



Vermont's Energy Challenge

Public Energy Forum

Liz Miller, Commissioner

Department of Public Service

Comprehensive Energy Plan: What is it?

- Title 30, Section 202b – the CEP must include:
 - (1) A **comprehensive analysis and projections** regarding the **use, cost, supply and environmental effects** of **all forms of energy resources** used within Vermont.
 - (2) **Recommendations** for state implementation actions, regulation, legislation, and other public and private action to carry out the comprehensive energy plan.
- Title 30, Section 202 – Also our updated Electric Plan

Why do we create a CEP?

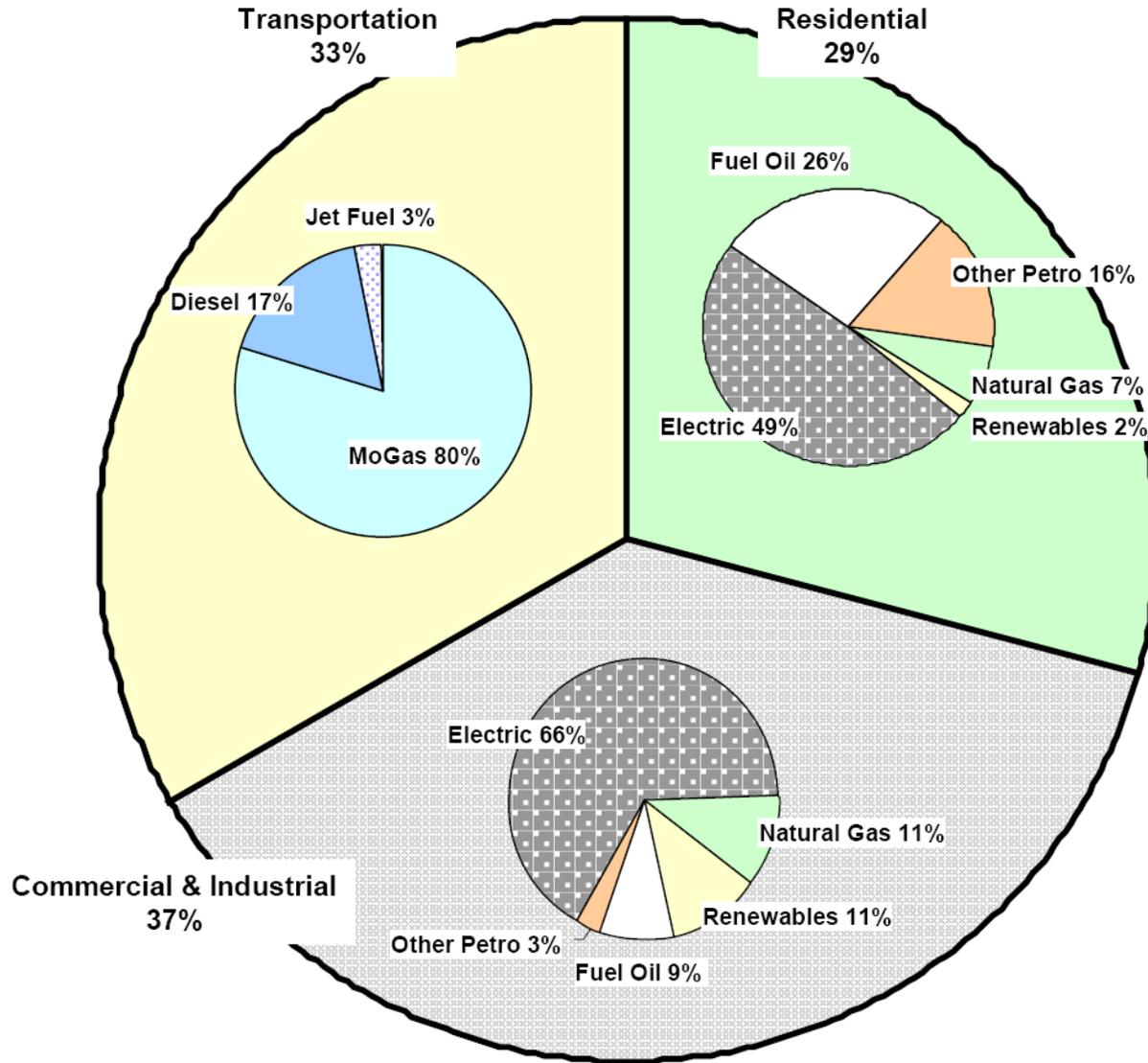
- Title 30, Section 202a:
 - To assure, to the greatest extent practicable, that Vermont can meet its energy service needs in a manner that is **adequate, reliable, secure and sustainable**; that assures **affordability** and encourages the state's **economic vitality**, the **efficient use** of energy resources and cost effective demand side management; and that is **environmentally sound**.
- Recommendations based upon all state law on the subject: e.g., GHG reduction goals, SPEED goals, Standard Offer

Overarching Goals of CEP:

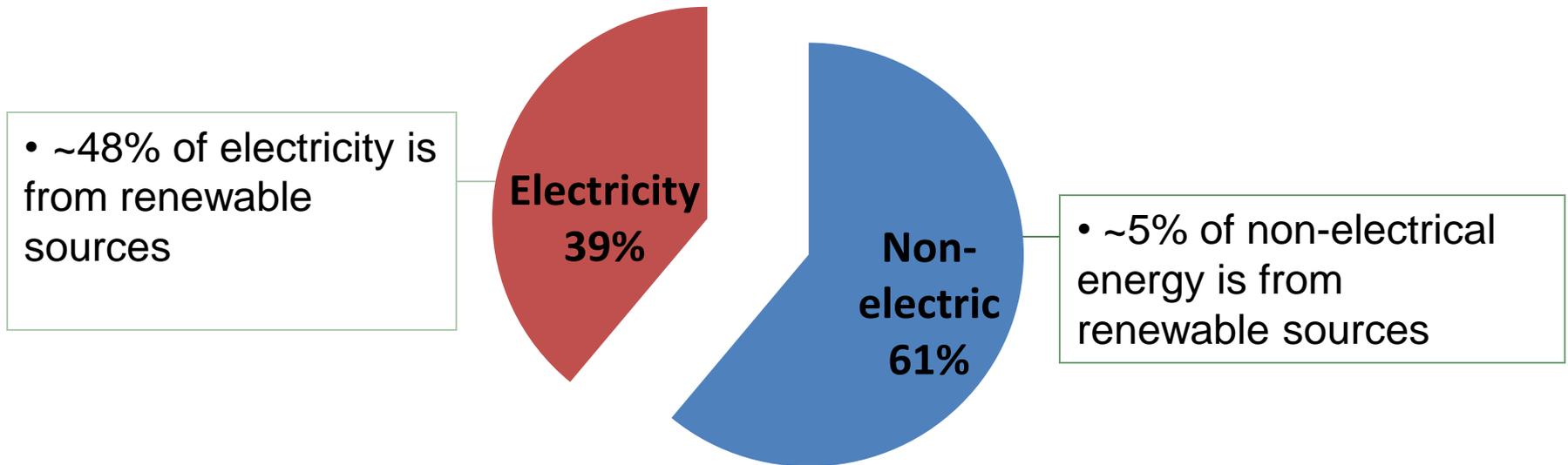
- Address All Energy Sectors, not just electricity
- Strive for lower GHG footprint, toward state law targets
- Support in-state energy solutions and economic growth
- At a cost that keeps Vermont regionally competitive

