Transportation Efficiency in Vermont

Clean Cities
April 14, 2009

Richard Watts, Director of Research
Transportation Research Center

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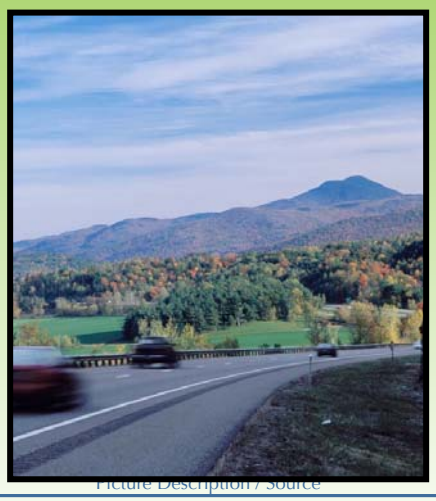
Transportation Research, Education and Innovation for Vermont and Beyond

University of Vermont Transportation Research Center

- Founded in Fall 2006 (SAFETEA LU)
- One of 10 National Transportation Centers
- Theme: Sustainable Systems and Advanced Technologies for Northern Communities
- Multi-disciplinary
- Service to Vermont



Picture Description / Source

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Research, Students & Programs

- Research Funding
- Transportation Scholars

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Clean Cities Mission

"…advance the economic, environmental and energy security of the U.S. *by supporting local decisions to adopt practices that contribute to reduced petroleum consumption in the transportation sector…*"

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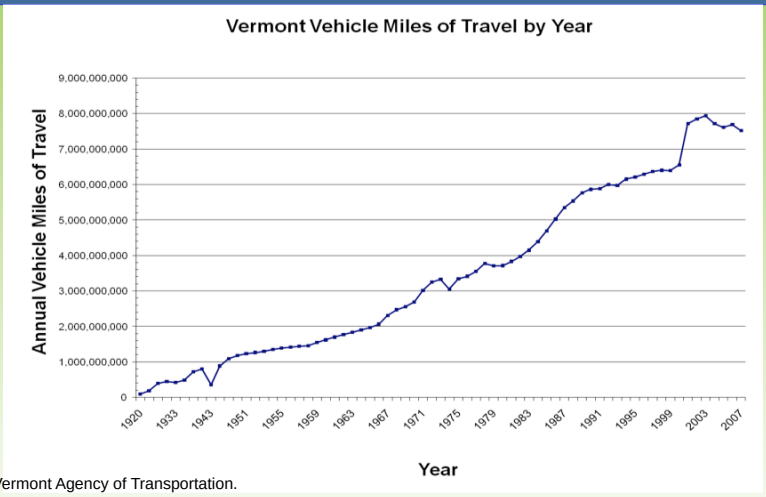
TRC Signature Focus Areas

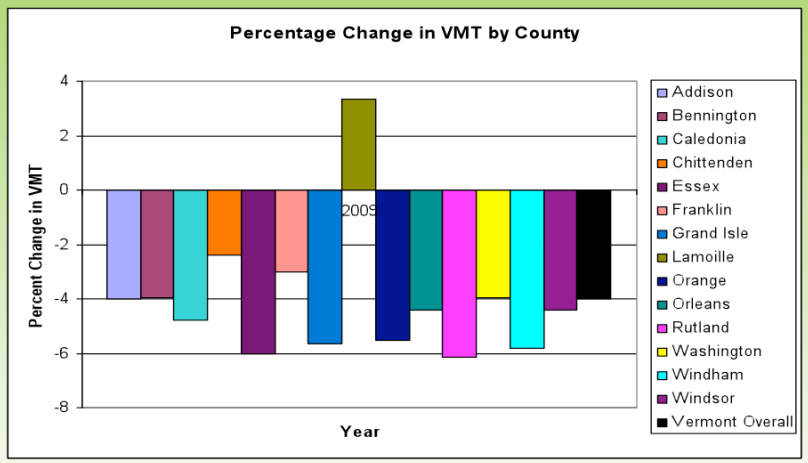
- Land Use & Transportation
- Tailpipe Emissions
- Tourism Travel
- Mobility & Seasonality (walking, biking, rural access)
- Transportation System Efficiency
- Data Collection

Vermont Vehicle Miles Traveled



Source: Vermont Agency of Transportation.

