



# Plug-In Hybrid Electric Vehicle Panel



Richard Watts, Senior Research Analyst,  
University Transportation Center

Steve Letendre, Associate Professor,  
Green Mountain College

Michael Cross, Electric Engineering,  
College of Engineering and Math Sciences

Bruce Bentley, Director of Planning,  
Central Vermont Public Service Corporation





# PHEV Panel Discussion

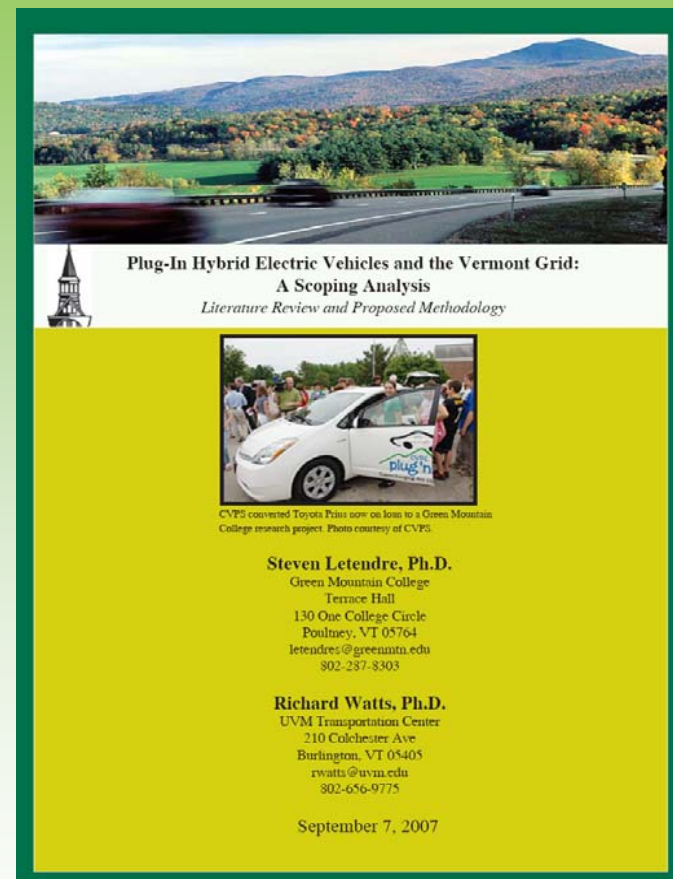
## Panel Discussion

- Fuel Costs
- Electric Grid Impacts
- CO2 Emissions
- The Future of PHEVs in Vermont

Your Questions and Comments

# PHEV Vermont Scoping Study Phase I

- How many PHEVs could the Vermont electric power system charge?
- What is the MPG equivalent cost of displacing gasoline with electricity?
- What are the net regional emissions impacts from the introduction of PHEVs in Vermont?



# Research Partners



Vermont Department of Public Service



UVM TRANSPORTATION CENTER  
*Transportation Research, Education and Innovation for Vermont and Beyond*

