

Cost to produce total BTUs with electric systems						
	Energy cost per gallon or kWh	HSPF	COP	Efficiency of system	BTUs per energy unit	BTUs after efficiency
Air source	\$0.20	9.22	2.70	100.00%	100,000.00	-
Geothermal	\$0.20	15.36	4.50	100.00%	100,000.00	-
Electric resistance	\$0.20	3.41	1.00	100.00%	100,000.00	-
Propane https://www.mass.gov/	\$3.50	-	-	95.00%	91,500.00	86,925.00
Heating oil https://www.mass.gov/	\$5.00	-	-	80.00%	138,500.00	110,800.00
Natural gas https://www.eia.gov/	\$2.70	-	-	80.00%	100,000.00	80,000.00

Source of energy numbers for NH: <https://www.nh.gov/ei/energy/energy-oh/fuel-prices/>

HSPF: BTUs generated per Watt
COP: HSPF * 0.293

Energy type	Propane	Heating oil	Natural gas	Geo system cost	Air source system cost
Yearly gallons	1,400.00	1,100.00	1,500.00	30,000.00	20,000.00
Yearly BTUs	121,695,000	121,880,000	120,000,000		
Yearly cost	\$4,900.00	\$5,500.00	\$4,050.00		
Yearly cost with geo	\$1,584.74	\$1,587.15	\$1,562.67		
Yearly savings with geo	\$3,315.26	\$3,912.85	\$2,487.33		32,464.4
ROI for geo (in years)	9.0	7.7	12.1		\$6.49
Savings after 20 years	\$66,305	\$78,257	\$49,747		
Yearly cost with air source	\$2,641.23	\$2,645.25	\$2,604.44		
Yearly savings with air source	\$2,258.77	\$2,854.75	\$1,445.56		
ROI for air source (in years)	8.9	7.0	13.8		
Savings after 20 years	\$45,175	\$57,095	\$28,911		
Yearly cost with electric res	\$7,131.33	\$7,142.17	\$7,032.00		
Yearly savings with electric res	-\$2,231.33	-\$1,642.17	-\$2,982.00		

To use this spreadsheet:

1. set the price of propane/heating oil/natural gas to your own prices per gallon or them in cells B6, B7, or B8. Then set the efficiency of your system in cells E6, E7, or E8
2. change the price per kWh to your own in cells B3 and B4 (make sure to include both delivery and generation). You can find this by adding all the costs for delivery and generation found on your electric bill from any month.
3. if looking at air source heat pumps, change the COP in cell D3 to what you expect to get given your climate and equipment. Do NOT trust HSPF if it is reported because those numbers are always reported for Zone 4 which is the middle of the United States, which tends to have much warmer temperatures than Zones 5 and 6 in the north
4. if looking at geothermal, do the same as with heat pumps by changing the COP in cell D4. Geothermal companies will almost always give you the COP since it's the same for most zones because it only varies based off the temperature of the earth at that location, which they will have accounted for already
5. change cells in row 12 to reflect your own usage
6. change cell F12 or G12 to the final estimated cost of the new heat pump system