2008-2009 VMT Declines By County



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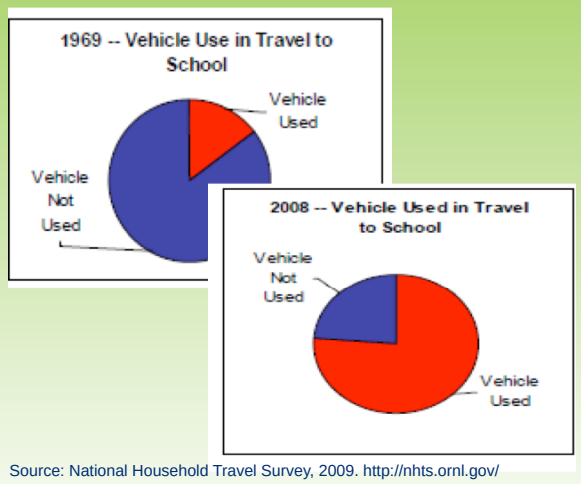
Driving Kids to School Increases



Source: National Household Travel Survey, 2009. http://nhts.ornl.gov/

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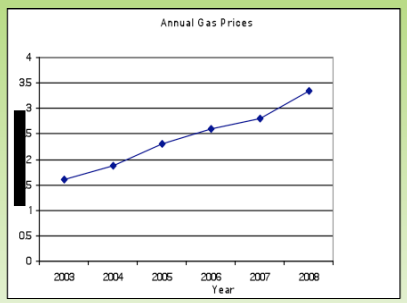
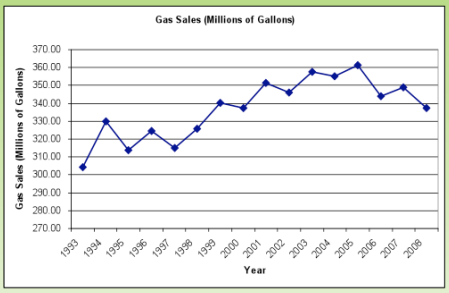
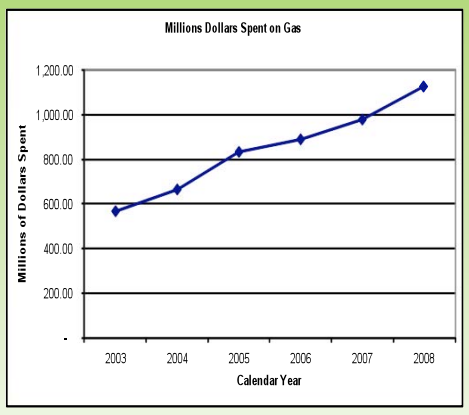
Driving Less: Spending More





Vermont Energy Report, 2009

Costs to Consumers Increases

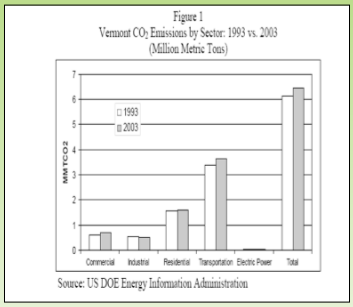


Source: Joint Fiscal Office, Vermont Legislature

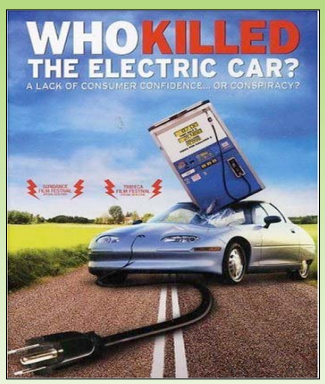
Reduce Petroleum Use

- 1. Vehicle Efficiency (CAFÉ standards, vehicle purchases trends)
- 2. Switch Vehicle Fuels
- 3. Increase Transportation System Efficiency (reducing vehicle miles traveled, switch modes, increase vehicle occupancy rates, driving behavior, etc.)