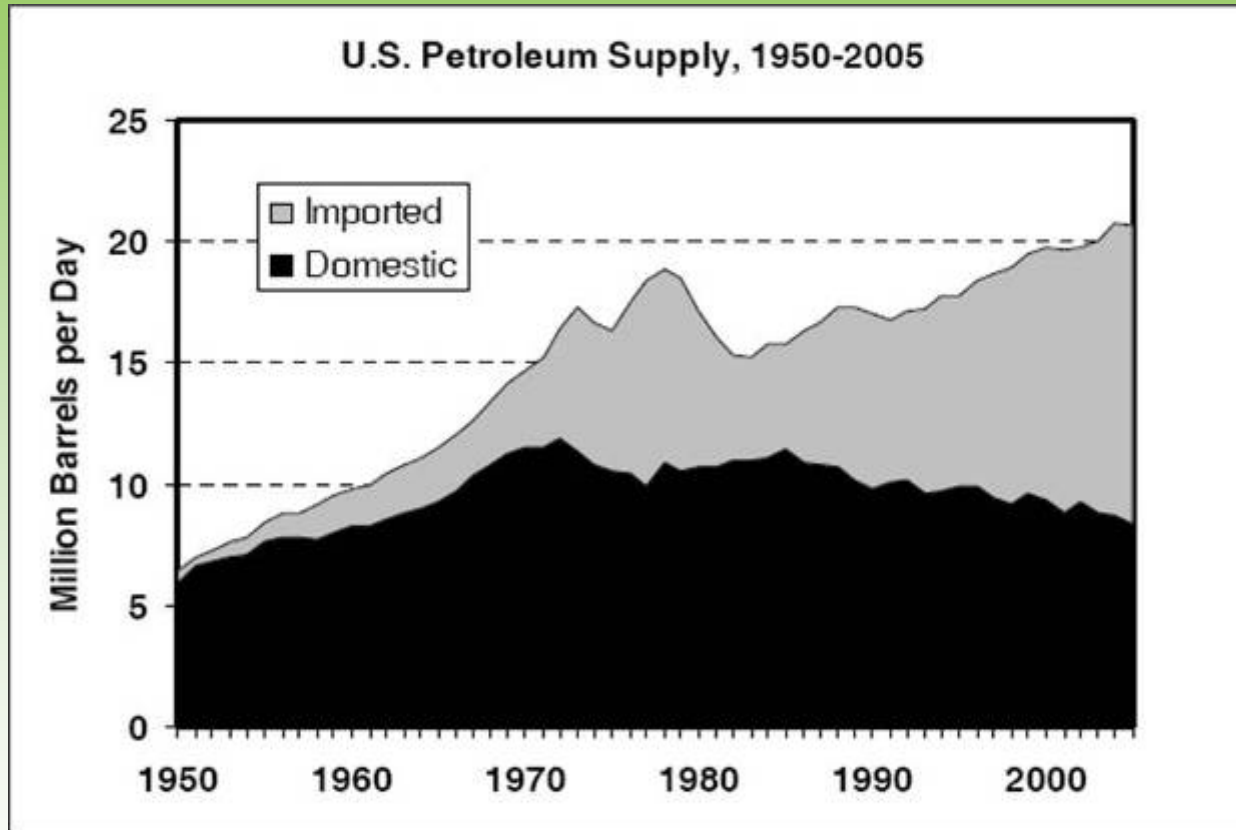


# Why PHEVs?

- Oil Dependence
- Vehicle Carbon Emissions



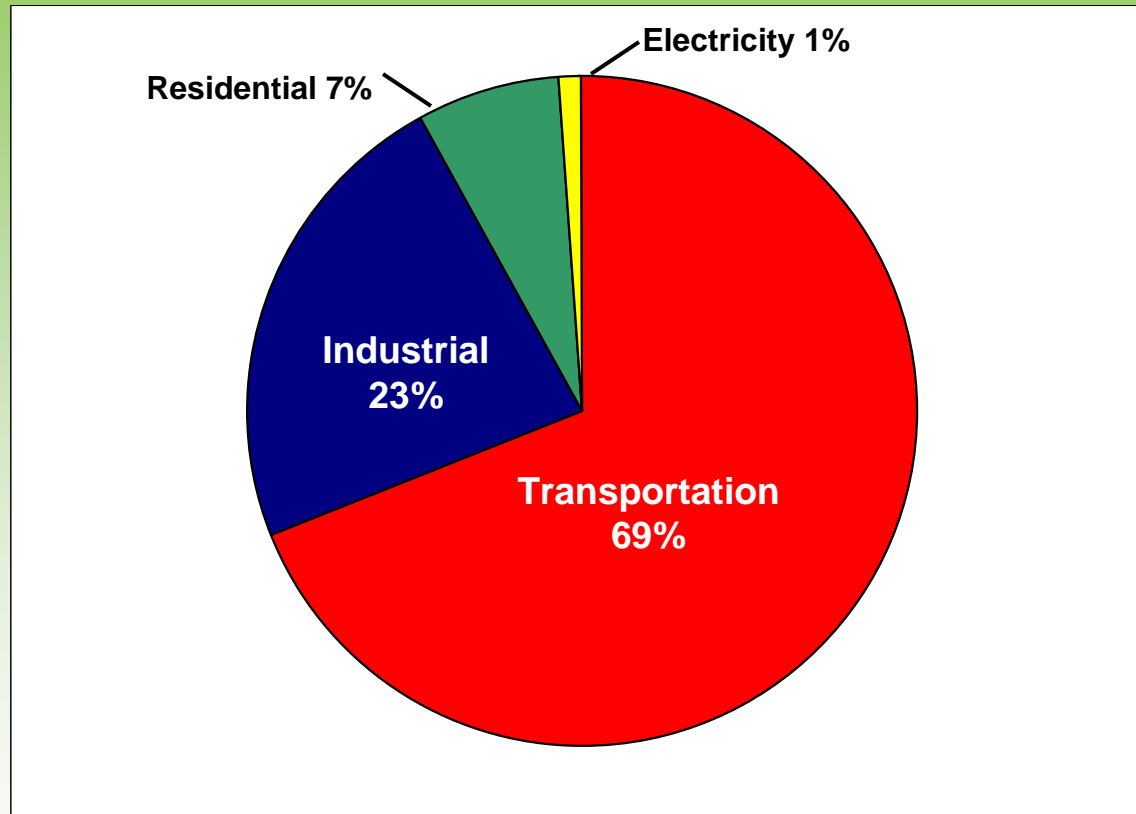
# US Petroleum Supply



Source: Greene, Leiby, Patterson, Plotkin