



FutureMetrics LLC

8 Airport Road
Bethel, ME 04217, USA

Weather, Heating Oil Prices, and Wood Pellet Sales

January 31, 2018

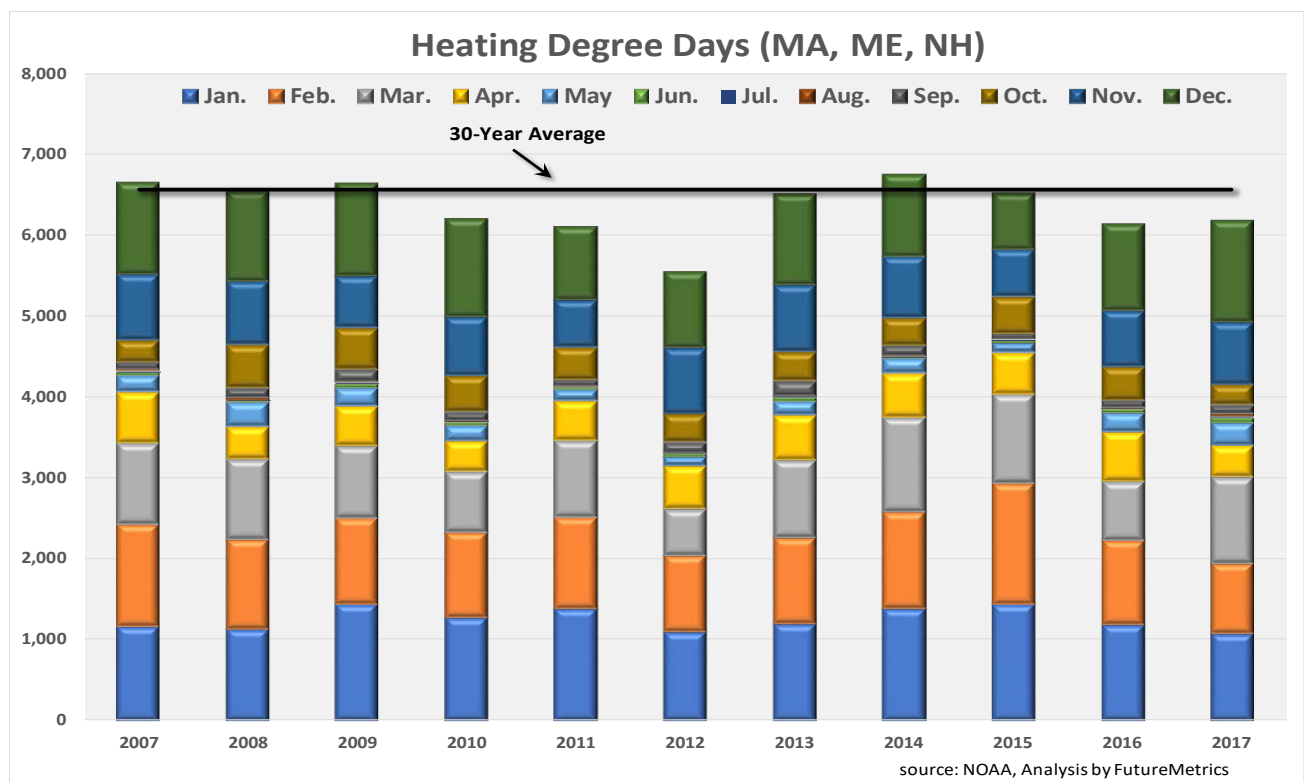
By William Strauss

This brief white paper will show how weather (heating degree days) and the price of heating oil influence demand for wood pellets for heating. The paper will also look at actual pellet prices in several selected states.

FutureMetrics has been gathering detailed data on retail prices for heating pellets in selected northern New England states since July 2017. Each month FutureMetrics contacts between 130 and 160 retail outlets across the region to get prices for individual 40-pound bags and one-ton pallets of 40-pound bags for each brand of pellets that the retail outlet sells. Some of that data is used in this white paper. Prior to July 2017, FutureMetrics gathered data from a limited number of sources on bag and ton pricing across New England.

A Good Beginning to the 2017-2018 Heating Season

Most of the past 10 years have been warmer than the 30-year average. This has presented challenges to the northern New England pellet producers. The chart below shows the past 10 years' median heating degree days for the combined data from Massachusetts, Maine, and New Hampshire.