Plug in Hybrid Electric Vehicles

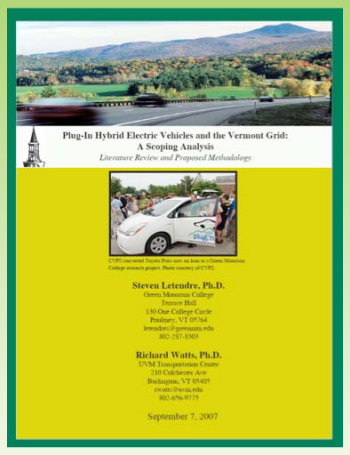


Electric Cars in Vermont



Phase 1 PHEV Vermont Study

- How many PHEVs could the Vermont electric power system charge assuming three plausible consumer charging patterns?
- What is the MPG equivalent cost of displacing gasoline with electricity?
- How much gasoline could be displaced annually from three different PHEV penetration scenarios?
- What are the net regional emissions impacts from the introduction of PHEVs in Vermont?



PHEV Technical Specifications

TABLE 3 PHEV 20 Technical Specifications for Vermont Study

Nominal Battery Pack Size (kWh)	7.5
Usable Energy in Battery Pack (kWh)	6
Round Trip Battery Efficiency (%)	85
Charger Efficiency (%)	82
Charge Rate (kW)	1.4
Time for Full Charge (hours)	6
Purchased Electricity per Charge (kWh)	8.4
Electric Efficiency (miles / kWh)	3.49
All Electric Range (miles)	20

Best Case Load Impacts

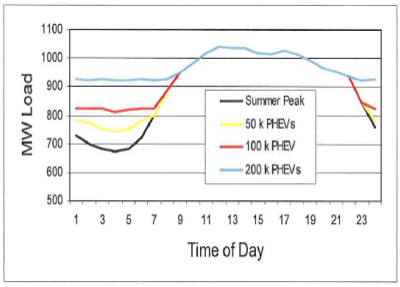


FIGURE 7 Summer Peak PHEV Load Impacts: Optimal Nighttime Charging

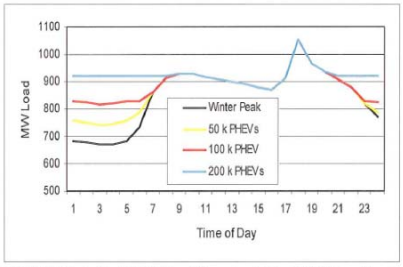


FIGURE 8 Winter Peak PHEV Load Impacts: Optimal Nighttime Charging

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Transportation System Efficiency

- SmartGrowth Study in two Maine towns
- Efficient driving behavior (with VEIC)
- Social Networks
- Town-based Efficiency (Hinesburg)

Smart Growth in Lisbon, Maine

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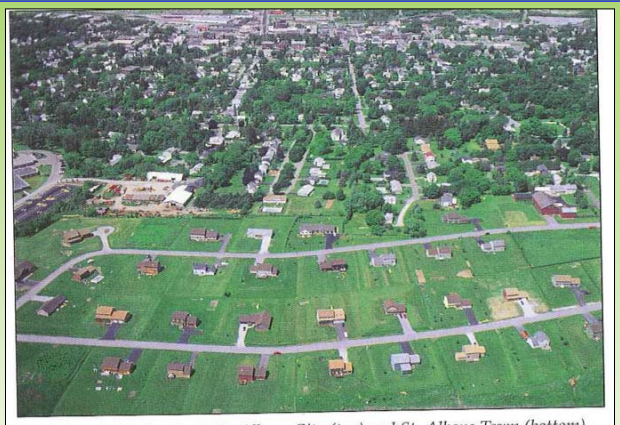
Source: Above and Beyond, Julie Campoli, Elizabeth Humstone, Alex Mac
2002. American Planning Association. Used with permission of the author.