Vermont Energy End-Use By Source, 2008

(Percent of Total BTU's Consumed)



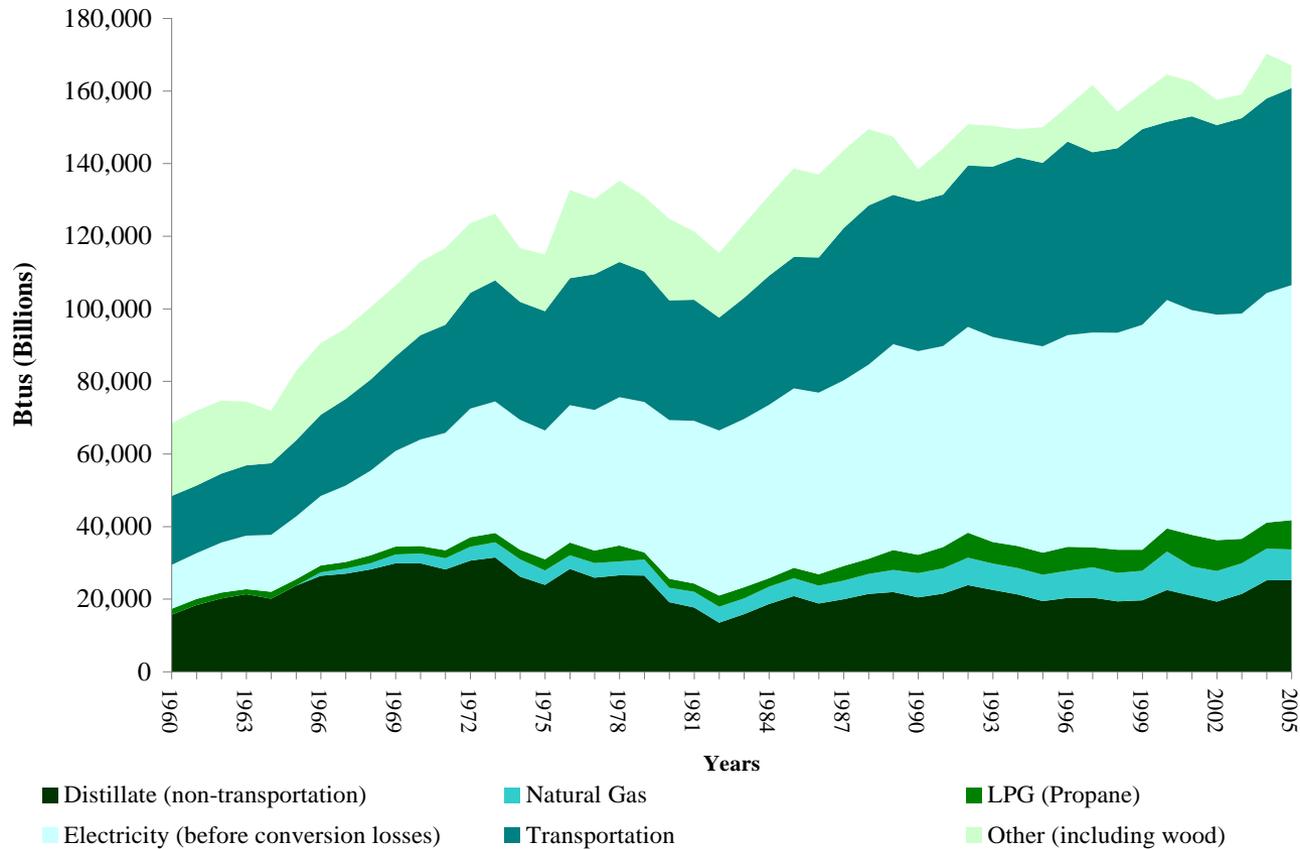
2009 Total Energy Consumed



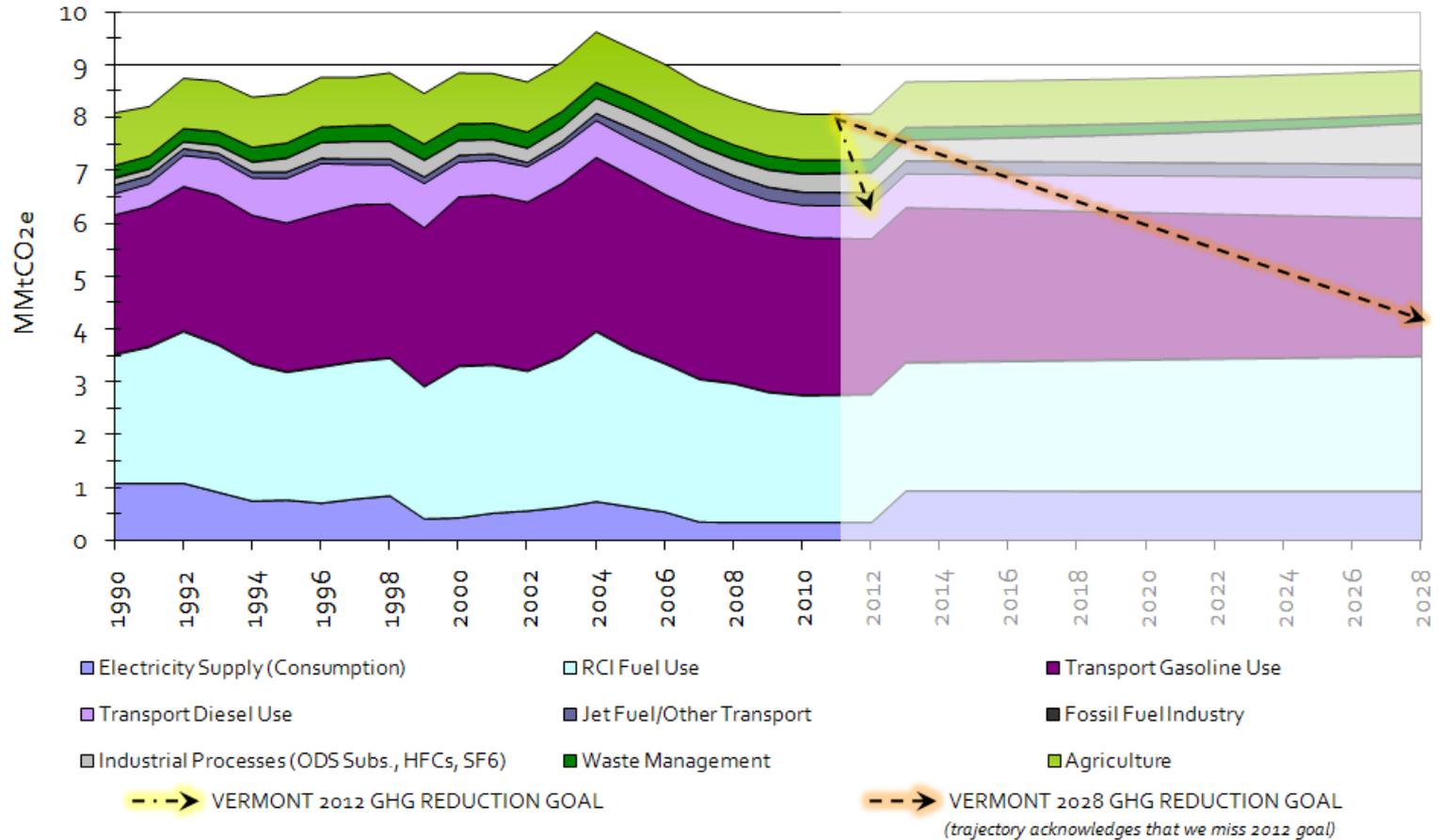
- ~ 23% of total energy is renewable energy overall, including HQ