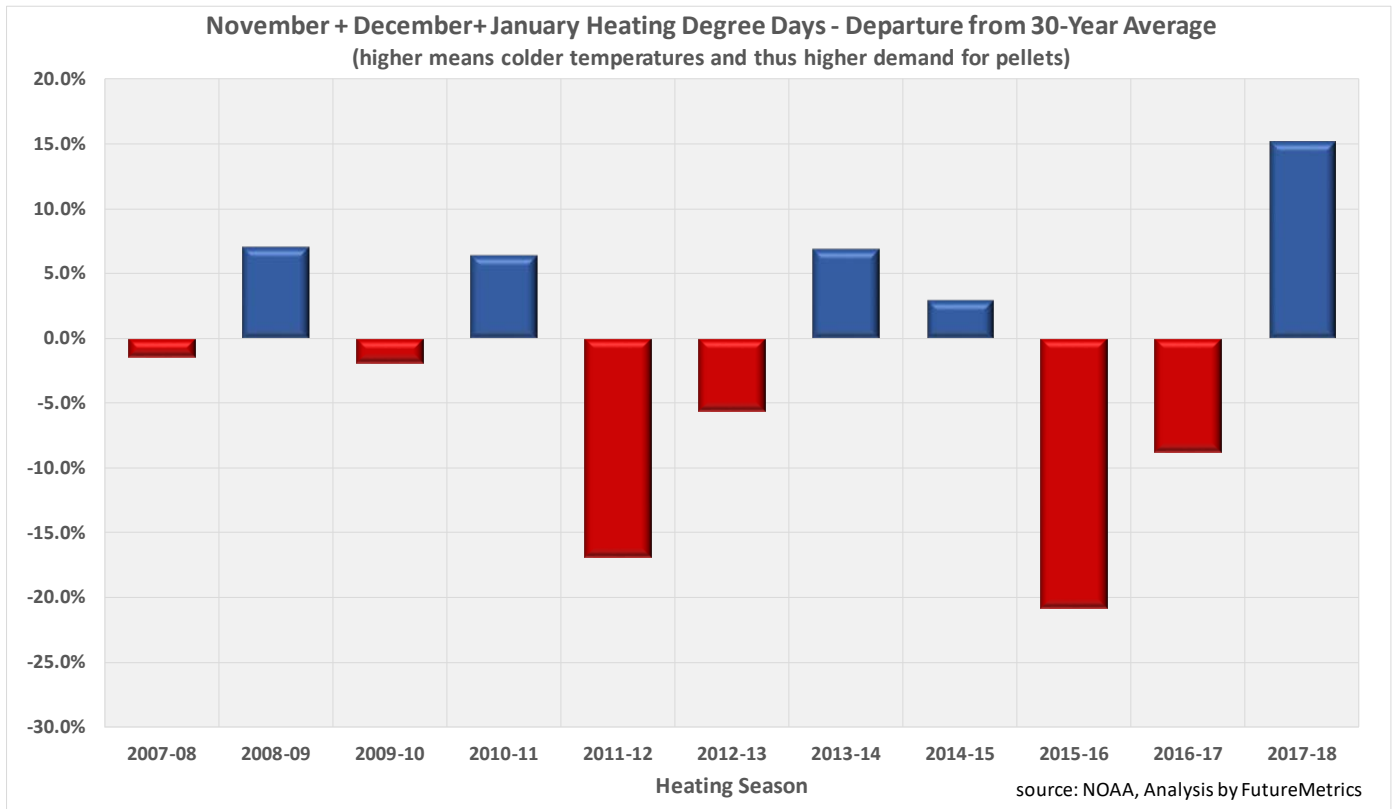




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However, the beginning of the 2017-2018 heating season is very different. As the chart below shows, the first three months of the 2017-18 heating season are by far the coldest in the past 10 years.



As the chart above shows, this is in strong contrast to the beginning of the last two heating seasons in Maine, New Hampshire, and Massachusetts. Colder than normal temperatures (i.e., higher heating degree days) results in increased sales of all heating fuels. As is discussed later in this paper, demand for pellets is also influenced by the cost of heating oil in those states.