3.17 Historic Richford Village with vacant industrial buildings in the center along the river.

Revitalize Existing Buildings

Concentrate Growth



7.10 The neighborhoods of St. Albans City (top) and St. Albans Town (bottom).

Source: Above and Beyond, Julie Campoli, Elizabeth Humstone, Alex Maclean. 2002. American Planning Association. Used with permission of the author.

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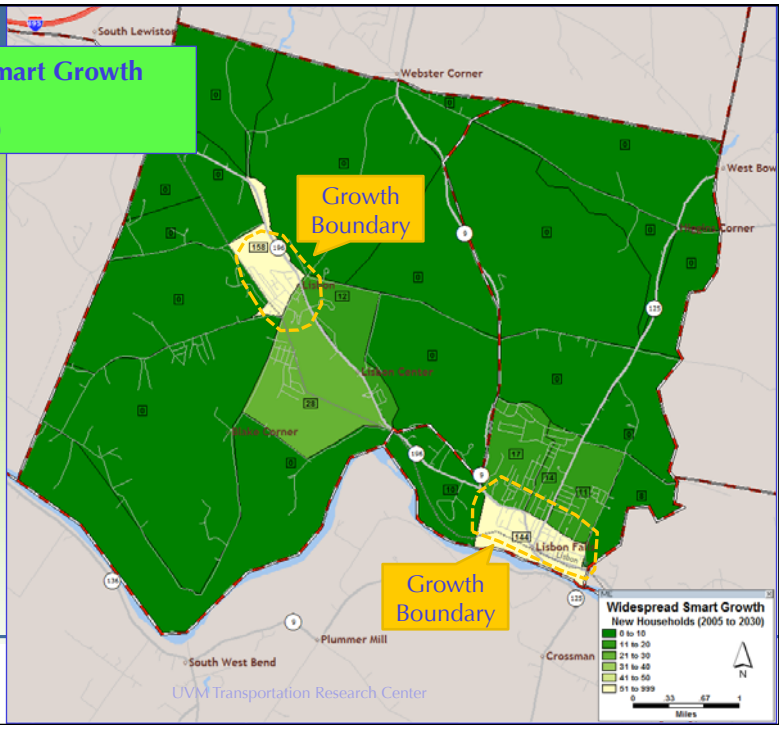
Widespread Smart Growth Households (2005 to 2030)



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Once Vibrant Transit Systems

Burning the last street car in downtown Burlington, Main St. Aug 4, 1929, Courtesy of Special Collections, Bailey Howe Library

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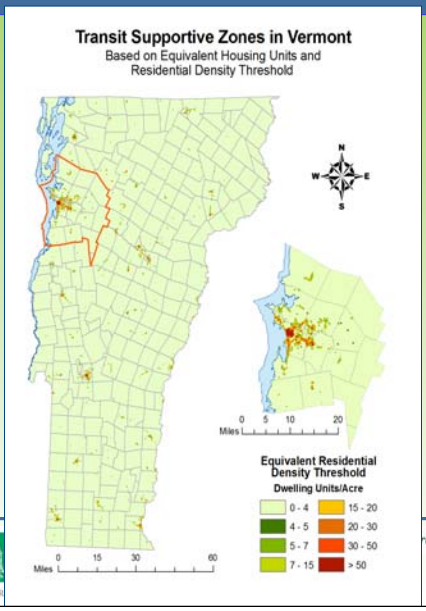
Transit Viability Index



walkscore.com

Social Networking

Hinesburg Rides – Town-Based Efficiency Programs

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The Future?

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