•Legislated goal is 25% by 2025 from farms and forests

Vermont Energy Consumption by Selected Categories 1960–2005



VT GHG Emissions (MMtCO₂e)

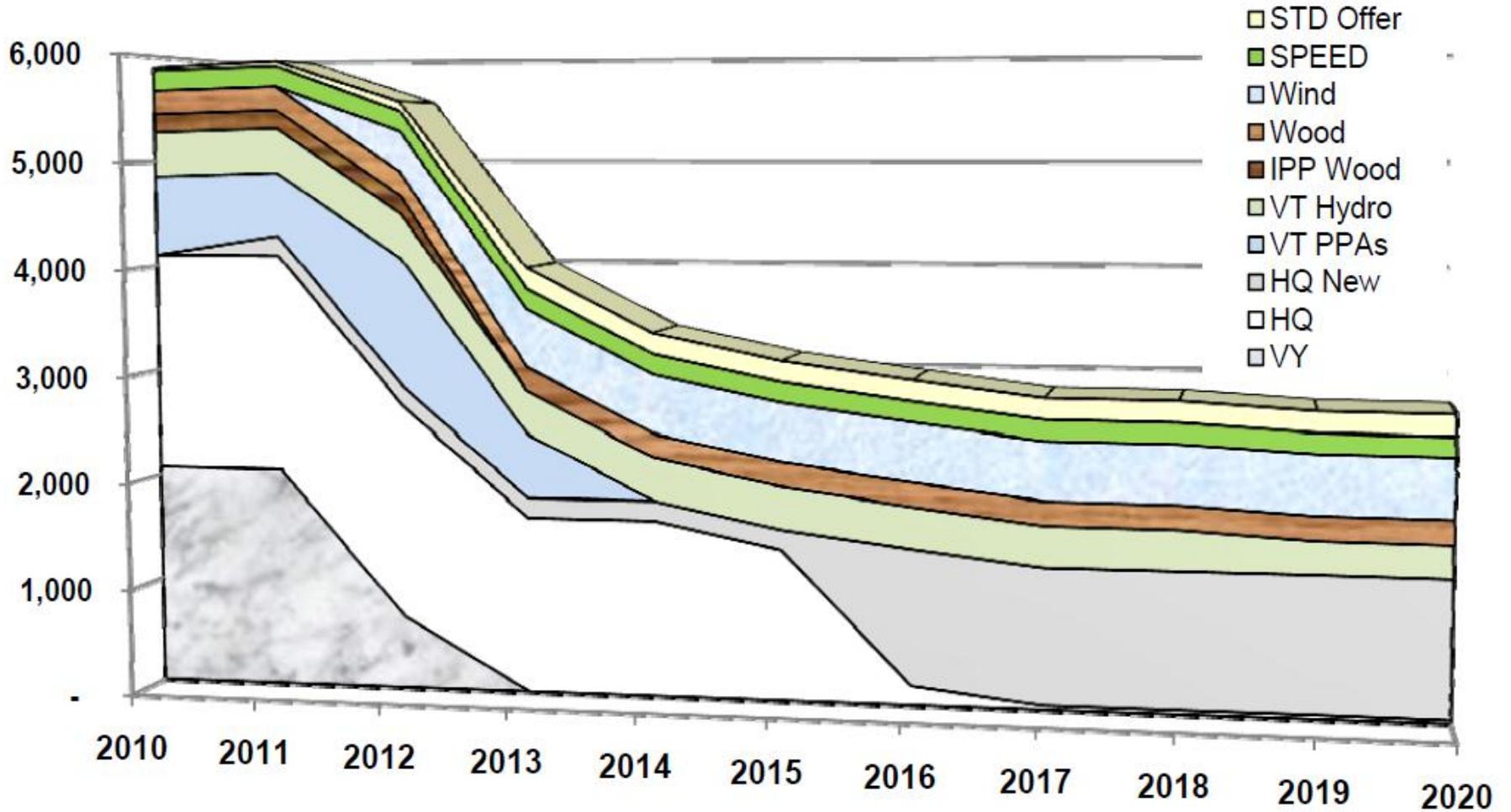


Energy Sectors

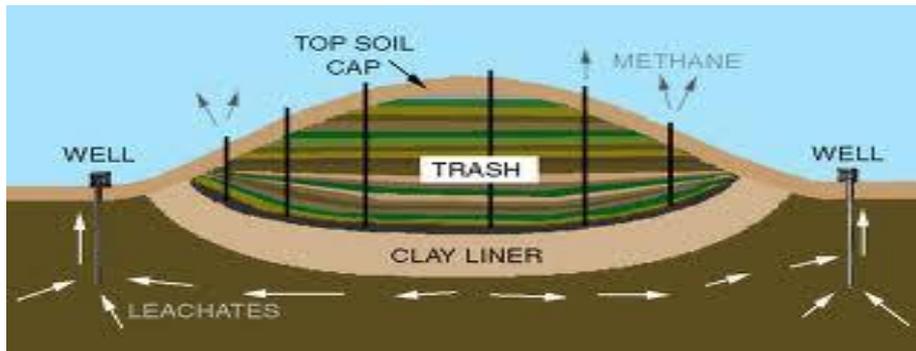
- Electricity
- Transportation
- Land Use
- Efficiency

