

Travel Model Improvements For Climate Change

Presentation to the Association of Metropolitan
Planning Organizations Annual Conference

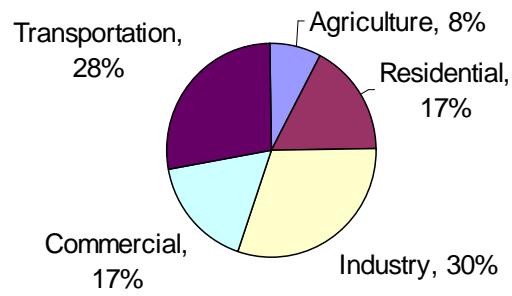
October 30, 2008

Puget Sound Regional Council
PSRC



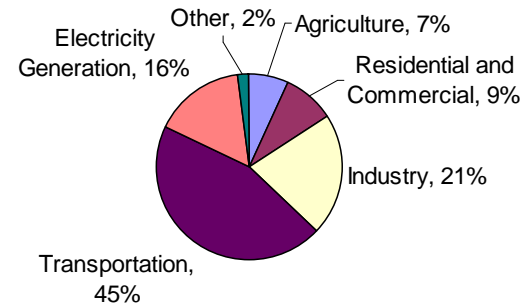
Sources of Climate Change in Washington

US Greenhouse Gas Emissions by Sector, 2004



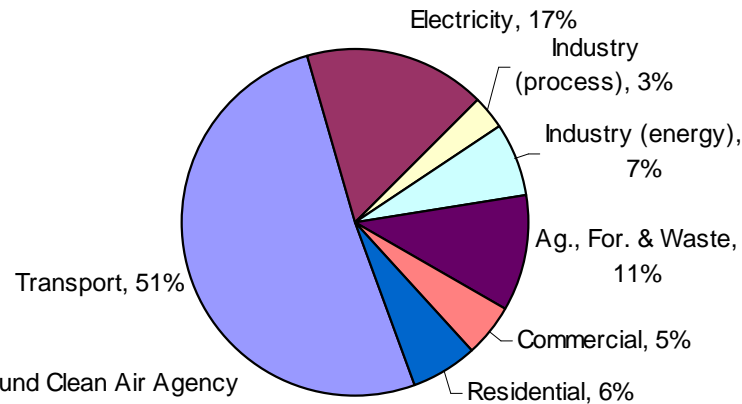
Source: Pew Center on Global Climate Change

Washington State Greenhouse Gas Emissions by Sector, 2004



Source: WA Dept. of Community, Trade and Economic Development

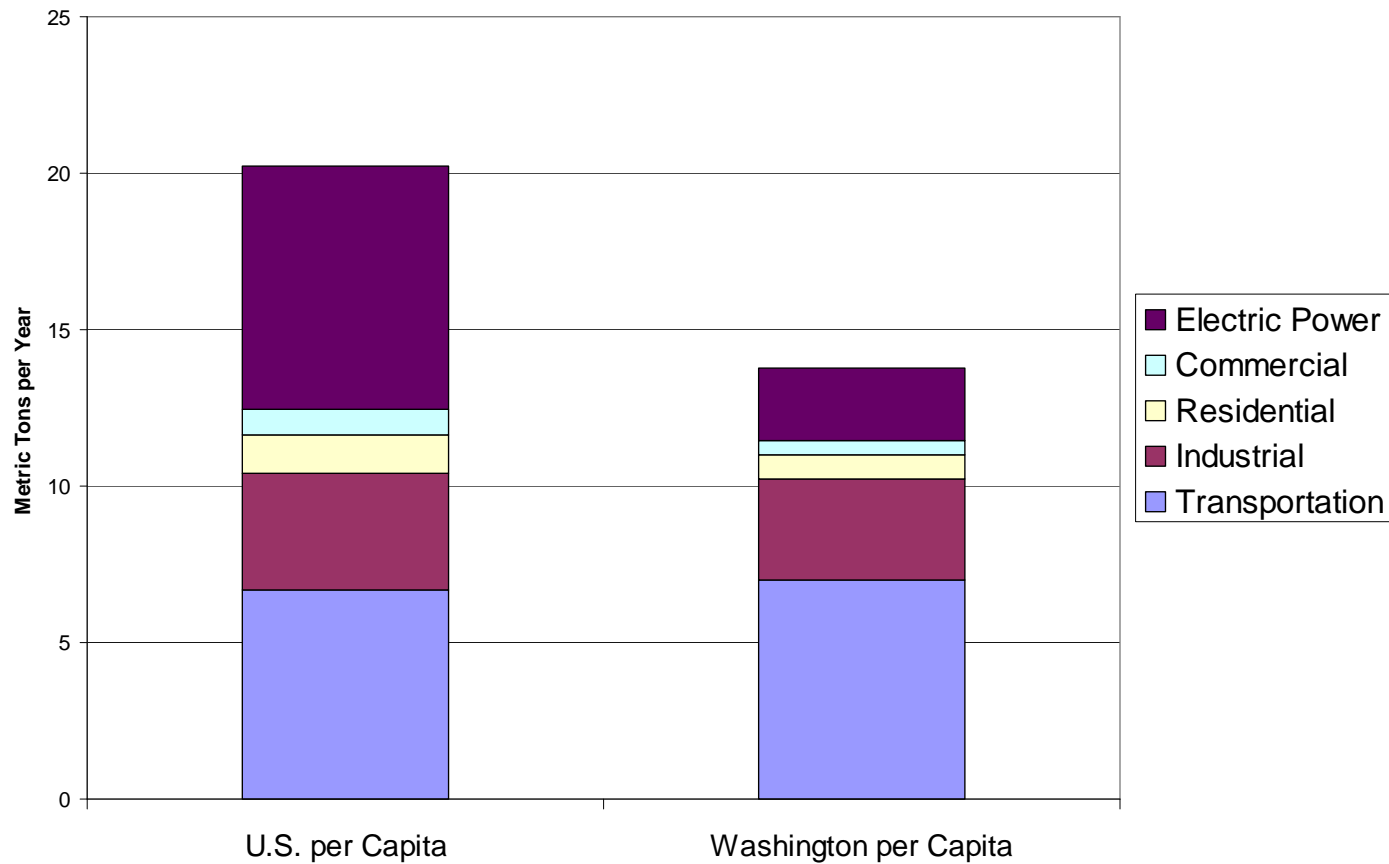
2002 Greenhouse Gas Emissions for the Puget Sound Region