and Singh, 2007



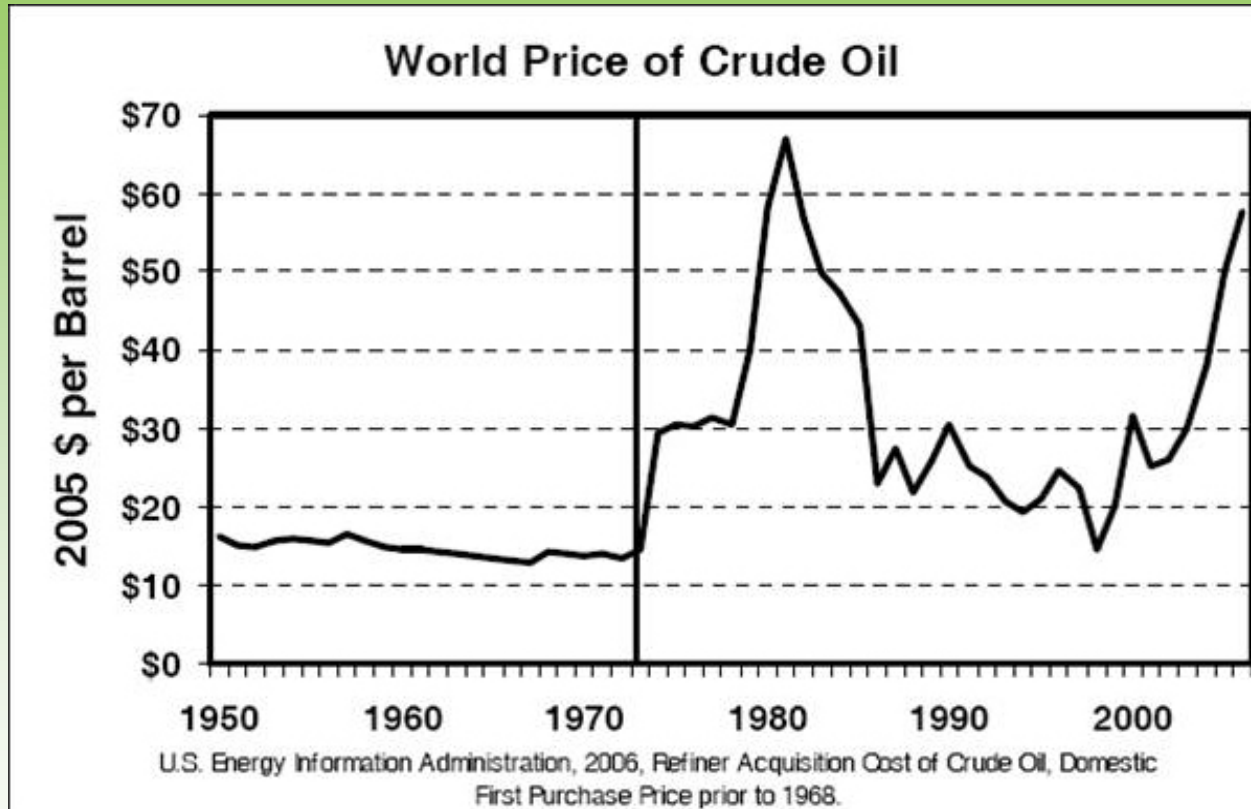
# U.S. Oil Use By Sector



Source: Energy Information Administration, *Annual Energy Outlook 2005*  
Data are for 2005



