustainability Objectives in the Planning, Operations and Maintenance of Transportation Systems"

ABSTRACT: Transportation systems are usually planned, operated and maintained to optimize social costs. Examples include the planning of public transportation networks and their operations to minimize user costs (expressed in units of total travel time) or the scheduling of highway maintenance to minimize vehicle costs, subject to various agency constraints. More recently, there has been an increased awareness of the need to reduce Green House Gas emissions from the transportation sector. In many countries and regions, including California, this has led to mandates to bring total emissions to specific lower levels. Research in the past decade has shown that significant reductions can be achieved through the use of low-carbon fuels for transit vehicles, improved pavement materials, and other technological advances. Less is known about the potential of incorporating GHG reduction as an objective in the planning, operations and maintenance of transportation systems.

Recent research at UC Berkeley has shown that the objectives of minimizing life-cycle user and agency costs, and minimizing life-cycle GHG emissions, are usually not aligned. For example, reducing transit frequencies and increasing station spacings in urban areas reduces emissions from infrastructure construction and vehicle operations, but increases user travel times (especially access and waiting times). Likewise, highway pavement resurfacing frequencies that minimize lifecycle costs can be significantly different from those that minimize lifecycle emissions. This presentation will include a demonstration of some situations where these tradeoffs exist. Pareto frontiers that provide a range of optimal solutions will be presented. We will also show cases where focusing exclusively on GHG reduction from the transportation system can lead to unintended consequences.

To read more about Dr. Madanat, click here.

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