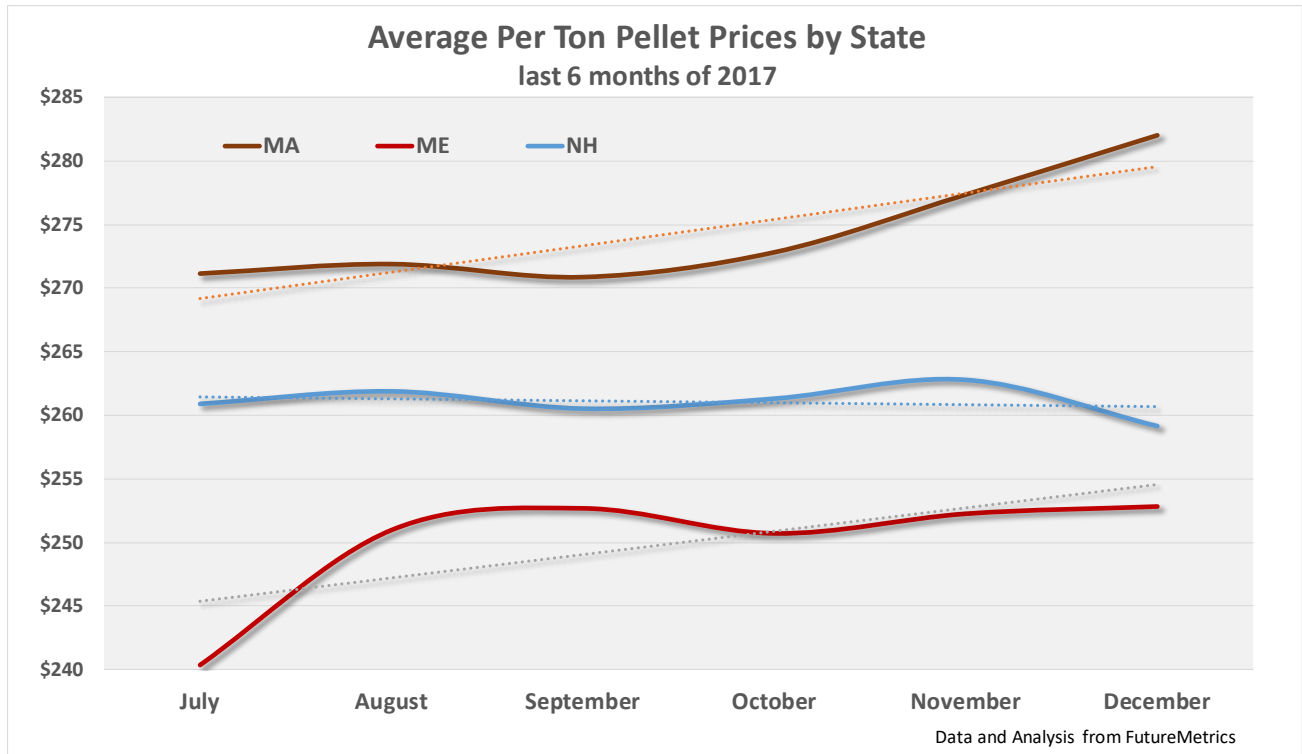
Pellet Prices in the Three States

Per ton pellet prices have been relatively stable for the past six months. FutureMetrics will have January data on retail prices by the end of the first week in February 2018. However, preliminary data suggests that per ton prices will remain relatively stable. The chart below shows the average of all brands prices per ton by state for a one-ton pallet of pellets for the six months through December 2017.



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The chart's y-axis scale exaggerates the increases in prices. Massachusetts pellet buyers, on average, experienced about an \$11/ton increase in the cost of pellets over the past six months. This equates to about a \$0.22 per 40 lb. bag increase.