# World Price of Crude Oil



Source: Greene, Leiby, Patterson, Plotkin and Singh, 2007

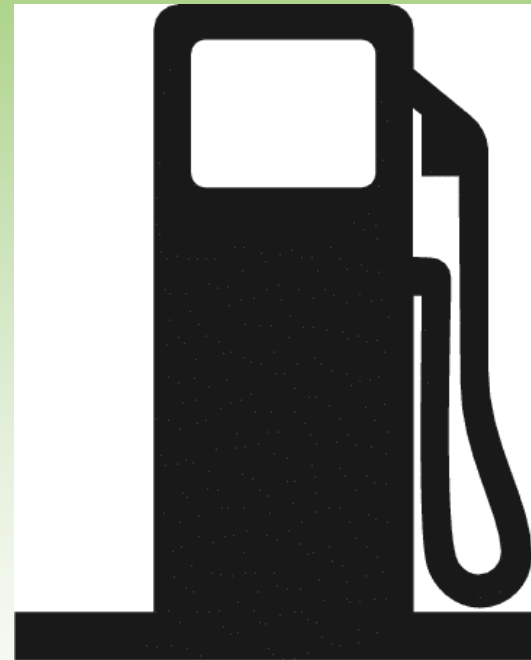


# Cost of Oil and Gasoline Today

\$89.62

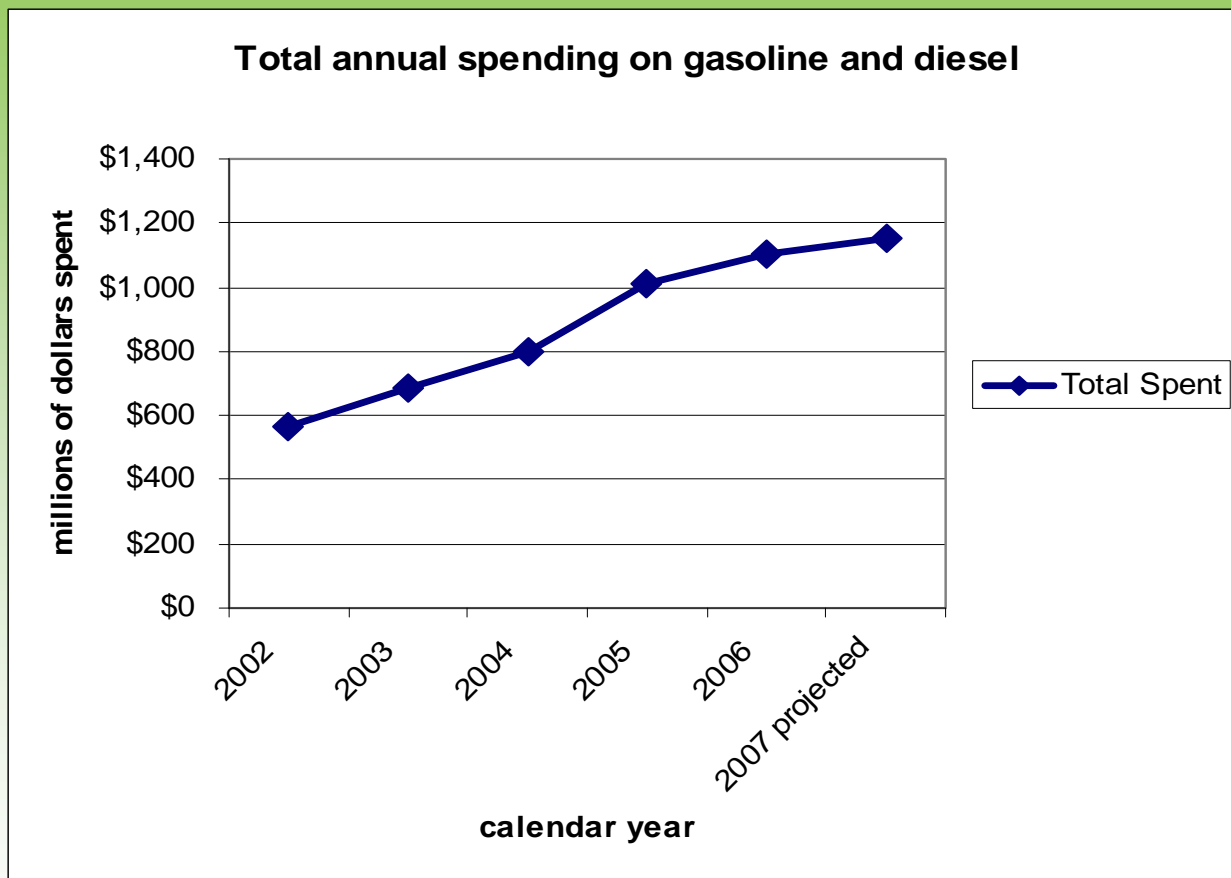