Source: Puget Sound Clean Air Agency

Comparison of CO2 Emissions by Sector

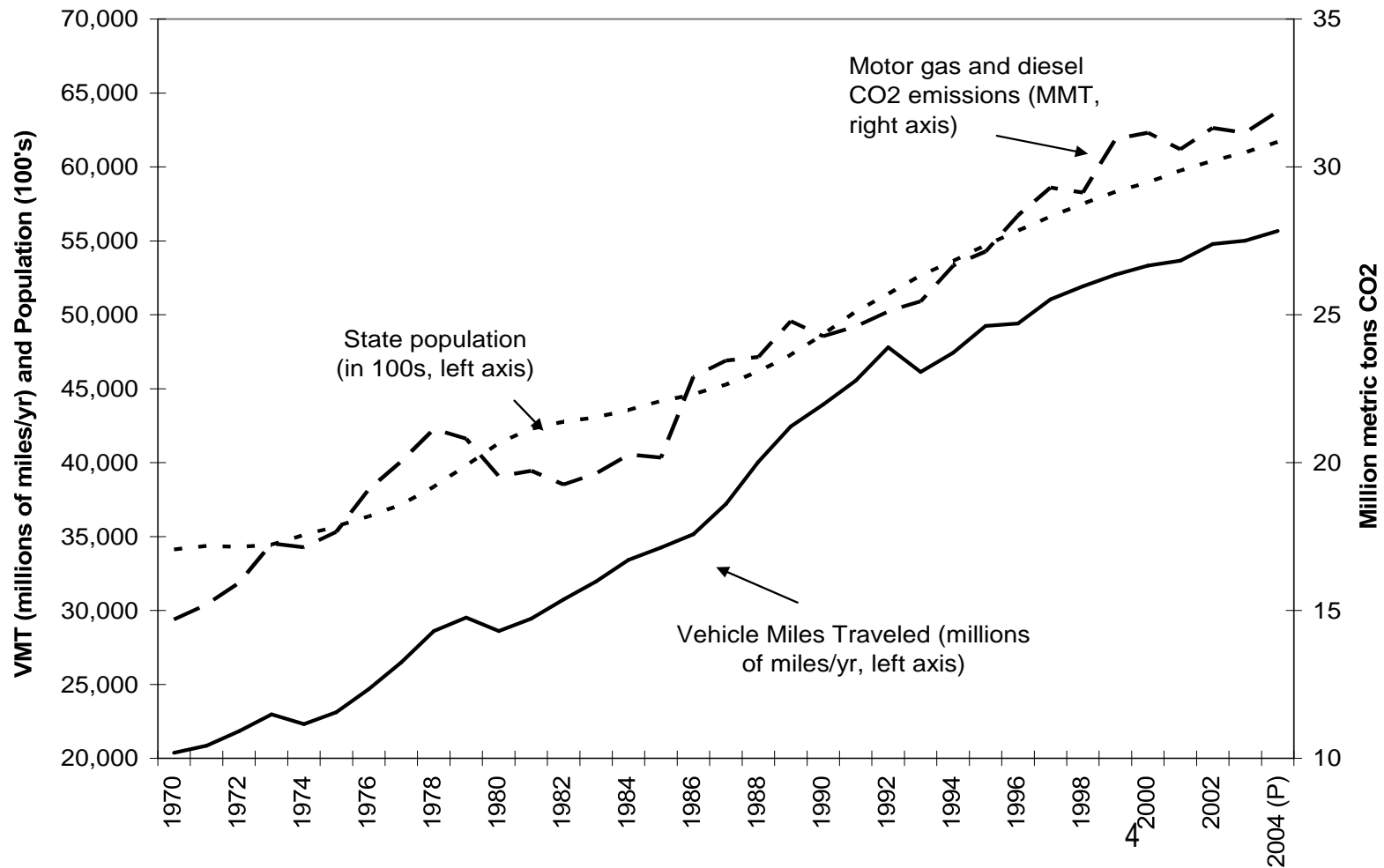
CO2 Emissions from Fossil Fuel Combustion



Source: EIA, 2007

Tracking VMT, Population, and CO2 in Washington

Vehicle Miles Traveled, Population and Transportation CO₂ Emissions for Washington State (CTED)



Climate Change Policies in Washington

- **VISION 2040**

- Environmental Framework
- Policies to reduce Greenhouse Gas Emissions, including Climate Change Action Plan



- **Transportation 2040**

- Cost of emissions by type set as criteria



- **Washington State Legislation**

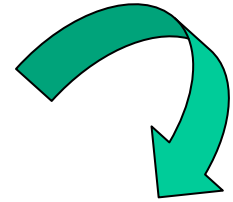
- Greenhouse Gas Emissions (GHG)
- Vehicle Miles Traveled (VMT)



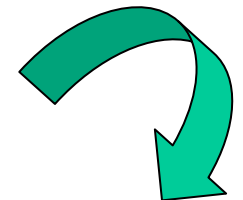
Relevant State Legislation

SB 6001 - greenhouse gas emissions (GHG) reductions:

