

FutureMetrics

RESEARCH, ANALYTICS, EXPERT ADVICE

North American Pellet Market Quarterly

Q1 2018

Volume 1., Issue 1.

March 26, 2018

www.FutureMetrics.com

FutureMetrics' North American Pellet Market Quarterly

Volume 1. Issue 1. Q1 – 2018

© 2018 FutureMetrics, LLC, P.O. Box 840, 8 Airport Road, Bethel, ME 04217

Editor – Seth Walker – sethwalker@FutureMetrics.com |  @BioEconomist

FutureMetrics' President – William Strauss – williamstrauss@FutureMetrics.com

Operations Expert – John Swaan – johnswaan@FutureMetrics.com

Senior Technologist – Laurenz Schmidt

About Us

FutureMetrics is recognized as one of the leading global consultants in the wood pellet sector. FutureMetrics provides information, analysis, operations guidance, and strategic advice to many of the world's leading companies in the wood pellet sector.

Our team's experience and expertise covers every part of the wood pellet supply chain. Key members of the FutureMetrics team are highlighted below. A selection of our current and recent clients is listed below.

Since 2001 FutureMetrics has specialized in the wood pellet sector. FutureMetrics believes that the foundation for all biomass based projects, from both an environmental and an economic/business model point of view, must be the sustainability of the forests from which the raw materials are harvested. Continuously renewing forests and the maintenance of the forest carbon stocks are essential for the support of the long-term security of project cash flows and the low carbon characteristics of the refined wood pellet fuel.

For more information visit www.FutureMetrics.com

Table of Contents

| | |
|--|----|
| Introduction | 4 |
| North American Pellet Exports | 5 |
| US Pellet Exports | 6 |
| Canadian Pellet Exports | 7 |
| Export Markets Update | 8 |
| Pellet Export Prices | 11 |
| North American Industrial Export Economics | 12 |
| Domestic Pellet Market Update | 13 |
| Northeast / North Central Production | 16 |
| West Production | 17 |
| South Production | 18 |
| New England Pellet Pricing | 19 |
| Competing Fuel Prices | 21 |
| Upcoming Events and Announcements | 22 |

Introduction

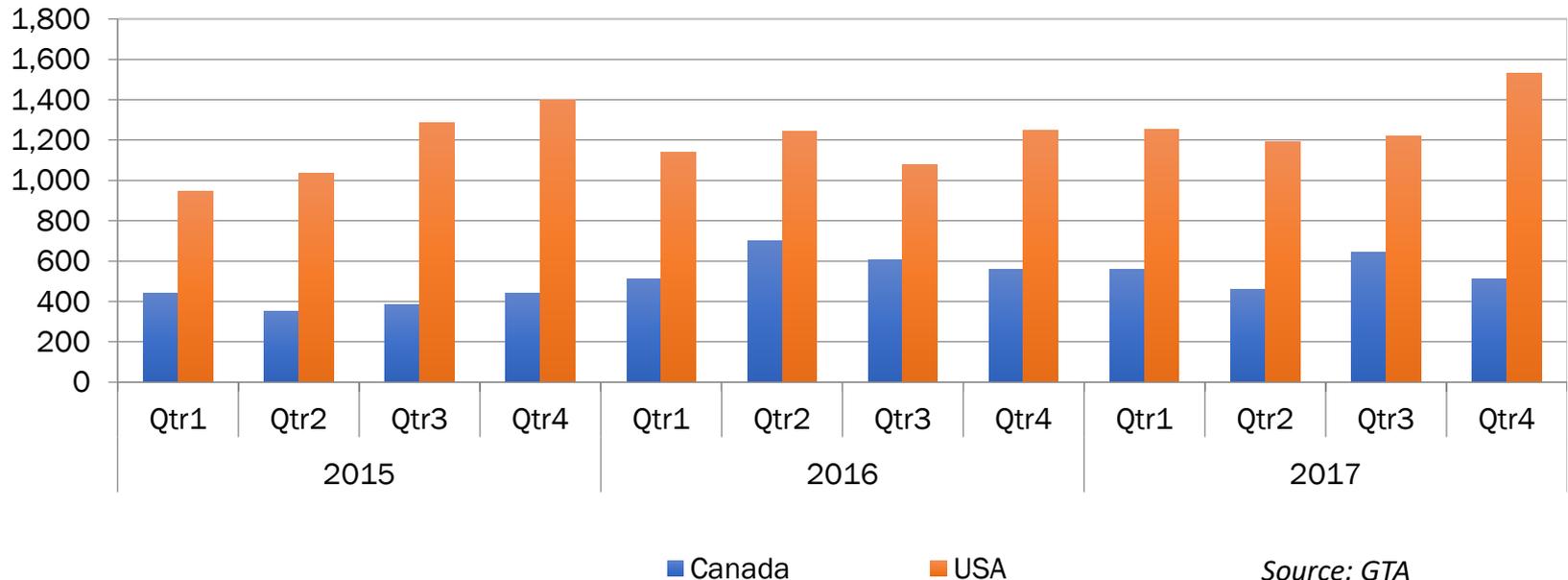
2017 brought some welcome relief to both domestic and industrial export pellet markets in North America.