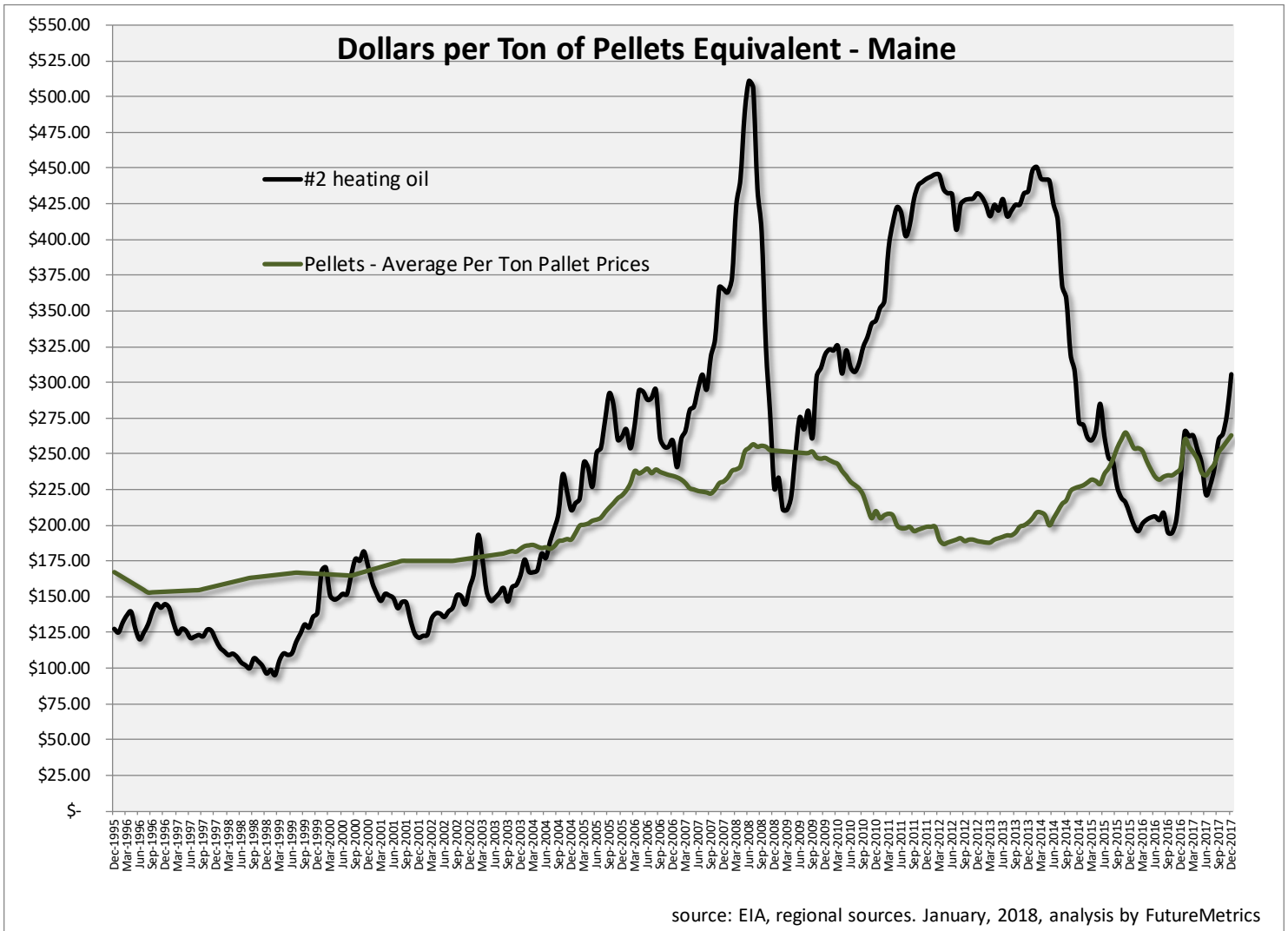
The two charts on the next pages show the average price history for pellets and heating oil in the state of Maine.



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In the first chart below, the heating oil prices are converted into the equivalent price per ton of pellets for the same heating energy¹.



Pellet prices have been much more stable over the past 22 years than heating oil prices. Heating oil has been as high as the equivalent of \$513 per ton of pellets in 2008 and recently as low as under \$200 per ton in 2015-16. The 2015-16 heating season, as the chart on page 2 shows, had the warmest start to a winter in recent years. The combination of low heating oil prices and warm temperatures were very challenging to the regional wood pellet producers.