Blended Statewide Committed Electric Resources

Figure 1.7 Committed Resources, in GWH (as of December 2010)*



Biomass



Biomass

- ~6.5% of current electric load
- 81 MW of utility-scale generation
- CHP plants at several institutional and commercial sites
- Wood Heat
 - Many primary/secondary schools, several colleges, many state buildings, some large commercial enterprises
 - 315,000 cords used for residential heating
 - Possibility of district heating projects – Montpelier, Burlington
- Farm Methane
 - 9 farm digesters in operation ($\sim 3MW$), more to come

Biomass -continued

- Biodiesel – Actions to promote locally grown seed-oil crops for thermal and/or off-road transportation (*farm*) uses are underway
- Landfill Methane (11.5MW)
 - Coventry (*8MW*), Moretown (*3.2MW*) and Brattleboro (*.3MW*)

Geothermal

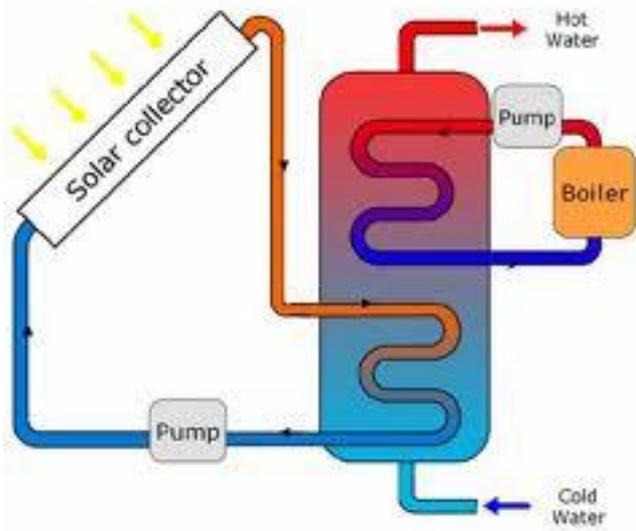
- <1% of thermal load
- Dozens of residential and commercial systems in operation for heating & cooling



Examples:

- Bennington Office Bldg
- Champlain College
- NRG Systems

Solar



Solar

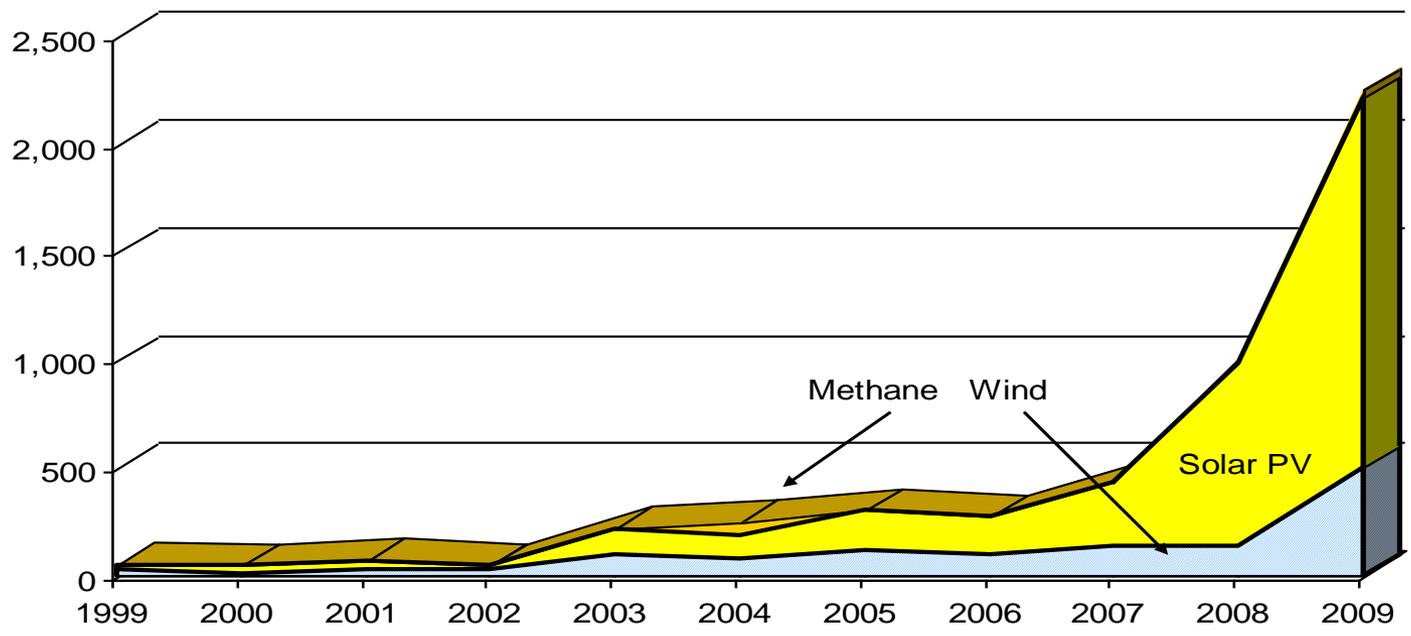
PV:

- ~.1% of electric load
- 719 net metered PV systems = ~4MW
 - ~1MW additional by 2012.
- Utility-scale systems installed= 1MW
 - ~4.4MW to be installed in 2011.

Thermal:

- ~500 solar thermal systems installed

No. Net Metered Systems

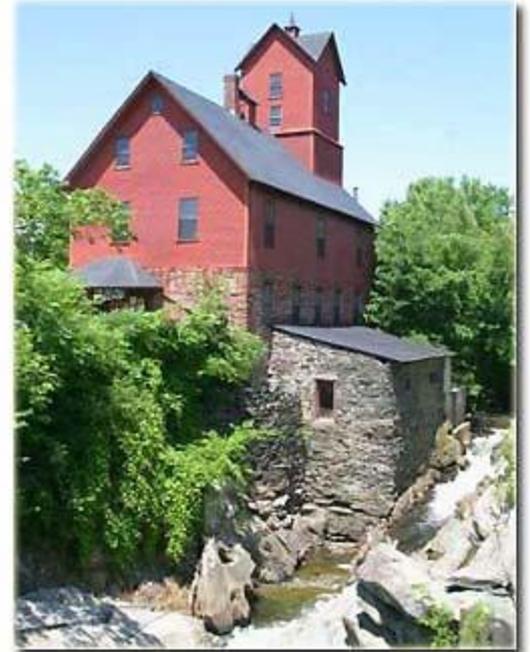


	Total	Wind	Solar PV	Methane	Wind	Percent Solar PV	Methane
No. Systems	867	145	718	4	16.7%	82.8%	0.5%
Total KW Approved	5,515	1,391	4,001	123	25.2%	72.5%	2.2%
Average Capacity (kw)	6.4	9.6	5.6	30.8			



