Travel Model Application for the Irvine Climate Action Plan
Transportation, Land Use, and GHG in Irvine Climate Action Plan

- Relationship between travel behavior, land use, travel speed, and emissions
- Typical Tools
- Recommended Approach
- Challenges
- Results
Travel Behavior Emissions

- We focus on VMT (Vehicle Miles Traveled)
- Reflects daily travel for work, shopping, school, etc
- Personal vehicle travel is a major contributor to emissions
Role of Technology

- Future vehicles should be more fuel efficient and produce less emissions
- However, if VMT continues to increase, these technological gains will be wiped out
Better MPG and Emissions controls will be offset by significant increase in VMT
If Technology Can’t Fix Our Problem, What Can?

- Changes in land use form
- Improving traffic flow
- Increased use of alternative modes

- Improvements in land use form and traffic flow are most promising
Daily Vehicle Miles per Person vs. Residential Density
Source: Baltimore Metropolitan Council, 2001 Travel Survey

Density significantly reduces VMT per capita
Emissions highest per vehicle on congested arterials, not freeways
Typical Approaches

- HPMS Data
- Travel Demand Models
- Land Use Models
- Household Surveys
Highway Pavement Management System (HPMS)

- Used in the initial ICLEI inventory
- Based on data taken from Caltrans inventory of State Highways
- Not scalable
- Not able to segregate into travel markets
Travel Model

- City of Irvine has a validated travel model (ITAM)
- Provides Base Year (2008), 2013 and 2030 forecasts
- Road Network
- Land Use Data
- Traffic Zones
Roadway Network
## Land Use Data

### Final SED by Planning Area

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<th>Group Quarters Population</th>
<th>Employed Employees</th>
<th>Retail Employees</th>
<th>Service Employees</th>
<th>Other Employees</th>
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<th>Non-Resident Univ/Coll Enrollment</th>
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TAZ Network
Travel Model Approach

- Modify Model
  - Replicate Speeds
  - Smart Growth

- Non-Model Adjustments
  - Transit
  - TDM

- Improved Travel Demand Model

- VMT Estimates

- Emissions Estimates

- Updated Land Use Data

- Parcel Based Land Use Model (ESRI)

- Alternative Testing

- Travel Demand Model

- Updated Land Use Data
Land Use Models

- Places, UPlan, Index are examples
- Can provide GHG estimates
- Usually tiering off existing travel model
- Irvine does not have existing land use model
Household Based Approach

- Parcel Based Land Use Model (ESRI)
- Household and employee VMT factors
- VMT Estimates For City only
- Alternative Testing
- Emissions Estimates
Recommendation

- Use Travel Model
- No existing land use model
- Survey data does not capture all travel behavior
- Surveys and HPMS not scalable
Challenges

- Need to segregate out non-Irvine Trips
- ITAM includes areas outside of Irvine
- Model provides forecasts for limited years
- Need to address external factors
  - Fuel economy standards
  - Low carbon fuels
Solutions

- Modify travel model outputs to segregate through trips from persons travel to/from Irvine
- Apply GIS to identify non-Irvine areas in ITAM
- Interpolate for additional analysis years
- Estimate effects of fuel economy standards and low carbon fuels through best available information
TAZ Network-Irvine Only
Results

- Obtained VMT and emission forecasts for 2006 analysis year
  - Mobile sources accounted for over 50% of total GHG emissions
- Determined VMT and emission forecasts for 2020 analysis year
  - Mobile sources still accounted for over 50% of total GHG emissions
  - 40% growth from 2006 to 2020 (assuming Business as Usual) in VMT
Results-continued

- Emissions are reduced through fuel efficiency and low carbon fuels
  - Not sufficient to offset VMT growth
- Evaluating a number of strategies to reduce VMT increases
  - Changes in land use
  - Alternative travel modes
  - Travel demand management