Comparing the Cost of Heating Fuels – Using Conversion Data– Neme Reb Exh. B

Type of Energy	BTU/unit	Typ Effic	$/unit	$/MMBtu		High Efficiency	$/MMBtu
Fuel Oil, gallon	138,200	80%	$2.68	$24.23		95%	$20.41
Kerosene, gallon	136,600	80%	$3.23	$29.53			
Propane, gallon	91,600	80%	$2.64	$36.04		93%	$31.00
Natural Gas, therm	100,000	80%	$1.44	$18.01		95%	$15.17[b]
Electricity, kWh (resistive heat)	3,412	100%	$0.15	$43.46			
Electricity, kWh (cold climate heat pump)	3,412		$0.15			~~240~~ **270%**[a]	~~$18.32~~**16.28**[b]
Wood, cord (green)	22,000,000	60%	$ 227.14	$17.21	*		
Pellets, ton	16,400,000	80%	$294.00	$22.41	*		
AVERAGE GAS CONVERSION w/distrib. losses	100,000		$1.44			**81%**[c]	**$17.76**[d]

* The natural gas price is based on the rate effective 2/5/15. *Wood green and Pellets updated 9/19/14.

This table is the same as the table in Neme Exh A, except that the average gas conversion efficiency is adjusted to include the effect of heating distribution system losses of approximately 7.6% (as documented in Mr. Neme's rebuttal testimony). Note that efficiency values are rounded to the nearest 1 percentage point. Costs per MMBtu are based on actual (unrounded) efficiency values.

a. 270% is the efficiency used in Dr. Hopkins' Exhibit C, page 12. This is the mid-point found in the meta-study of cold climate heat pump efficiency cited by both Dr. Hopkins in Exhibit C and by Mr. Neme in his report. A New Hampshire study conducted by Mr. Neme estimated the efficiency to be 280%. A recent evaluation study in Maine suggests that cold climate heat pumps had an averaged efficiency of a little over 300%. Thus, the mid-point in the range in the meta-study appears consistent with climates similar to Vermont's.
b. This is the $/MMBtu using an efficiency of 270%, holding constant the other values used by Dr. Hopkins.
c. 81% is the net system efficiency of a system with weighted average heating equipment efficiency of 87.7% (see Neme Exb A) and an average distribution system efficiency of 92.4% (see explanation in Neme Rebuttal testimony).
d. This is the $/MMBtu using a weighted average efficiency of 81%, holding constant the other values used by Dr. Hopkins.