Hydro Power

- 43% of electrical consumption (2009)
 - *~17% of total energy*
- 85 operating hydro dams in VT
 - In-state production *~12%* of electrical consumption
- *~6 MW* of capacity (8 projects) currently under development



Wind

~.2% of load on line

**Current Utility-Scale Plants:
Searsburg= 6MW**

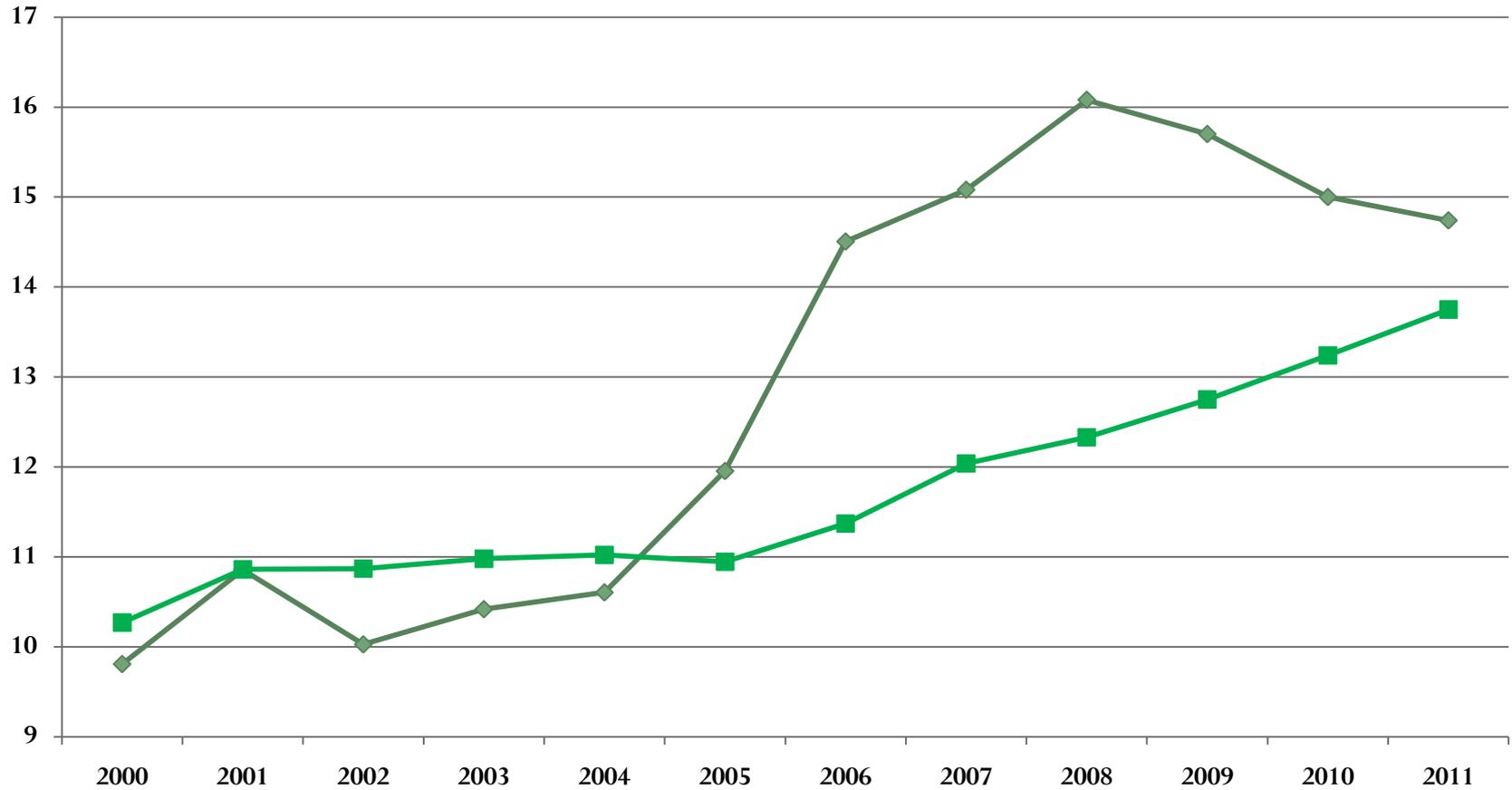
**CPGs Conditionally Granted for:
Sheffield = 40MW
Deerfield= 30MW
Georgia Mtn= 11MW
Lowell = 63MW**



145 net metered wind turbines = 1.4 MW

If everything above gets built wind power could produce ~6% of total electricity consumed in state.

Average Electricity Rates, New England, Vermont, (Cents/kWh)