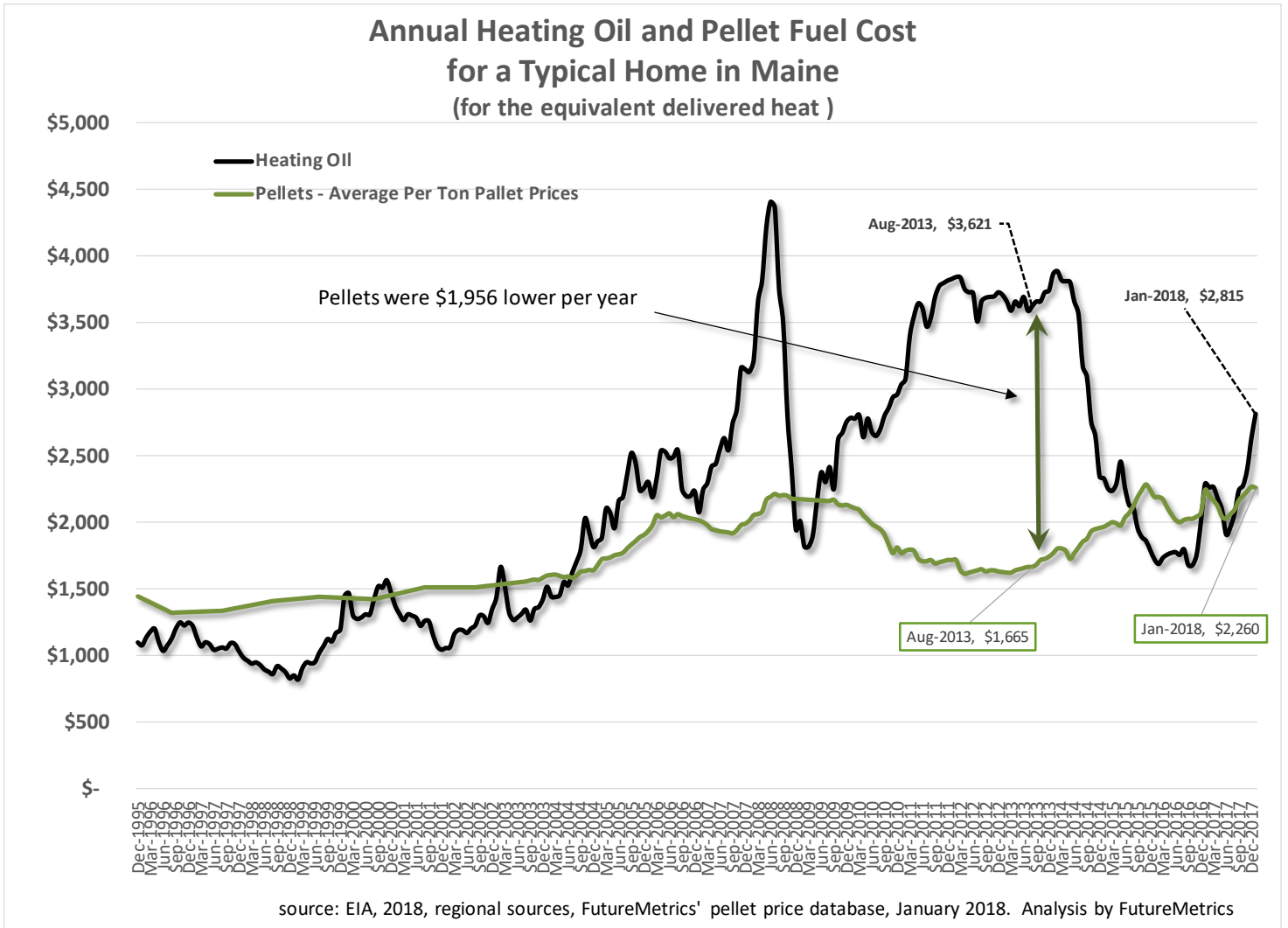
¹ Based on 8,000 BTU/pound for pellets and 138,000 BTU/gallon for heating oil.



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The chart below shows the estimated annual cost to heat a typical home in Maine with wood pellets and heating oil.



The same data as the chart on the preceding page, when converted to the energy needed to heat a typical home in Maine, suggests that the recent rise in heating oil prices, combined with the cold start to the 2017-18 heating season, will increase the demand for pellets and for new pellet heating appliances.