- to 1990 levels by 2020
- to 25% below 1990 levels by 2035;
- to 50% below 1990 levels by 2050



Climate Advisory Team (CAT) proposed 45 strategies to meet goals, from five sectors (transportation, agriculture, energy, forestry, residential/ commercial/ industrial)

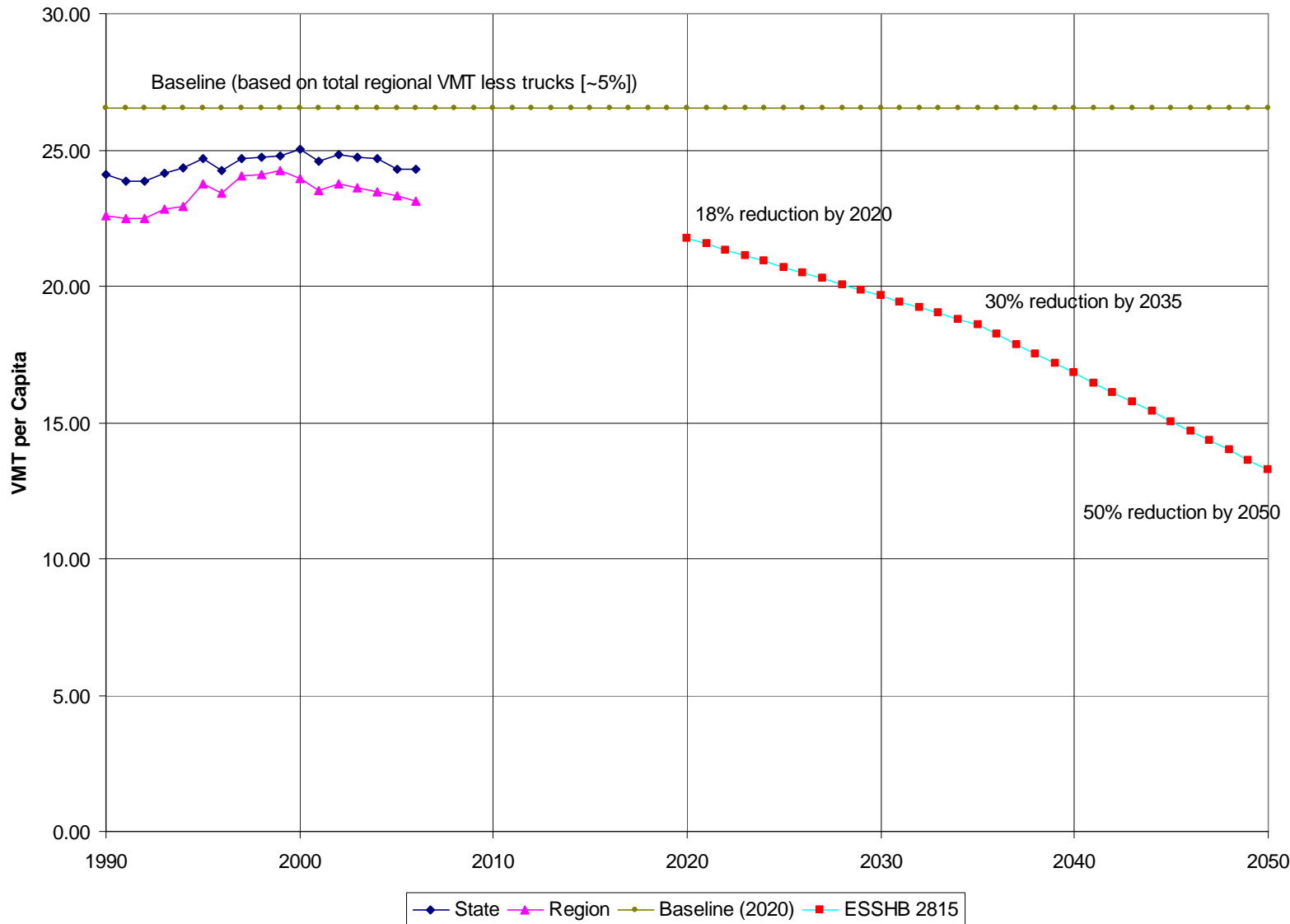


E2SHB 2815 - Climate Change Framework/Green Jobs Act

- Emissions monitoring and reporting system
- Design a regional multi-sector market-based system
- Clean energy jobs/Green Economy Jobs Growth Initiative
- **Adopt statewide vehicle miles traveled reduction benchmarks**
 - *Using a baseline of 75 billion total statewide VMT in 2020, less VMT from trucks: by 2020, decrease by 18%*
 - *By 2035, decrease by 30%*
 - *By 2050, decrease by 50%*

