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ASSESSMENT OF POLICY FOR URBAN MOBILE EMISSION MANAGEMENT WITH SYSTEM DYNAMIC APPROACH

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ABSTRACT

This study use a system dynamics based decision support system to assess the change of mobile air pollution emission due to new added transportation infrastructure and some proposed transportation management strategies. The assessment system includes three sub-models, namely the mode choice sub-model, traffic flow Sub-model and traffic emission sub-model. The three sub-models were integrated as an assessment model with system dynamic theory to perform case studies. In the model, a geographic information system (GIS) was also included for the data input and for displaying spatial distribution of mobile emission. That provides an overview of the city's mobile emission change when responding to a specific management policy. Some case studies for applying the model in the assessment of the changes in total emission of NO_X, HC and CO in Taipei City were performed. The assessments include impact on mobile emission change from new construct of transportation infrastructures and some proposed traffic management strategies. The new transportation infrastructures include new extension of a mass rapid transit (MRT) route (the Hsin-I route) in the existing Taipei MRT system and a new extension of one express way of Taipei metropolitan highway system. The proposed traffic management strategies include parking space management, adjustment of bus schedule and fee, regulating on motorcycle usage. The strategies that combine transportation infrastructures with transportation management policies and policies with multi transportation management strategies were also studied.

This study found that there is increasing of NO_X emission while reducing HC and CO emission when a new express way was added. For the transportation management policies such as bus schedule adjustment and bus fee reduction, and strategies combine a new constructed express ways with regulating motorcycle usage were found to increase NO_X emission while to reduce HC and CO emission. The assessed strategies that can resulted in reducing emissions of NO_X, HC, and CO are (1) MRT route added, (2) regulating motorcycle usage, (3) added one express ways combined with extending of one MRT route, (4) regulating motorcycle usage combined with an extension of MRT route, (5) MRT schedule adjustment and MRT fee reduction. The assessed parking management policies include adjustment of progression parking rate and non-progression parking rate. The assessment reveals that the parking management can resulted in reducing all NO_X, HC, and CO emissions. The optimal parking rating and progression rate from air quality prospective were assessed and derived in this study.