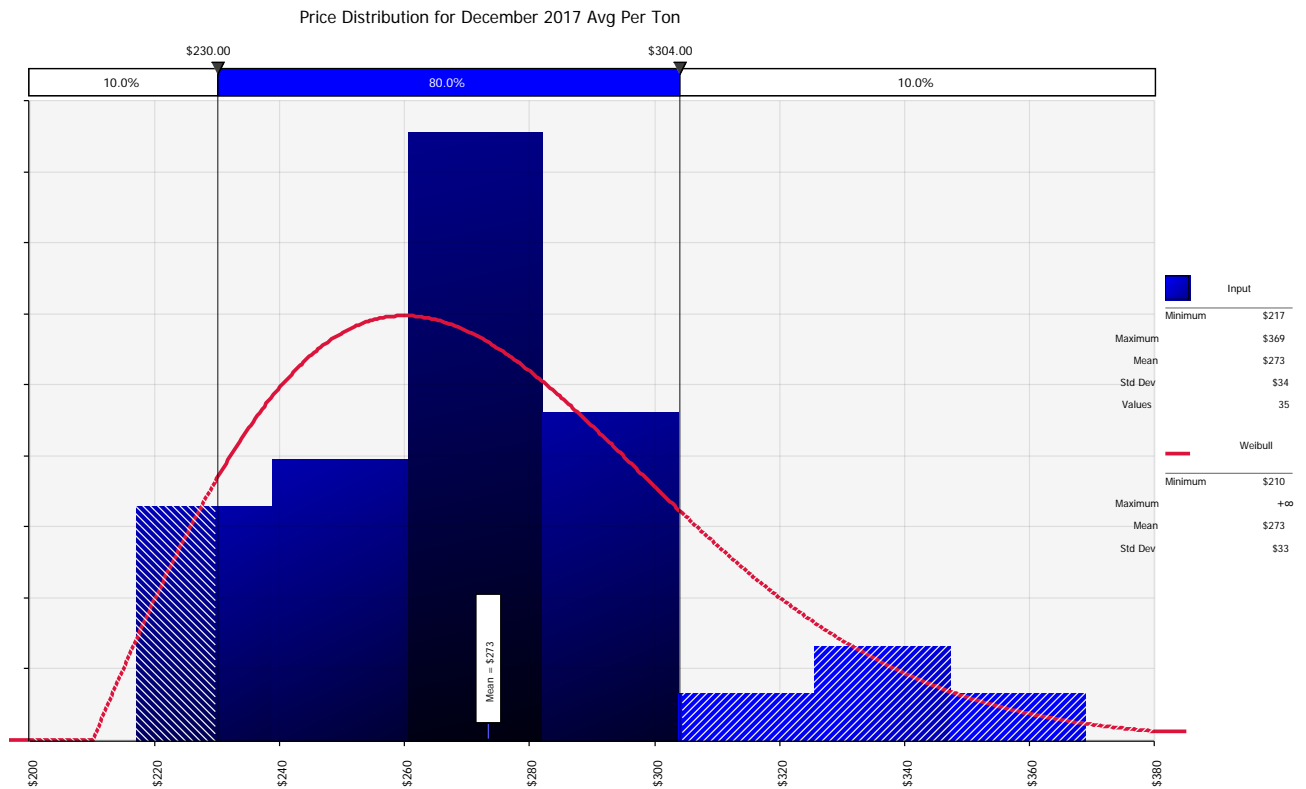
Pellet prices vary by location and brand. The farther the retail outlet is from a pellet mill, all other inputs held constant, the higher the retail price. Transport costs from the pellet mill to the retail outlet increase the cost at the retail outlet.



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The chart below shows the distribution of pellet prices for all 35 brands contained in the FutureMetrics data across all three states in December 2017. The red line is the best fit probability distribution for the data².



80% of the pellet per ton prices fall between \$230 and \$304 with the average being about \$273 per ton. The data includes all types of retail shops including farm supply stores, hardware stores, stove shops, and big box stores.

The price variations by brands, as an average across all type of retail outlets, are shown in the table on the next page containing price data from December 2017.

² See Wikipedia for a detailed description of the distribution. https://en.wikipedia.org/wiki/Weibull_distribution. The best fit was estimated using @RISK software by Palisade Corporation.



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Brand	December 2017 Avg Per Ton
Northeast Pellets	\$217.00
Still River	\$219.99
Corinth - Blend	\$228.00
Comfy Cozy	\$230.00
Crabbe Softwood	\$232.67
Easy Heat	\$239.99
Maine Woods Co Blend	\$243.35
Blackstone Hardwood	\$247.00
Green Supreme	\$252.05
Corinth Softwood	\$255.00
Premium Pennington	\$259.50
Energex - Hardwood/Softwood	\$261.42
Canawick - Hardwood	\$262.66
Maine Woods Co Softwood	\$263.50
Maine's Choice hardwood	\$265.87
New England Wood Pellet	\$268.63
Fireside Softwood	\$269.00
Lignetics Softwood	\$272.20
Okanagan	\$272.49
Blue Ridge Hardwood	\$274.00
Energex - Softwood	\$274.75
Northern Warmth Purely Pine	\$279.00
GRANULCO - Softwood	\$279.50
Inferno Gold	\$279.99
LG Granules - Softwood	\$286.17
Warm Front	\$287.00
Northern Max - Hardwood	\$295.00
Northern Warmth Super Spruce	\$295.00
Turman Premium Oak Hardwood	\$299.00
Barefoot - Hardwood	\$302.50
La Crete	\$303.25
Vermont Wood Pellets - Softwood	\$304.00
Northern Warmth Douglas Fir	\$339.00
Blazer Softwood	\$340.00
Northern Warmth Supreme Douglas Fir	\$369.00