\$3.02



Gasoline avg. price November, DPS Fuel Price Report, Oil Bloomberg Dec 10, NYMEX crude oil future.

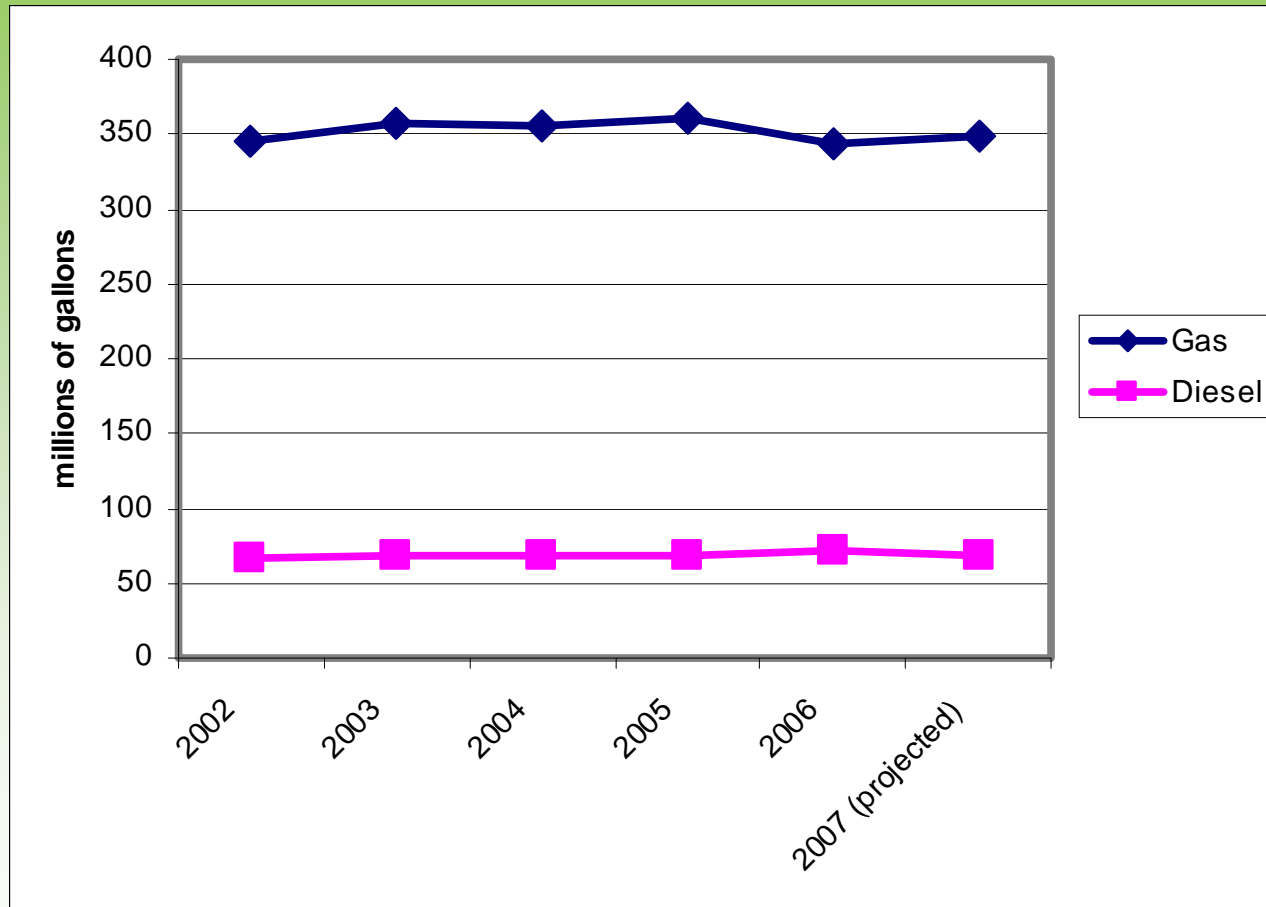
# Vermont Spending Doubled in Five Years