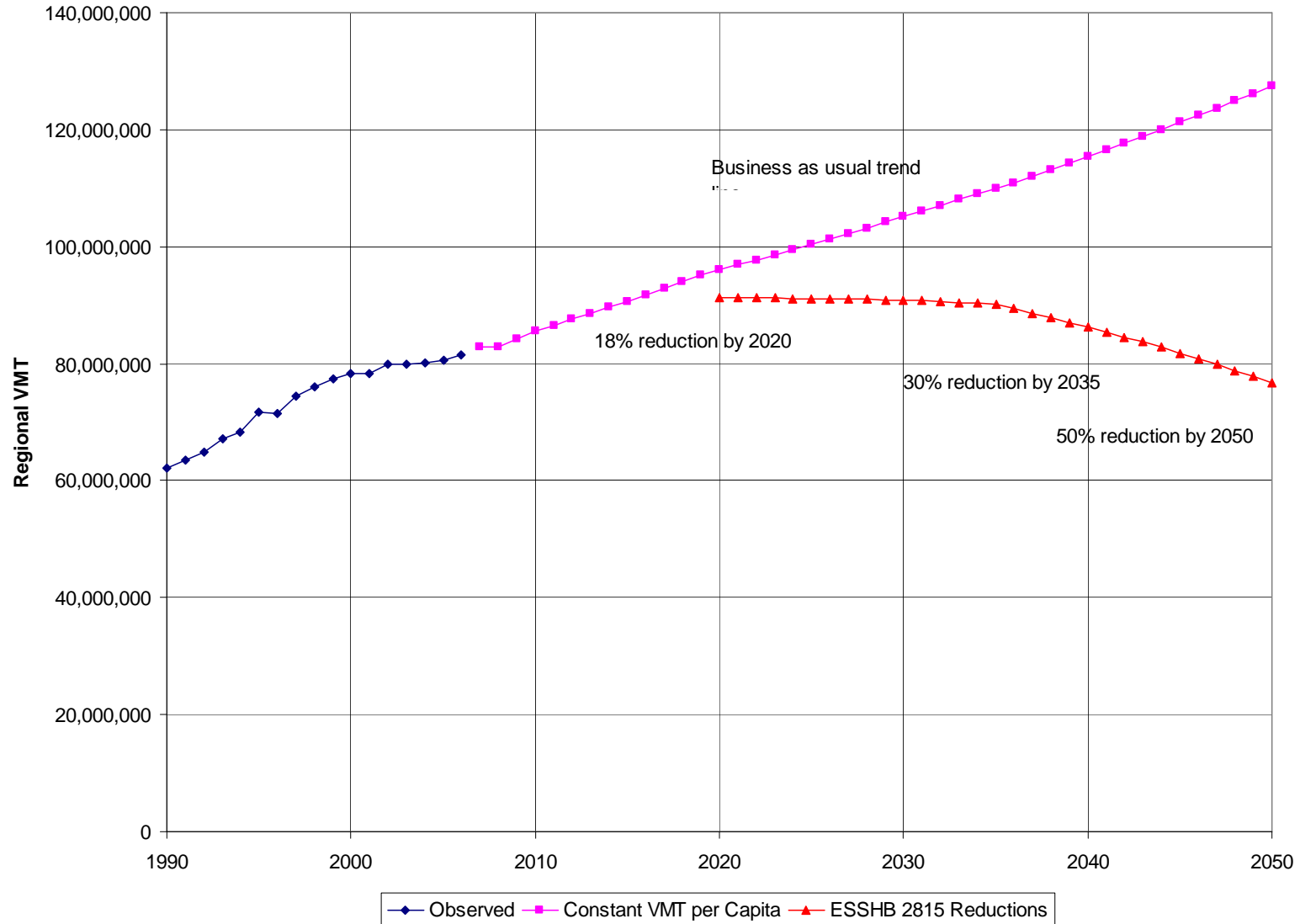
VMT per Capita Reduction Benchmarks

VMT per capita trends compared to the VMT reduction benchmarks



Total VMT Reduction Benchmarks

Forecasted VMT trends, compared to VMT reduction benchmarks



Washington State Climate Action Team (CAT)

- **High Priority Mitigation Options**

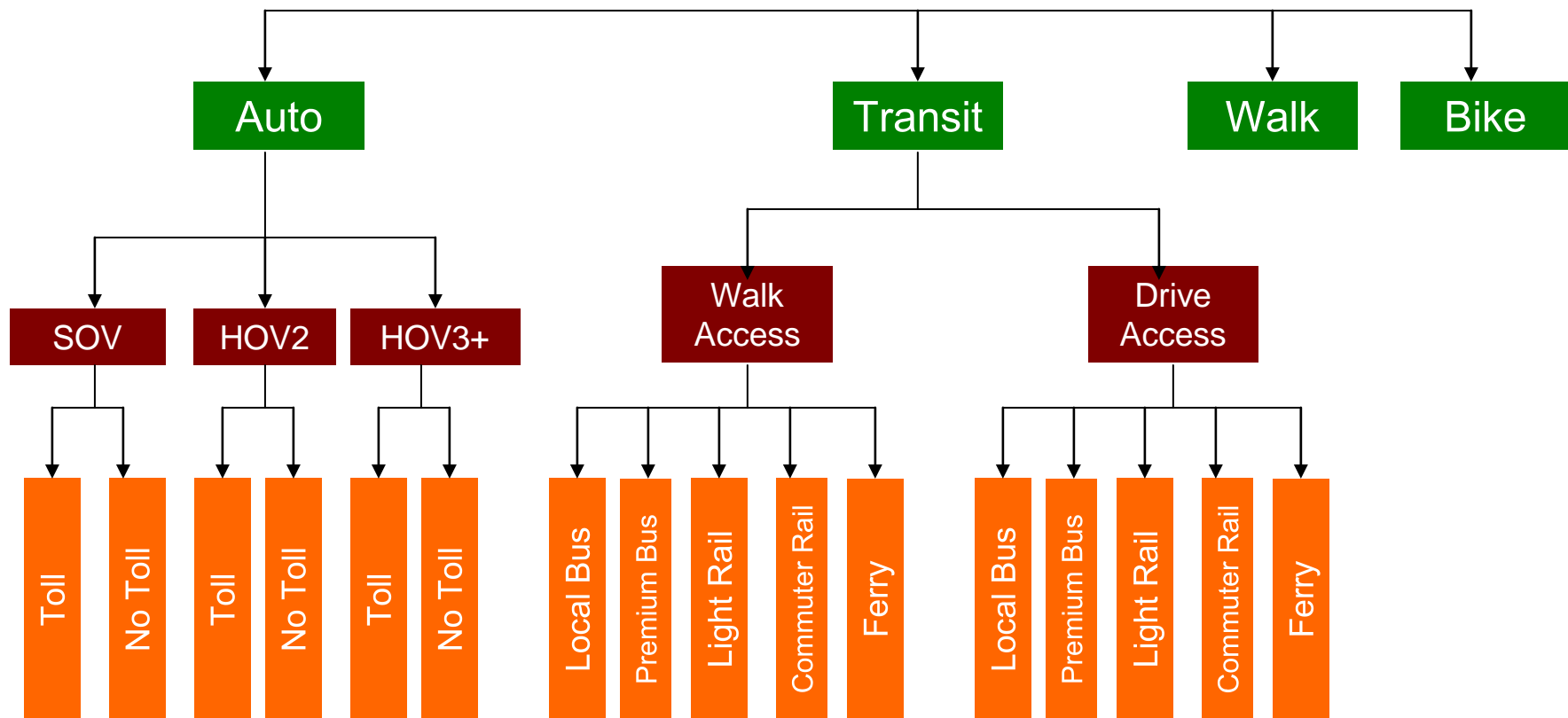
- Transit, Ridesharing, and Commuter Choice Programs
- Transportation Pricing
- Compact and Transit-Oriented Development
- Improvement to Freight Railroads and Intercity Passenger Railroads
- Local Transportation Financing Tools and Bicycle and Pedestrian Infrastructure Improvements

