



U.S. Department of Energy
Energy Efficiency and Renewable Energy

Wood Chip Usage in Vermont Schools, 2002-2003 Heating Season.

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School Energy Management Program**

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In association with:

***Vermont Dept. of Forests, Parks and Recreation and
Vermont Dept. of Public Service, Energy Efficiency Division.***



Wood Chip Usage in Vermont Schools, 2002-2003 Heating Season.

- 23 public and three private schools in Vermont have been equipped to utilize wood chips since 1986.
- Two more public schools are scheduled to start using wood chips within the next year; plus, three additional projects in Vermont and the interstate Vt. – N.H. districts have included wood chip systems in their recently approved construction projects.
- \$366,000 in estimated fuel cost savings to Vermont taxpayers in the 2002 – 2003 heating season.
- Over 10% of Vermont's public school students attend schools which are heated in whole or in part by wood chips.
- Rule of thumb: at this time, it appears that roughly 50,000 sq. ft. is the minimum size school building for which a wood chip system will be life-cycle cost-effective in our climate zone. *However*, each project needs to be considered individually.
- There are no special air quality permitting requirements for a 180 h.p. or smaller wood chip boiler in Vermont.
- At current prices, heat from wood chips is about 50% the cost of heat from No. 2 fuel oil when energy costs alone are considered.



Wood Chip Heating Experience in Vermont, 2002-2003 Heating Season.

Fuel	Recent Price Range	Unit	Typical System Efficiency	\$ / Million BTU
Hardwood Chips	\$25.54 - \$36.00	Ton	70%	\$3.80 - \$5.36
No. 2 Fuel Oil	\$0.82 - \$1.10	Gallon	80%	\$7.42 - \$9.95
Electricity	\$0.10 - \$0.13	kWh	100%	\$29.31 - \$38.10

Typical school building heating costs reported when heating with wood chips, with fuel oil backup.	\$0.13 to \$0.38 / sq. ft. / yr.
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A probable scenario. 80,000 sq. ft. school, 0.4 gal. / s.f.	Annual Heating Cost	Annual Heating Cost / Sq. Ft.
Heated with combination of: 395 tons of Wood Chips, \$30.00 / ton, 70% efficiency, and 8,000 gallons of No. 2 Fuel Oil, \$0.9422 / gal., 80% efficiency.	\$19,388	\$0.242
Heated with Wood Chips only, 526 tons, \$30.00 / ton, 70% efficiency.	\$15,780	\$0.197
If heated with No. 2 Fuel Oil only, 32,000 gallons, average \$0.9422 / gallon, 80% efficiency.	\$30,150	\$0.376
If heated with Electricity only, \$0.10 / kWh, 100% efficiency.	\$103,596	\$1.295



Summary of Wood Chip Utilization in Public Schools in Vermont, 2002-2003.

Facility	'02-'03 Chips Tons	'02-'03 Back up Fuel	'02-'03 \$/Sq. Ft.	'02-'03 Net BTU/s.f.	'02-'03 Total Fuel Cost	'02-'03 Savings vs. All Fossil Fuel
Barre City Elementary	590	<i>Propane</i>	\$0.14	31,952	\$18,208.00	\$36,888.80
Barre Town	669.73	No. 2 Fuel	\$0.17	32,792	\$26,607.04	\$15,569.27
Berlin Elementary	125	No. 2 Fuel	\$0.31	49,244	\$13,590.00	\$2,480.10
Blue Mountain U.H.S.	351.57	No. 2 Fuel	\$0.22	41,598	\$16,809.27	\$8,395.45
Browns River Middle	386	No. 2 Fuel	\$0.20	37,084	\$17,047.34	\$11,258.86
Calais	123.05	No. 2 Fuel	\$0.24	43,400	\$6,275.61	\$2,207.05
Camels Hump Middle	382	No. 2 Fuel	\$0.16	33,138	\$14,024.14	\$11,009.32
East Montpelier	109.53	No. 2 Fuel	\$0.21	36,232	\$7,501.00	\$2,173.23
Franklin Elementary	142.01	No. 2 Fuel	\$0.36	58,360	\$8,479.91	\$2,714.21
Grand Isle Elementary	112.12	No. 2 Fuel	\$0.29	38,237	\$11,839.93	\$3,616.07
Hartford H.S.	803	No. 2 Fuel	\$0.28	51,146	\$44,744.48	\$22,633.68
Hazen Union School	302	No. 2 Fuel	\$0.24	36,931	\$19,137.02	\$9,189.37
Johnson Elementary	320.78	No. 2 Fuel	\$0.27	52,470	\$13,685.31	\$11,230.45
Leland & Gray U.H.S.	253.33	No. 2 Fuel	\$0.13	26,638	\$9,939.68	\$5,835.75
Lyndon Town School	257	No. 2 Fuel	\$0.15	26,980	\$16,127.79	\$6,753.41
Mt. Mansfield U.H.S.	898	No. 2 Fuel	\$0.19	40,421	\$29,709.18	\$22,937.91
North Country U.H.S.	1,230	No. 2 Fuel	\$0.38	64,491	\$60,203.31	\$32,193.60
Randolph U.H.S.	1,040	No. 2 Fuel	\$0.37	62,207	\$53,489.20	\$36,254.01
St. Albans Tn. Ed. Ctr.	314	<i>Nat'l Gas</i>	\$0.22	33,100	\$26,446.79	\$12,220.63
Spaulding H.S., Barre	1,333	No. 2 Fuel	\$0.21	46,924	\$46,957.00	\$50,618.32
Springfield H.S.	1,546.01	No. 2 Fuel	\$0.27	52,159	\$71,966.57	\$43,564.70
U-32 High School	824.61	No. 2 Fuel	\$0.18	35,629	\$35,665.11	\$17,185.54
Westford Elementary	<i>not reported</i>					
Totals:	12,113				\$568,453.68	\$366,929.75
Average:	\$29.29		\$0.24	42,324		
	Total cost / total tons.		Total fuel cost / total s. f.	Total net BTU / total s. f.		
Range - Low:	\$25.54		\$0.13	26,638		
Range - High:	\$35.00		\$0.38	64,491		