Source: FutureMetrics

There are quantitative differences between hardwood and softwood pellets primarily in terms of ash content. Softwood pellets have less ash. Douglass fir pellets have a significantly lower percentage of ash



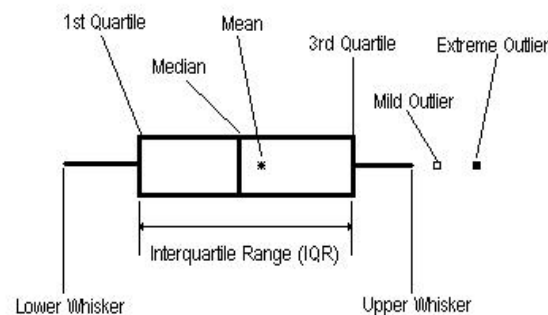
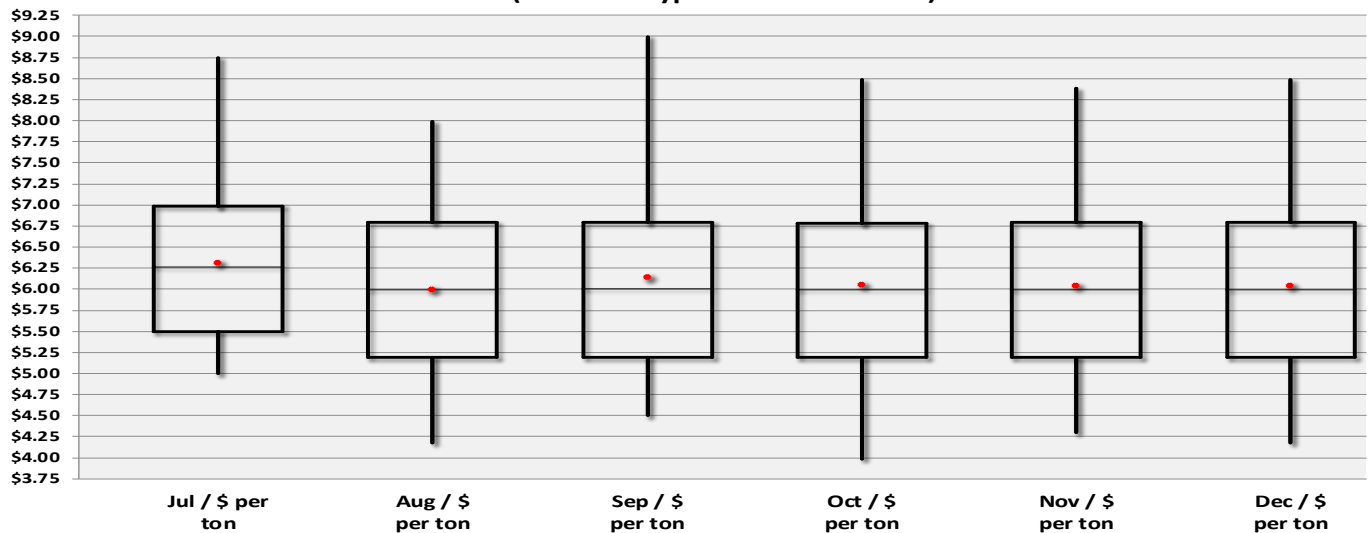
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than most other pellets and thus often sell at “ultra-premium” prices³. Softwood pellets also typically deliver a slightly higher BTU per pound. However, as the table above shows, prices for hardwood, blends, and softwood pellets vary considerably.

If pellet stove owners buy pellets by the bag, they pay a slightly higher price than if they buy by the ton. The chart below shows the distribution of per bag prices by month. Note that the median price is constant at about \$6.00 per bag (\$300 per ton: one ton contains 50 forty-pound bags).

Distribution of Bagged Pellet Prices
(across all types of retail outlets)



Whiskers extend to the furthest observations that are no more than 1.5 IQR from the edges of the box. Mild outliers are observations between 1.5 IQR and 3 IQR from the edges of the box. Extreme outliers are greater than 3 IQR from the edges of the box.

³ Ultra-premium is not an official label. With ash content often less than 0.25% versus a typical premium pellet, which is between .075% and 1.00%, a pellet stove must be cleaned 1/3 as frequently (or less). If the buyer is not price sensitive, this characteristic supports the higher pricing.