- **Travel Demand Forecasting Model Improvements**

- Mode Choice Models
- Trip Assignment Improvements
- Activity Generator
- Non-motorized Trip Factors
- Costs of Driving

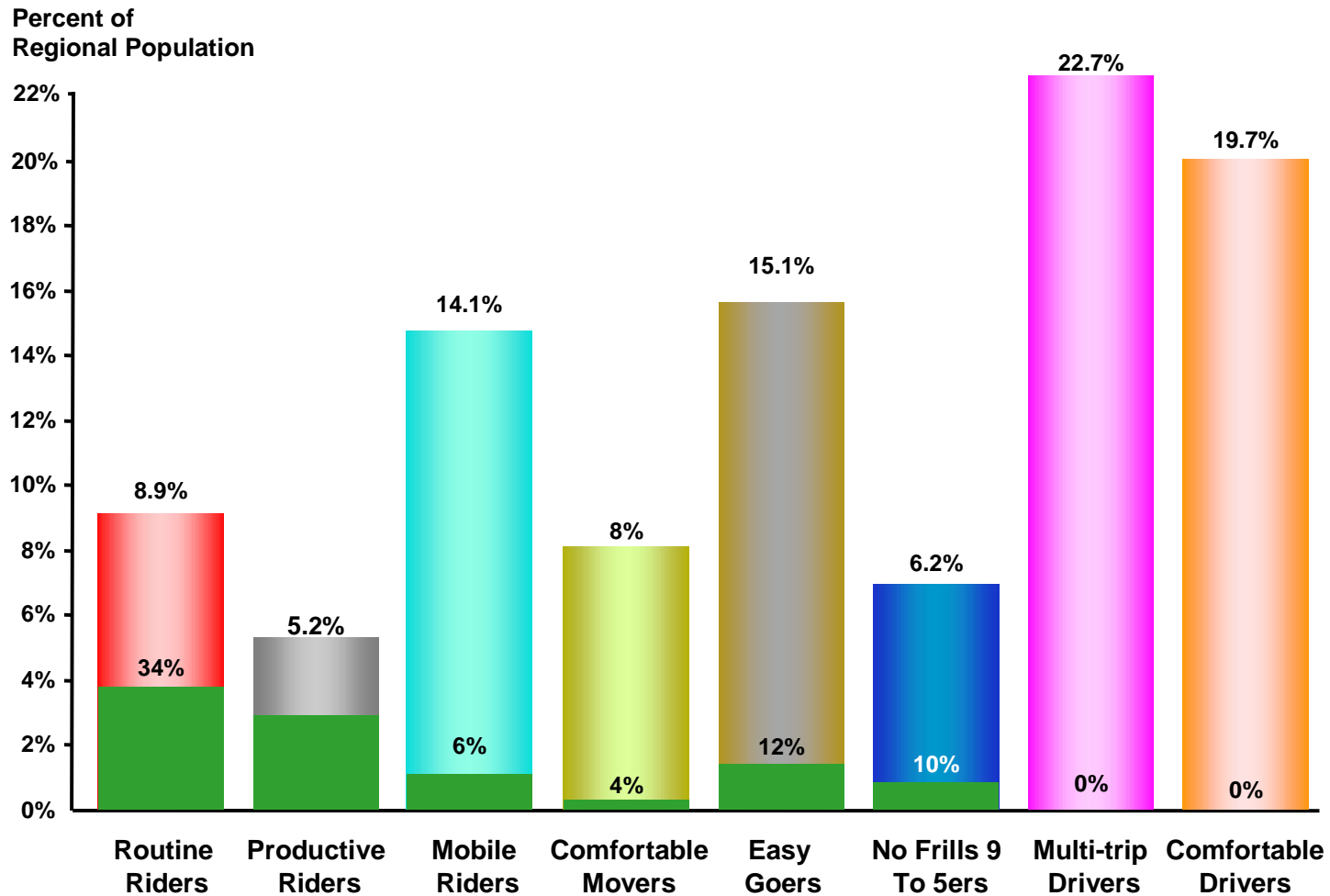
Transit, Ridesharing, and Commuter Choice Programs