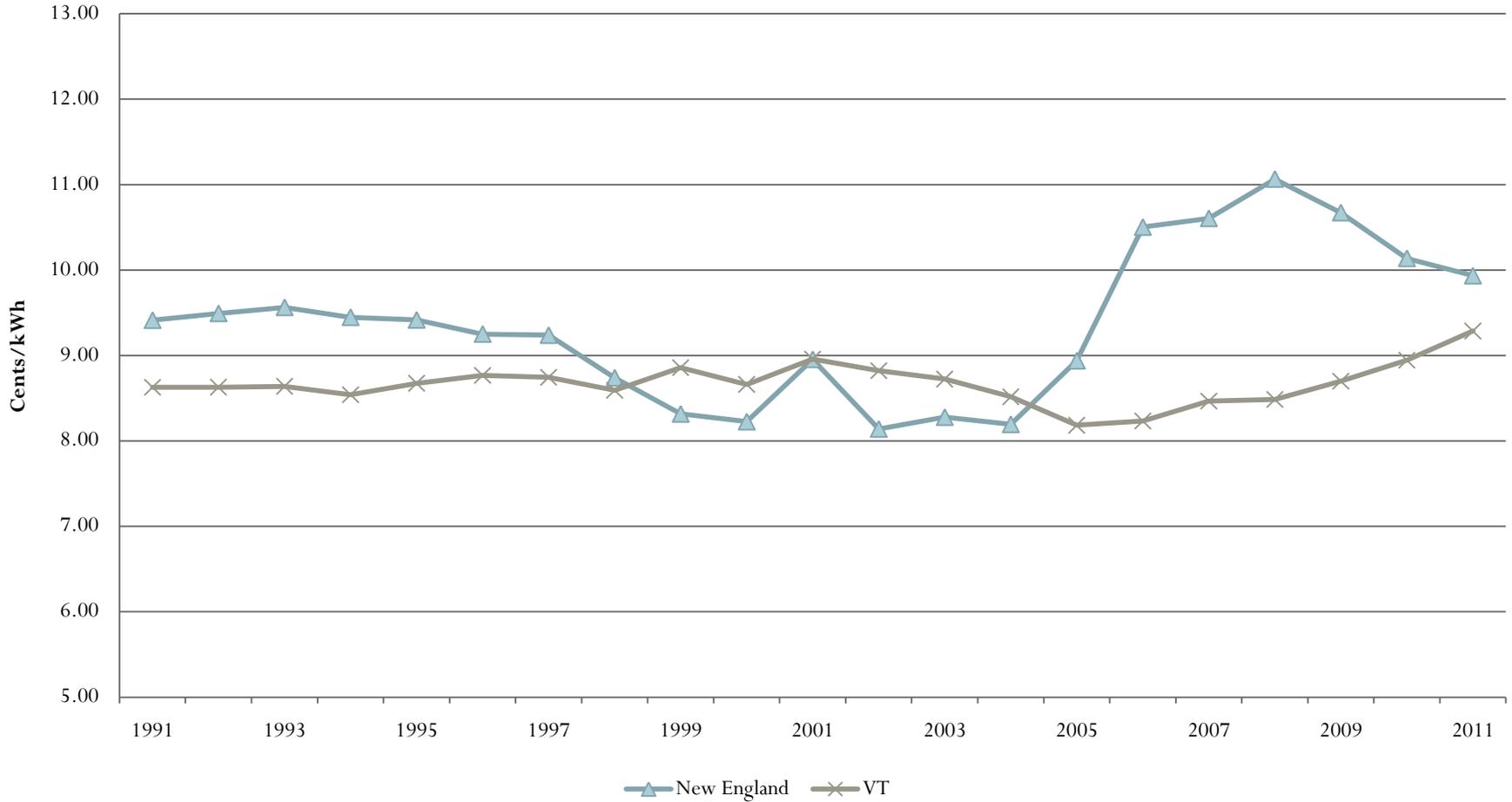
2011 Data is YTD Feb

◆ New England ■ VT



DEPARTMENT OF PUBLIC SERVICE

Average Retail Price of Electricity Cents/kwh (1991 \$)



Vermont's Regional Placement...

- Vermont has more utilities per customer, but also currently has lowest overall prices.

2009	# of Utilities	# of Customers	Cust per Util	Sales	Revenue(000)	Ave Price
CT	10	1,423,377	142,338	16,660,567	3,188,120	19.14
MA	45	2,678,233	59,516	29,424,777	4,741,857	16.12
NH	9	684,216	76,024	8,806,376	1,329,505	15.10
NY	60	6,761,198	112,687	77,326,047	12,582,835	16.27
RI	3	484,234	161,411	5,677,262	838,784	14.77
VT	19	357,225	18,801	5,496,513	701,055	12.75

Price of Various Resources Sets Rates

Illustrative Prices for Various Supply Types for 2016

Cents per kWh; Shown w/ REC Credits

	Capacity	Energy	REC	Total
NYPA	1.13	0.57		1.70
Utility Hydro	5.80			5.80
HQ PPA II		6.47		6.47
Large hydro	0.69	6.47		7.16
HQ VJO	3.67	3.53		7.20
Methane (landfill)		8.98	(1.75)	7.23
Gas CC	1.69	5.78		7.46
Millstone	7.64	0.61		8.25
McNeil Biomass	4.62	5.77	(1.64)	8.75
New Biomass	5.19	5.99	(1.64)	9.54
Gilman Hydro	1.15	11.03	(1.64)	10.54
Wind	12.79		(1.75)	11.04
Standard Offer		13.52	(1.64)	11.88
Other IPP hydro		12.19		12.19
VEPPI hydro	1.84	11.19		13.03
Net Metering	(1.13)	15.50		14.37
Gas CT	16.86	8.86		25.72
Intermediate Oil	17.54	9.42		26.96
Solar PV	33.61	-	(1.75)	31.86
Peaker (Oil)	60.98	11.78		72.76

Vermont's Renewable Energy Future

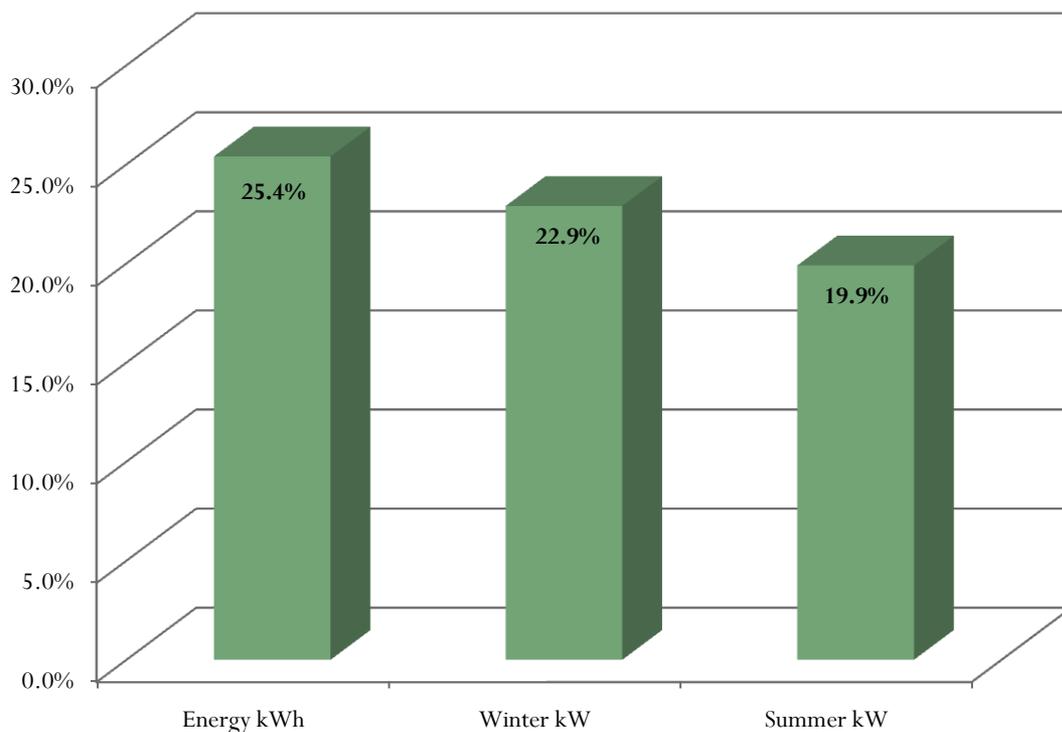
Questions: Where Should We Be?