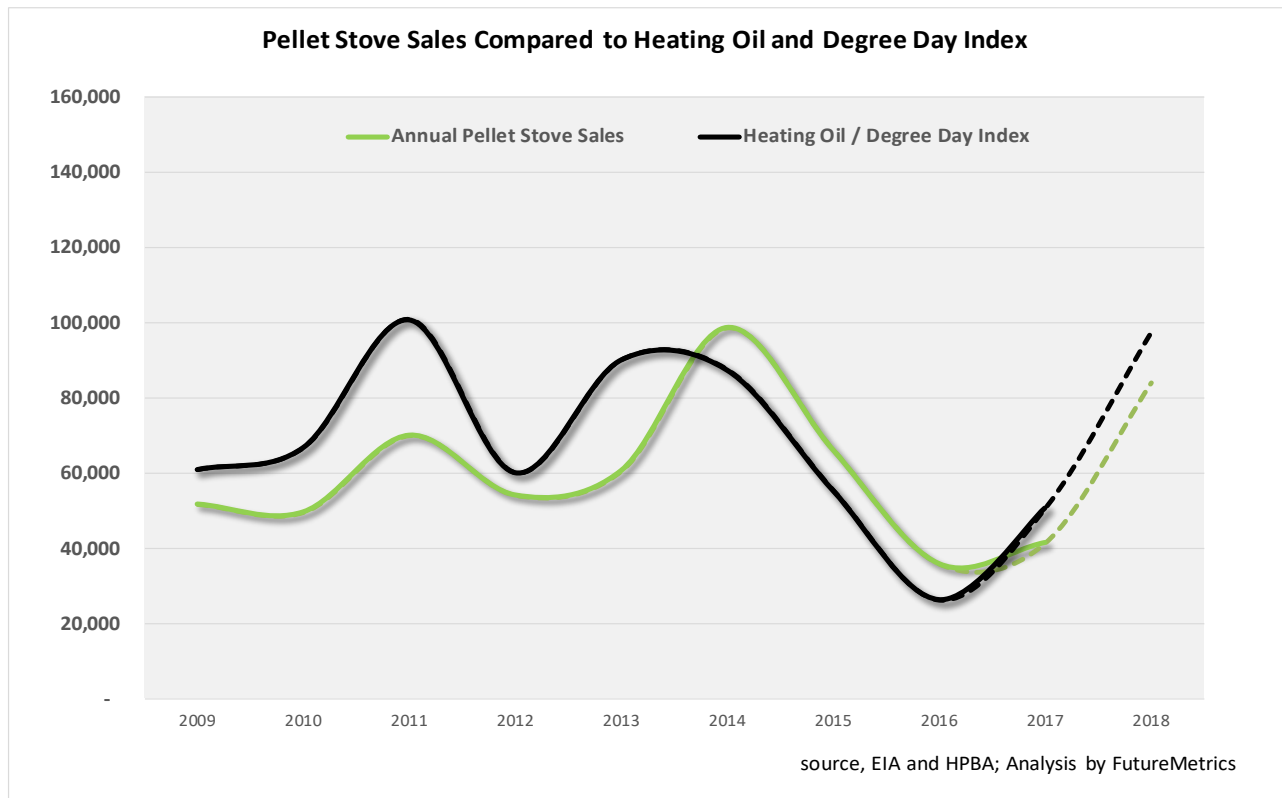
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2018: A much better year for pellet producers

Wood pellet demand depends first on the number of pellet appliances (stoves, boilers, and hot air furnaces) that are installed in homes and businesses. Upon that base, pellet demand depends on how cold the winter is and on the prices of alternate heating fuels. In the three states surveyed in this paper, heating oil commands a significant market share. Maine has the highest proportion of heating oil use in the US with about 64% of homes using heating oil. New Hampshire is second in the nation at about 46%. In those states, when heating oil is significantly lower cost than pellets for the same energy, as it was in 2015-16, pellet stove owners may stop using pellets altogether. Lower heating oil prices combined with a warm start to the winter heating season two years ago caused rapid drops in pellet demand and a significant decline in the sales of pellet stoves and boilers.

Using the average heating oil prices and the heating degree days in each year to create an index yields a predictor of pellet stove sales. The chart below shows this relationship with a forecast for 2018.



If the remainder of the 2017-18 winter is as cold as normal and if heating oil prices remain as high as they are at the end of January 2018, pellet stove and boiler sales should increase significantly in 2018.

This will expand the base of pellet appliances and, given seasonal winters combined with crude oil prices remaining in the mid to upper \$60's per barrel, the prospects for growth in the NE US heating pellet markets are much improved.