Mode Choice Nested Structure



Transit, Ridesharing, and Commuter Choice Programs

- **Transit market segmentation models**



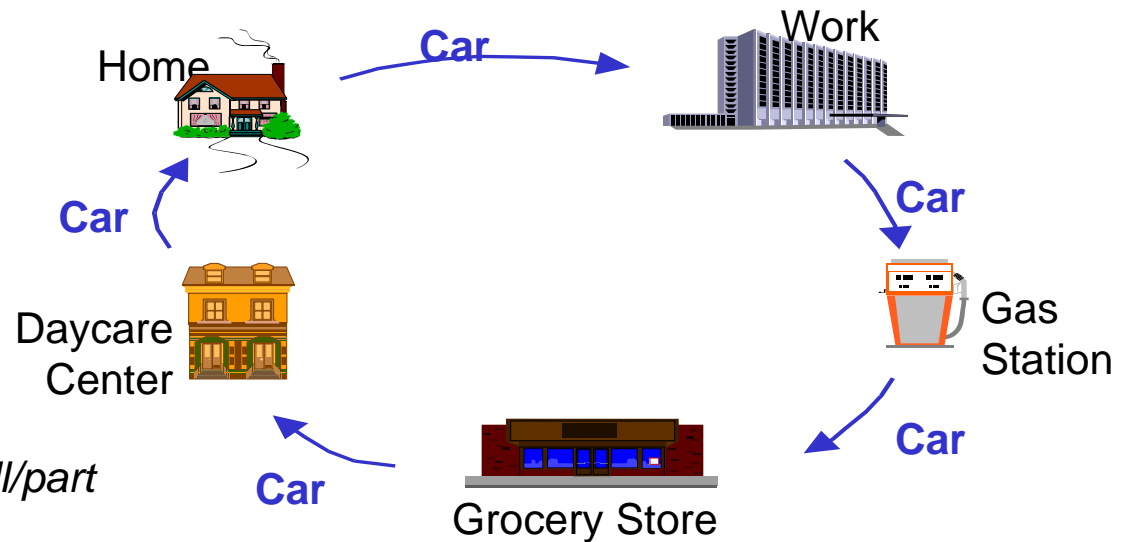
Transportation Pricing

- **Trip Assignment Improvements**
 - Improved speed validation
 - *Freeway speeds were 50 percent closer to observed*
 - Added reliability measure
 - *Developed from WSDOT loop detector data on freeways*
 - Modified value of time
 - *Developed from Traffic Choices observed data by purpose and income*
- **Costs of Driving**
 - Test sensitivity of models to changes in parking cost
 - Test sensitivity of models to changes in gas prices

Transportation Pricing

- **Activity Generation Models**

- Added sensitivity
 - *Person Type*
 - *Age*
 - *Presence of Children*
 - *Household Composition (full/part time worker(s) with/without children)*
 - *Income and Vehicle Availability*
 - *Urban Form (mixed use, parks, retail)*
 - *Level of Service and Pricing*

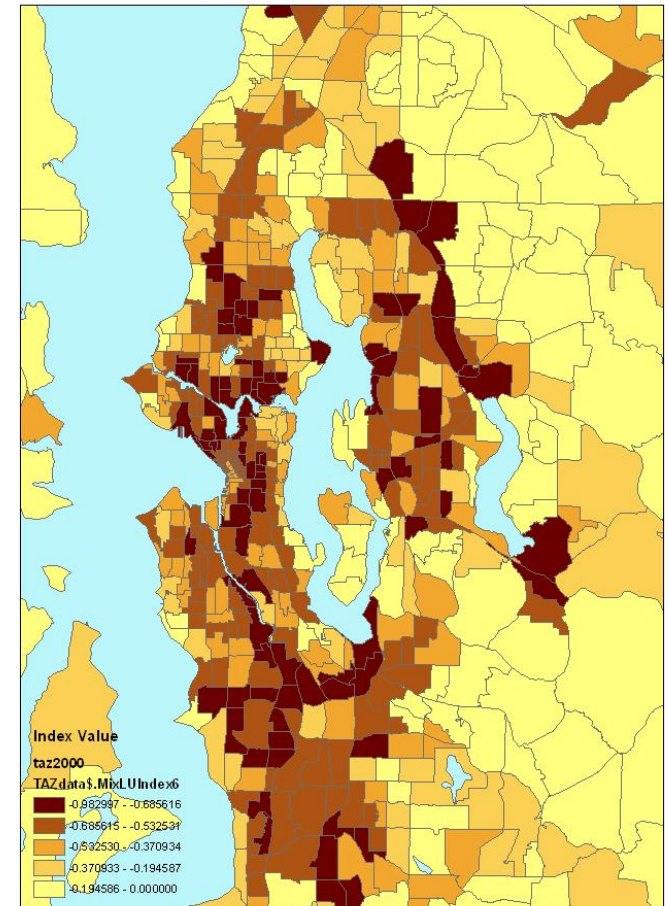


- Recognizes effects of trip chaining

Compact and Transit-Oriented Development

- **Integrated, parcel-based land use and travel models**
 - Short-term integration of Urbansim and Activity Generator
 - Long-term integration of Urbansim and Full Activity Model
- **Include urban form variables in mode choice models**
 - Street connectivity
 - Mixed land use
 - Presence of non-motorized facilities
 - Retail floor area ratios

Test 2b Mixed Land Use 6 Walkable



Improvement to Freight Railroads and Intercity Passenger Railroads

- **Short Term**

- Separate commuter rail, light rail, ferry and bus modes in mode choice models

- **Medium Term**

- Include counties north and south of Puget Sound to represent commuter rail services