- Should renewable energy (RE) be promoted?
 - If yes, what technologies? In what locations? What about cost/price compared to non-renewables?
 - Are there technologies that should be added to the list of RE?
- Should in-state RE be given preference to out of state RE? Small distributed RE vs. utility-scale centralized RE plants? RE electricity vs. RE thermal energy?

Efficiency in the CEP

- “Societal” Benefits
 - Address Greenhouse Gases
 - Potential to alleviate T&D Constraints
 - Less risk associated with energy efficiency than power supply
- Potential to meet many of the CEP objectives

Maximum Achievable Electric Efficiency Potential...Plenty more to go!



Possible Methods for Encouraging EE

- Building Codes
 - Res/Commercial Codes in effect soon based on IECC 2009
 - Contractors must certify compliance with code
- Voluntary Codes/Standards
- Act 250
 - Res – meeting code meets Act 250 requirements
 - Com – best available technology
- Property Assessed Clean Energy District
- Time of Sale Disclosure
- Smart Grid
 - Advanced Metering Infrastructure enabled measures

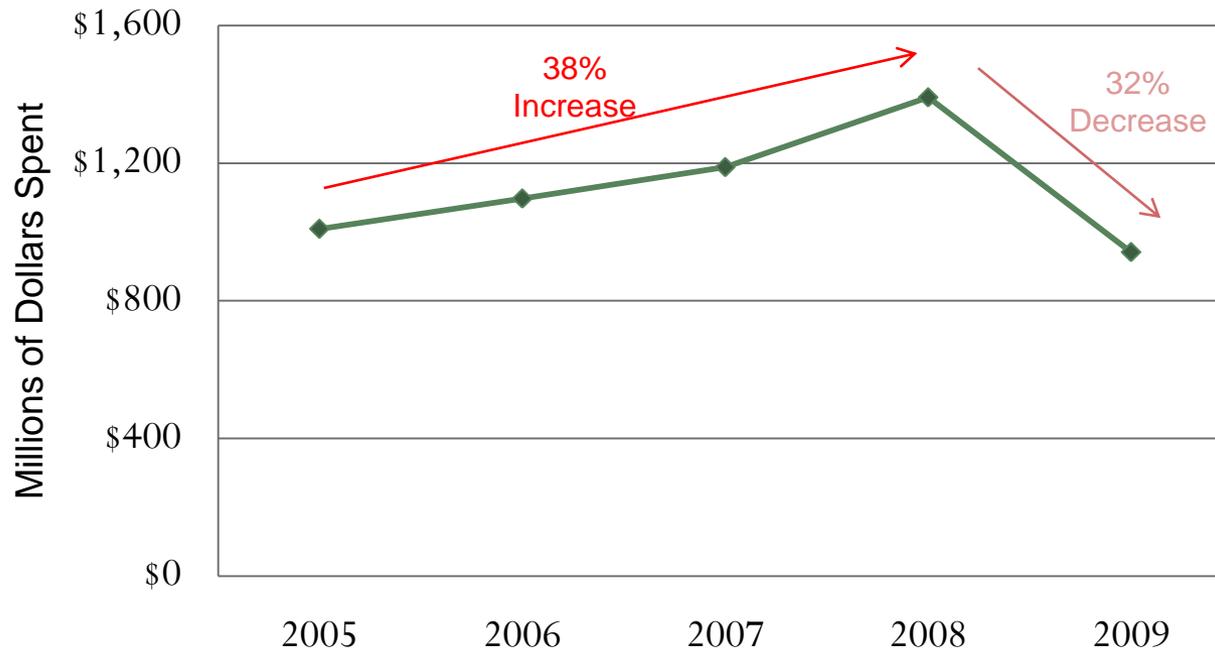
The Transportation GHG Emissions and Energy Challenge



Transportation & Energy Use



Total Annual Spending on Gasoline and Diesel in Vermont, 2005-2009



Source: The Vermont Transportation Energy Report: Vermont Clean Cities Coalition (August 2010)

Transportation & Energy Use



Vehicle Class of New Vehicle Purchased in Vermont, 2009

Vehicle Class	% of New Vehicle Purchases in 2009
Economy (i.e. Honda Civic, VW Rabbit)	35%
Midsize & Large Sedan (i.e. Toyota Camry, Ford Fusion)	24%
S.U.V., Pick-up Trucks, Minivan & Van	40%
Other	1%

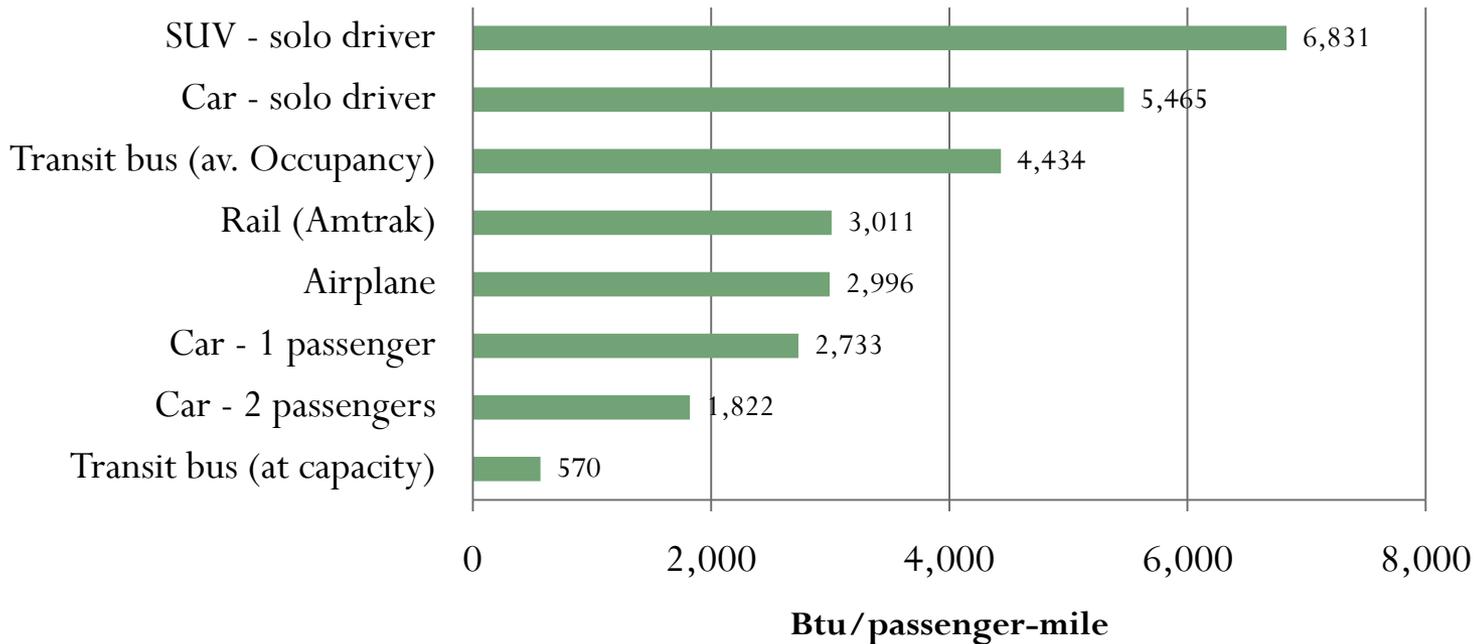
Source: The Vermont Transportation Energy Report: Vermont Clean Cities Coalition (August 2010)

