

# On The Transportation-Energy and The Transportation-GHG Emissions Connection

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## **Abstract**

Rising greenhouse gas (GHG) emissions, which are unequivocally linked to human activity, have been identified as one of the major causes of global climate change. Research in the field suggests that, if greenhouse gases in the earth's atmosphere continue to rise, the earth's temperature would steadily increase, resulting in considerable damage to our quality of life. In the U.S., energy-related activities account for three-quarters of total human-generated greenhouse gas (GHG) emissions, mostly in the form of carbon dioxide (CO<sub>2</sub>) emissions from burning fossil fuels. While about one-half of these emissions come from large stationary sources such as power plants, the transportation sector ranks second, accounting for about one-third of all human generated GHG emissions. Further, the transportation sector has been identified as the most rapidly rising source of GHG emissions, due to the significant growth in travel demand over the last decade. This increasing travel demand trend is expected to continue into the next decade and beyond.

In this presentation, the author will discuss the various transportation-related sources of energy consumption and GHG emissions as an important step toward the effective assessment of energy consumption reduction efforts, emission reduction strategies, and climate change adaptation strategies for vulnerable transportation systems. Particular emphasis will be placed on procedures to evaluate various transportation, taxation, land-use, pricing, and traffic operational policies and initiatives designed to influence such travel behavior choices as vehicle type choice of household vehicles, adoption rate of low carbon fuel-driven vehicles, participation in accelerated vehicle-retirement programs for old and less-fuel efficient vehicles, automobile dependency and level of automobile usage, and public transportation/non-motorized mode use. Ongoing efforts to develop procedures to forecast vehicle fleet composition and fuel consumption as an essential precursor to transportation-related energy consumption and GHG emissions forecasting will be presented and discussed. Additionally, an

activity-travel simulator that is capable of assessing potentially complex travel behavior responses to alternative land-use and transportation policies will be discussed.