The Effects of Demand Management Measures on Commercial Vehicle Travel

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Policy Question

How might transit oriented development (TOD) and vehicle pricing policies (VMT fees) change local commercial vehicle miles traveled (VMT) and greenhouse gas emissions (GHGs)?
Share of Total VMT & GHGs in U.S. for Light & Commercial Vehicles from 2013 to 2040 (EIA)
What Do Other Studies Say?

- **Transit Oriented Development (TOD)**
  - Urban areas with high population densities less commercial vehicle travel

- **Distance-Based Pricing (VMT Fee)**
  - Potential for significant reduction in passenger and commercial vehicle travel
  - Since 2005, pilots and field tests of fees and technology throughout U.S.
  - GAO recommended pilot of commercial vehicle distance based fee in 2012
Methodology

• TOD and VMT Fee simulated with California Travel Demand Model
  – Advanced activity-based microsimulation
  – First applied at large geographic scale
  – Explicit treatment of personal & local commercial vehicle travel
California Travel Demand Model

**Inputs**
- Zone System
- Road Network
- Transit Network
- Population
- Employment
- Other Zonal Properties

**Models**
- Short Distance Personal Travel Model (SDPTM)
- Long Distance Personal Travel Model (LDPTM)
- Short Distance Commercial Vehicle Model (SDCVM)
- Long Dist. Commercial Vehicle Model (LDCVM)
- External Travel Model (ETM)

**Outputs**
- Trip Lists
- Trip Tables
- Loaded Network
- Travel Times and Costs
- Summary Travel Statistics
- Maps
- Graphs
## Data for Model Development

**Surveys**
- Travel Surveys
- Census-PUMS
- American Community
- Freight Analysis Framework
- Commodity Flows

**Observed**
- Sensors
- Loop-Detectors
- WIM data
- On the Map
- Google Earth
- General Plans
- Zoning
What is different about this study?

• New type of local commercial vehicle travel model: tour-based.
  – Better represents underlying mechanisms driving change in commercial travel due to public policies, investments, and plans that alter travel distances, times, and costs experienced by drivers.
2035 Base Case Scenario

- MPO’s population and employment forecasts for 2035
- Adds roadway and transit projects from regional transportation plans
- As of August 2011
- Not latest SCS plans
## VMT Fee: Double per Mile Vehicle Operating Costs

<table>
<thead>
<tr>
<th>2035</th>
<th>Base</th>
<th>VMT Fee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passenger &amp; Light Commercial</td>
<td>$0.14</td>
<td>$0.28</td>
</tr>
<tr>
<td>Medium Truck</td>
<td>$0.49</td>
<td>$0.98</td>
</tr>
<tr>
<td>Heavy Truck</td>
<td>$0.58</td>
<td>$1.16</td>
</tr>
</tbody>
</table>
## Transit Oriented Development: Population & Density

<table>
<thead>
<tr>
<th></th>
<th>Population Moved Closer to Transit</th>
<th>Weighted Population Density</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2035</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base</td>
<td>--</td>
<td>32.2</td>
</tr>
<tr>
<td>TOD</td>
<td>4.0 Million</td>
<td>35.2</td>
</tr>
<tr>
<td>Percentage Change</td>
<td>8.2%</td>
<td>9.5%</td>
</tr>
</tbody>
</table>
TOD: San Diego Region

- Transit Station
- TAZ within 3-12 miles of transit
- CSTDM TAZ
TOD: San Francisco Bay Area

- Transit Station
- TAZ within 3-12 miles of transit
- CSTDM TAZ
Dramatic Reduction in Congestion for VMT Fee: AM Peak

> 5% Change in Vehicle Volumes on Road

None
Medium
Heavy
Severe

Base

VMT Fee
Percentage Change in Local Commercial Vehicle Travel: VMT Fee Compared to Base

- Trips: 29.6%
- Tours: -0.6%
- VMT: -8.4%
- VMT/Trip: -29.3%
5 Mile Bins for Local Commercial Vehicle Travel: VMT Fee Compared to Base

- **Base VMT**
- **Scenario VMT**
- **Base Trips**
- **Scenario Trips**

**Trip Distance Bins**

**Quantity (Millions)**

- 0
- 5
- 10
- 15
- 20
- 25

- 5
- 15
- 25
- 35
- 45
- 55
- 65
- 75
- 85
- 95
Modest Reduction in Congestion for TOD: AM Peak

> 5% Change in Vehicle Volumes on Road

Base

Compact

None  Medium  Heavy  Severe
Percentage Change in Local Commercial Vehicle Travel: TOD Compared to Base

- VMT/Trip: -0.6%
- Tours: -1.8%
- Trips: -2.4%
- VMT: -2.5%
5 Mile Bins for Local Commercial Vehicle Travel: TODs Compared to Base

- Quantity (Millions)
- Trip Distance Bins

- Base VMT
- Scenario VMT
- Base Trips
- Scenario Trips

Graph showing the comparison of Base VMT and Scenario VMT for local commercial vehicle travel across different trip distance bins.
Comparison of VMT & Delay Changes for TOD & VMT Scenario

![Bar chart showing percentage changes for TOD VMT, TOD Delay (VHD), VMT Fee VMT, and VMT Fee Delay (VHD).]
Conclusions

• TOD scenario provides modest reduction in commercial vehicle travel due to closer proximity of origins & destinations

• VMT fee scenario has significant reductions in local commercial travel distance due to dramatic congestion reduction & financial incentives to minimize distance traveled
  – Increase local commercial vehicle productivity
  – Enough to offset added VMT costs?
Thank you!

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