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Efficiency in Buildings: Saving Money and Avoiding Carbon

Vermont General Assembly

Senate Natural Resources Committee

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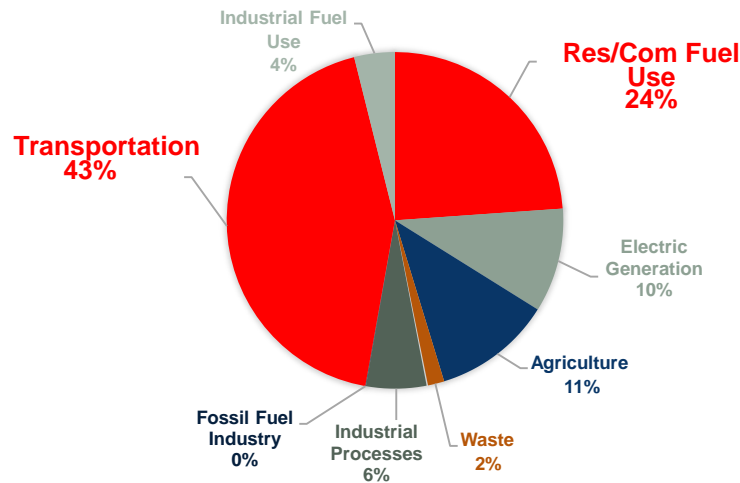
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Vermont Succeeds with Efficiency First

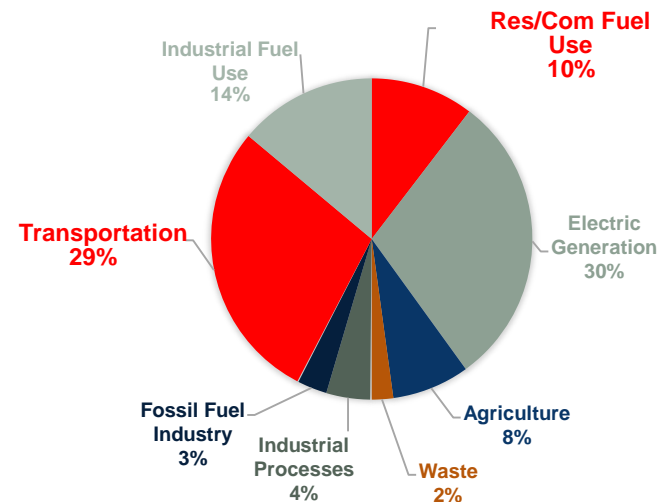
- Vermont pioneers – Sec 248; EE dockets; Efficiency Vermont
- Efficiency now avoids 20% of total power demand (EVT + utility programs to date)
- Larger than solar, wind, biomass, methane generation
- Has generated \$2.5 billion in electric energy savings
- Avoiding carbon emissions at better than zero cost

Now for the hard part

VERMONT GHG EMISSIONS



U.S. GHG EMISSIONS



Transportation and heat =
67% of GHG emissions in Vermont,
only 39% in US

Vermont's Fossil Energy Bill

- \$500 Million for fossil heat & \$1.5 Billion for gasoline and diesel fuel

\$2 Billion = 35,000 HH



More than 2X the entire Ag economy



The total income of 35,000 average VT families

Heating Programs: Costs & Benefits

Measures	Total Cost Perspective				Program Cost Perspective				
	NPV Costs	NPV Benefits	NPV Net Benefits	BCR	NPV Costs	NPV Benefits	NPV Net Benefits	BCR	
Efficiency									
Non-low income weatherization	\$281	\$348	\$67	1.24	\$159	\$348	\$189	2.19	
Low Income weatherization	\$152	\$195	\$42	1.28	\$152	\$195	\$42	1.28	
Electrification									
Cold Climate Heat Pumps	\$306	\$316	\$10	1.03	\$167	\$316	\$149	1.89	
Heat Pump Water Heaters	\$27	\$49	\$22	1.81	\$30	\$49	\$19	1.62	
Biofuels									
Wood Pellet boilers for schools	\$20	\$46	\$26	2.26	\$16	\$46	\$30	2.84	

Ten-year programs
 Costs and benefits in millions 2018\$
 NPV = present value (2018)

Heating Programs: Carbon Reductions & Costs/Ton Avoided*

Measures	Lifetime CO2 Reduced from Measures Installed over 10 Prog Yrs (Metric Tons)	Average Annual Program Budget (millions of 2018 \$)	Levelized \$/Ton of Lifetime CO2 Reduced (Total Cost Perspective)	Levelized \$/Ton of Lifetime CO2 Reduced (Program Perspective)
Efficiency				
Non-low income weatherization	1,458,078	\$18	(\$75)	(\$212)
Low Income weatherization	817,850	\$18	(\$84)	(\$84)
Electrification				
Cold Climate Heat Pumps	1,795,531	\$19	(\$8)	(\$119)
Heat Pump Water Heaters	314,094	\$3	(\$97)	(\$83)
Biofuels				
Wood Pellet boilers for schools	340,222	\$2	(\$131)	(\$152)

*Note: since energy savings exceed costs for all 5 programs, the carbon savings are better than free.

Conclusions

- Urgency: a 2030 roadmap is needed
- Good news: Vermont's history of creative, resourceful leadership
- Initial steps now:
 1. Expand the **Weatherization Assistance Program**
 - Focus first on low-income housing – 750 units per year out of 50,000 units is not enough
 - Fossil fuels should contribute to efficiency at a level closer to power and gas
 2. **Thermal efficiency** in housing is also a priority – leverage existing institutions to drive change faster
 3. Continue and expand support for **advanced wood heat** for Vermont schools

Conclusions

- Support a strong regional **Transportation Climate Initiative** – and have a backup plan for vehicles
- Start now with a program for **low-income and working families'** access to low-emissions cars – e.g., used EVs, PHEVs, hybrids

Additional Resources

- *Ensuring Electrification in the Public Interest*
- *Beneficial Electrification of Space Heating*
- *Beneficial Electrification of Water Heating*
- *Beneficial Electrification of Transportation*
- *Affordable Heat: Whole-Building Efficiency Services for Vermont Families and Businesses*
- *The carbon floor price – a hammer in need of a toolbox*
- *Carbon caps and efficiency resources Vt Law Rev 2008*

About RAP

The Regulatory Assistance Project (RAP)[®] is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org