\*Petroleum sales times average cost per gallon

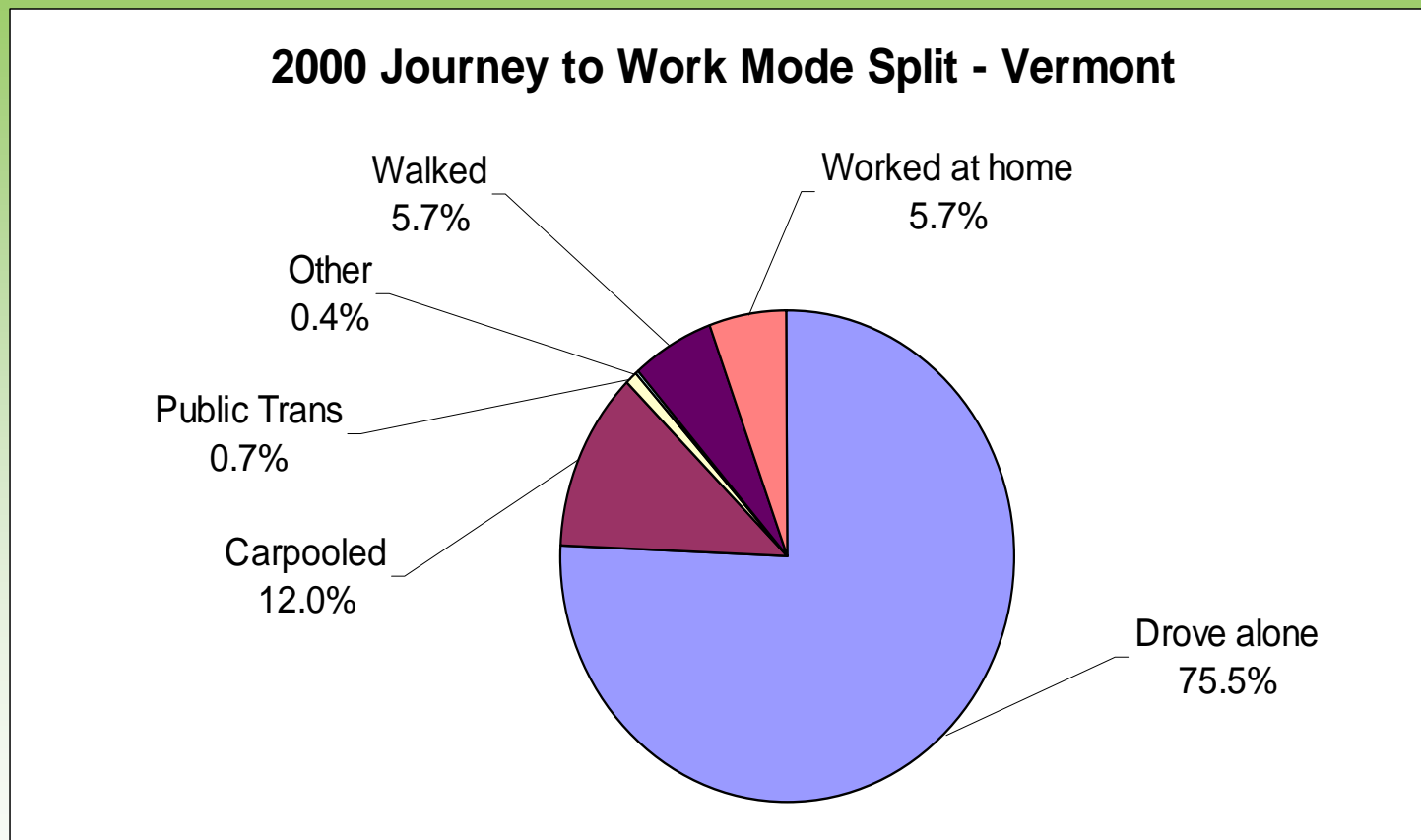


# Vermont Gas & Diesel Sales Flat





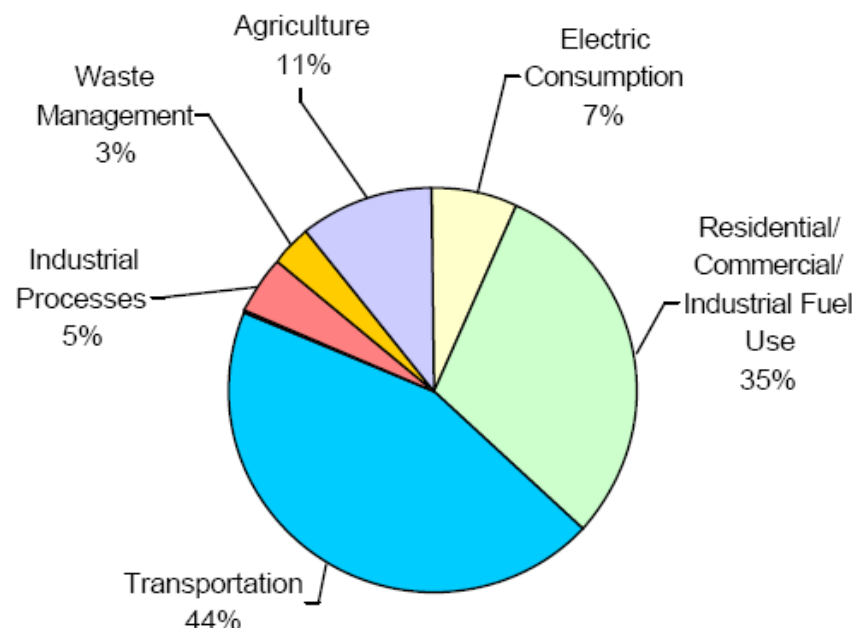
# Vermonters Are Dependent on Vehicles



Source: Center for Rural Studies, US Census, RSG Systems LRTBP

# Transportation Largest Contributor to Vermont's GHG Emissions

**Figure 3.3 Vermont Greenhouse Gas Emissions by Sector 2005:  
Percent of Total Emissions**

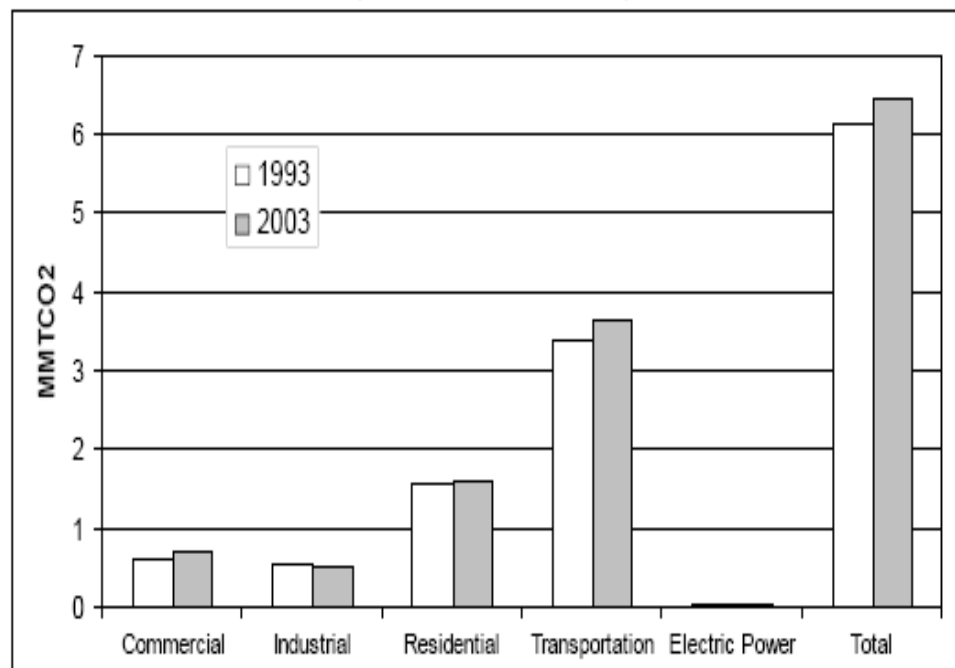


Source: DPS Utility Facts, 2006, updated August 2007



# Vermont Electric Industry Emissions are Low

Figure 1  
Vermont CO<sub>2</sub> Emissions by Sector: 1993 vs. 2003  
(Million Metric Tons)