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Transportation & Energy Use



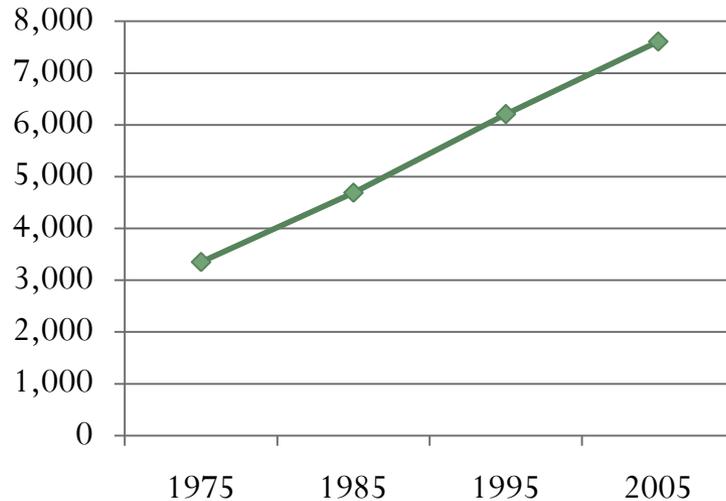
Energy Use per Passenger-Mile by Transport Mode and Occupancy



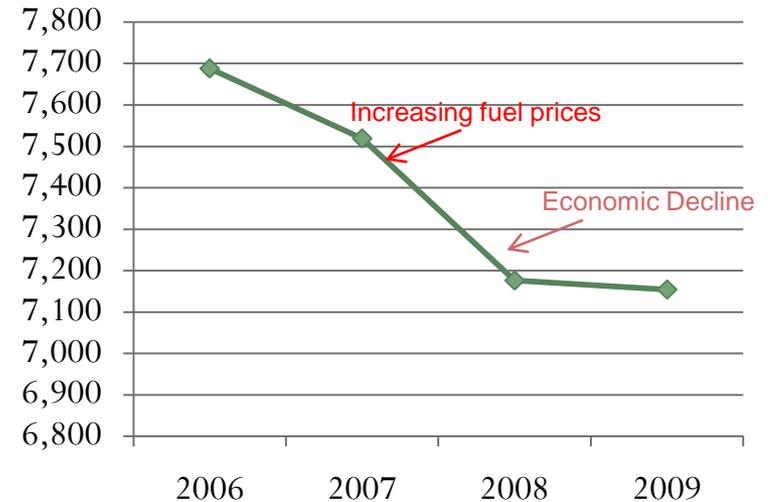
Source: The Vermont Transportation Energy Report: Vermont Clean Cities Coalition (August 2010)

Transportation & Energy Use

Vermont Annual Vehicle Miles Traveled (in millions), 1975-2005



Vermont Annual Vehicle Miles Traveled (in millions), 2006-2009



Source: Vermont Agency of Transportation Highway Research VMT Report



Overall, vehicle miles traveled declined as accessibility, density and/or land-use mixing increased.

- Ewing and Cervero, 2001



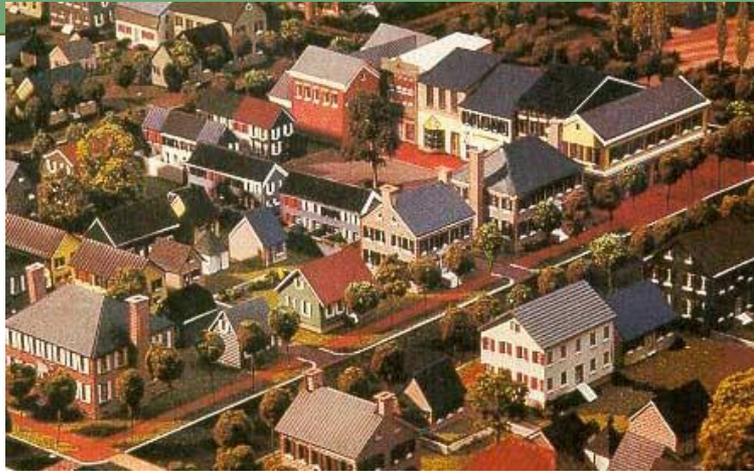
Drive to Work?

- Nationally, transportation costs account for 21% of all household expenses
- Most families spend more on driving than health care, education, or food
- Driving is Vermont's single largest contribution to greenhouse gas emissions (more than 40%)



Surface Transportation Policy Project, 2003. "Driven to Spend: A Transportation and Quality of Life Publication."

How we grow matters



State Land Use Programs

Municipal and Regional Planning Development Act

Supports mixed-use development through comprehensive planning and implementation

Programs are intended to help . . .

- Develop a comprehensive local or regional plan that implements the State's land use goals
- Implement regulatory and non-regulatory tools to guide growth
- Support development in appropriate places
- Integrate various land use needs



State Smart Growth Incentives

1st Generation Programs

Designates Downtowns /Villages

Target resources to fix what we have

2nd Generation Programs

Growth Center / Vermont Neighborhoods

Plan for compact growth in and adjacent to designated areas

Programs are intended to help . . .

- Preserve rural character and the working landscape
- Conserve natural and historic resources
- Support development in appropriate places
- Invest efficiently in public infrastructure



Everyone plays an important part...

- Directing limited funding (infrastructure, grants...)
- Location of buildings
- Clear goals and strategies in regional and local plans
- Local energy committees
- Developing for community energy systems
- Designing for transportation alternatives
- Site orientation – for renewable
- Location – near homes/services/transit
- Incentives for employees

Thank you for inviting me today...

For more information regarding the energy plan, go to:

<http://publicservice.vermont.gov>

Coming soon: <http://vtenergyplan.vermont.gov>

Thanks to Vtrans and Agency of Commerce and Community
Development for Slides and Data...

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