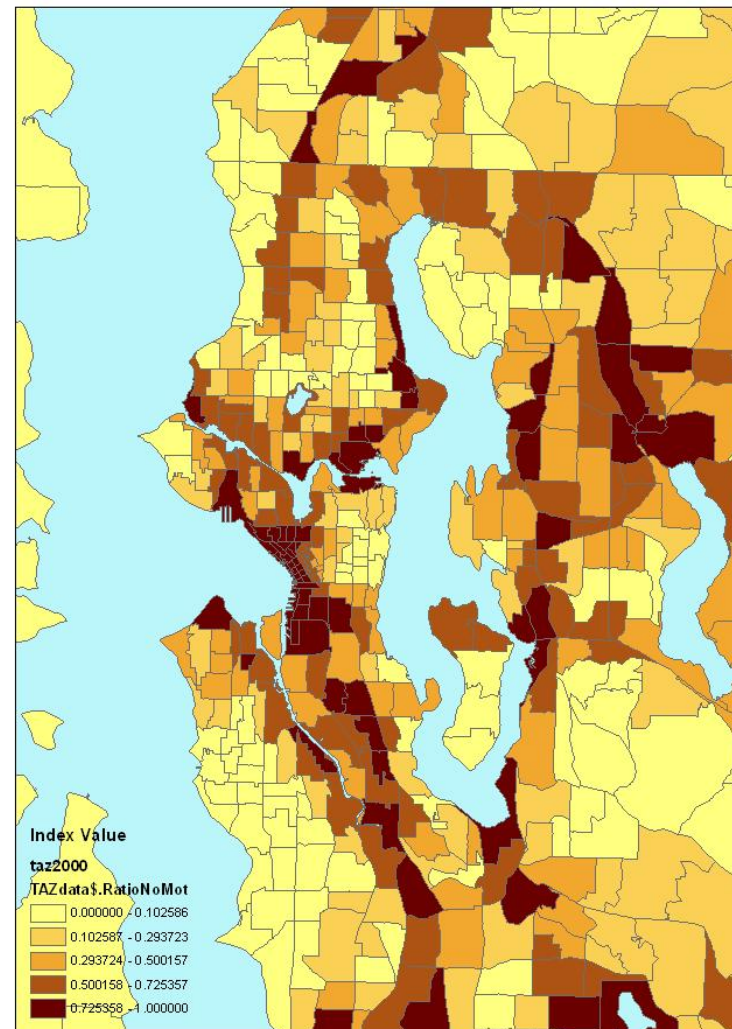
- **Long Term**

- Add mode choice component to freight/truck models

Local Transportation Financing Tools and Bicycle and Pedestrian Infrastructure

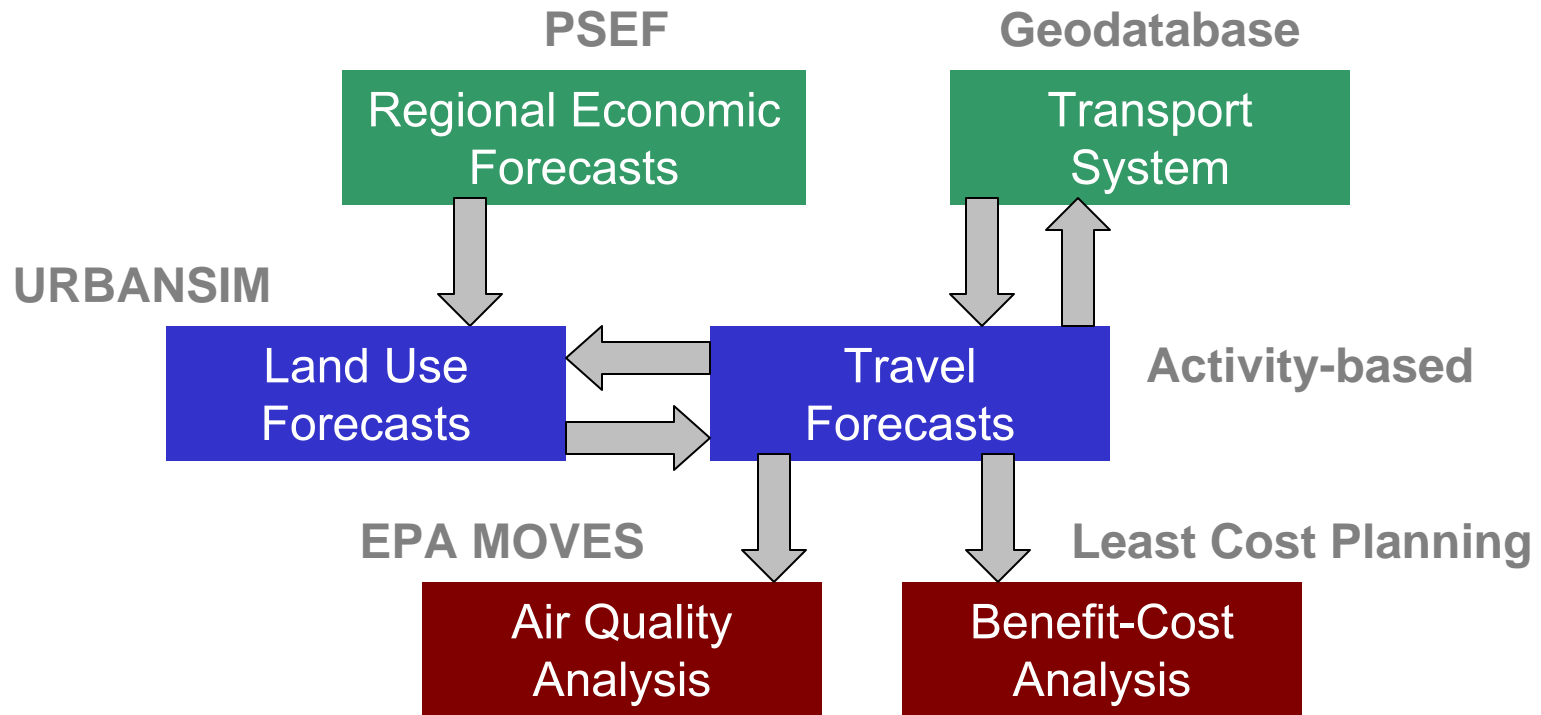
- **Direct representation of walk and bike facilities**
- **Urban form variables in mode choice models**