Source: US DOE Energy Information Administration

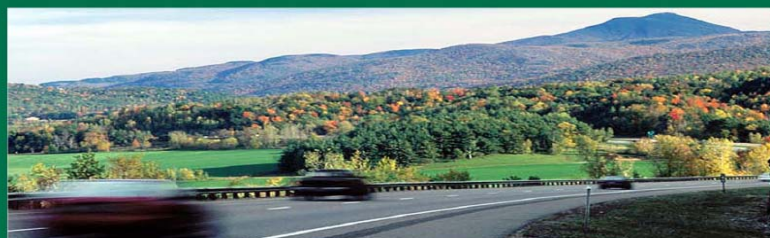


# Public Policy Measures Related to PHEVs

- Governor Douglas Climate Action Plan
- Regional Greenhouse Gas Initiative
- California CO2 regulations
- Federal income tax incentives
- Electric infrastructure rate designs



# PHEV Vermont Scoping Study Phase I



## Plug-In Hybrid Electric Vehicles and the Vermont Grid: A Scoping Analysis

*Literature Review and Proposed Methodology*



CVPS converted Toyota Prius now on loan to a Green Mountain College research project. Photo courtesy of CVPS.

### Steven Letendre, Ph.D.

Green Mountain College  
Terrace Hall  
130 One College Circle  
Poultney, VT 05764  
letendre@greenmtc.edu  
802-287-3303

### Richard Watts, Ph.D.

UVM Transportation Center  
210 Colchester Ave  
Burlington, VT 05405  
rwatts@uvm.edu  
802-656-9775

September 7, 2007

- How many PHEVs could the Vermont electric power system charge?
- What is the MPG equivalent cost of displacing gasoline with electricity?
- What are the net regional emissions impacts from the introduction of PHEVs in Vermont?

# Panel Discussion

- Steve Letendre, Associate Professor, Green Mountain College
- Michael Cross, Electric Engineering, College of Engineering and Math Sciences
- Bruce Bentley, Director of Planning, Central Vermont Public Service Corporation