Test 4 Non-motorized Walkable



Integrated Modeling System

Simulating persons and vehicles at a parcel level



Activity-based Travel Models

- **Short Term**

- Activity generator models
- Model design

- **Medium Term**

- Develop detailed zone and networks from geodatabase
- Remaining development of destination, mode and time of day models
- Calibration and validation

- **Long Term**

- Dynamic traffic assignments
- Simulations of vehicles

Air Quality Analysis

Emissions Modeling - EPA MOVES

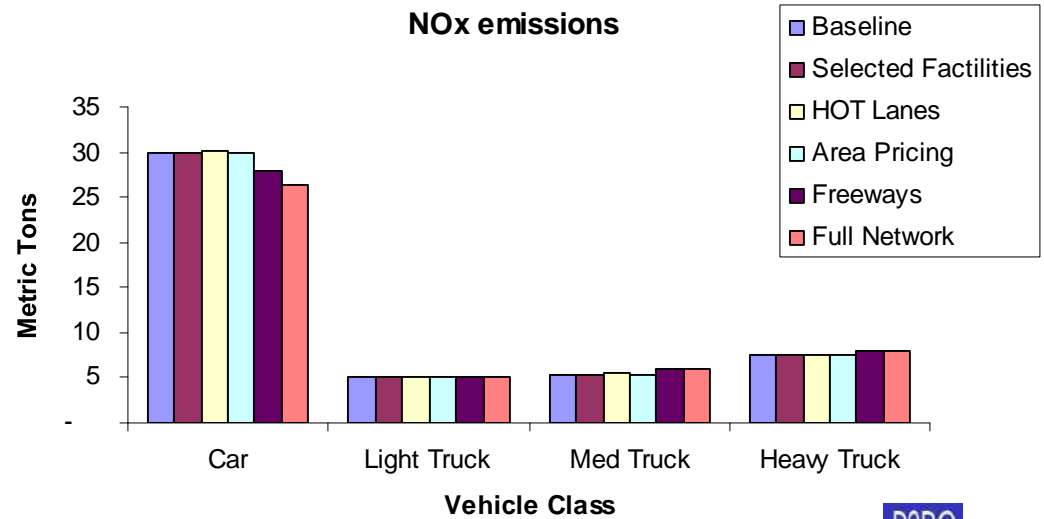
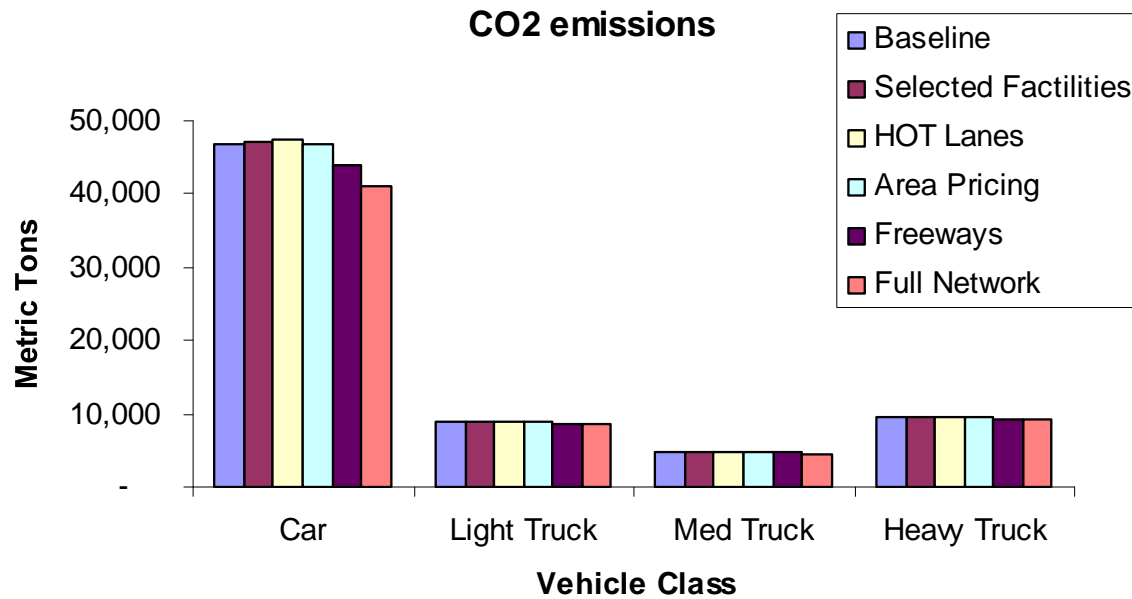
- Analyze speed variations, changes in vehicle/fuel mix, corridor/subarea analyses, analysis of transportation and land use strategies (e.g. pricing)
- PSRC, regional partners working with EPA on testing emissions model improvements

Climate Change

- Transportation 2040 will consider and address the impacts of climate change
- PSRC working with FHWA on travel model improvements to provide sensitivities for climate change

Impacts of Tolling on Emissions

CO₂ and NO_x examples



Summary

- **Short-term model improvements can begin addressing climate change**
 - Focus on trip generation, costs, and mode choice
 - Integrated land use and travel models are critical
- **Long-term model improvements are necessary to improve accuracy of results**
 - Activity-based models simulating all persons will show choices of individuals
 - Dynamic traffic assignment and simulation of vehicles will show the cumulative impact of each vehicle