Industrial pellet exports from the United States increased to 5.2 million tonnes in 2017, up 10.5% from the previous year (Figure on slide 5). This uptick comes after exports plateaued, increasing less than 1%, in 2016, as the market reconciled with excess capacity, and US producers lost their competitive edge due to a strong US dollar. Markets have improved significantly over the past year with European industrial spot market prices, as reported by *Argus Biomass Markets*, up approximately 45% from a year ago, and within a range where FutureMetrics analyzes that US producers can sell profitably.

On the domestic front, where the market is heavily influenced by weather and oil prices, this current heating season has been an improvement over the last two, albeit an unspectacular one. The season started with one of the coldest Decembers on record in New England (the biggest market for domestic wood pellets), but reverted within the range of a normal heating season after a warmer-than-usual January, and the warmest February in 30 years. Still, the market is in significantly better shape than it was a year ago, following two warm winters where weak demand was compounded by low oil prices (the main competing fuel for wood pellets).

North American Pellet Exports

Quarterly Wood Pellet Exports
Thousand MT

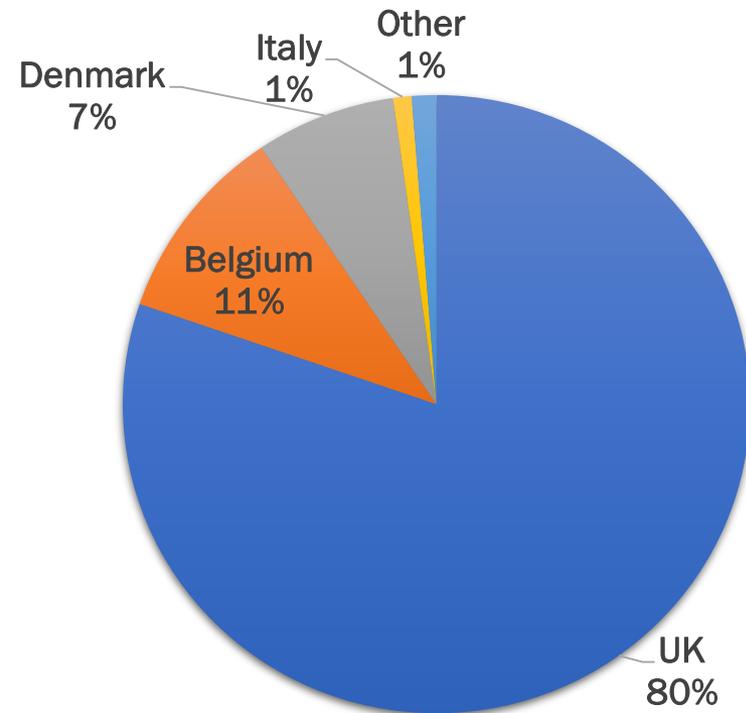


United States wood pellet exports reached record levels in the 4th quarter of 2017, exceeding 1.5 million MT for the first time. In 2017 the US exported 5.2 million MT, a 10.5% increase from a year ago. Canadian exports decreased moderately from record highs in 2016 (2.4 million MT) to 2.2 million MT in 2017.

US Pellet Exports

- In 2017 80% of US Pellet Exports went to the United Kingdom
- Actual exports to the UK were down slightly, but volumes to Denmark and Belgium increased 293% and 76%, respectively.
- The US exported 50,000 tonnes to the Italian heating market in 2017 after a 30-month hiatus due to weak pricing and the strong US dollar.
- A bulk shipment of pellets went to the Netherlands in October as co-firing activity resumed in the Dutch market.

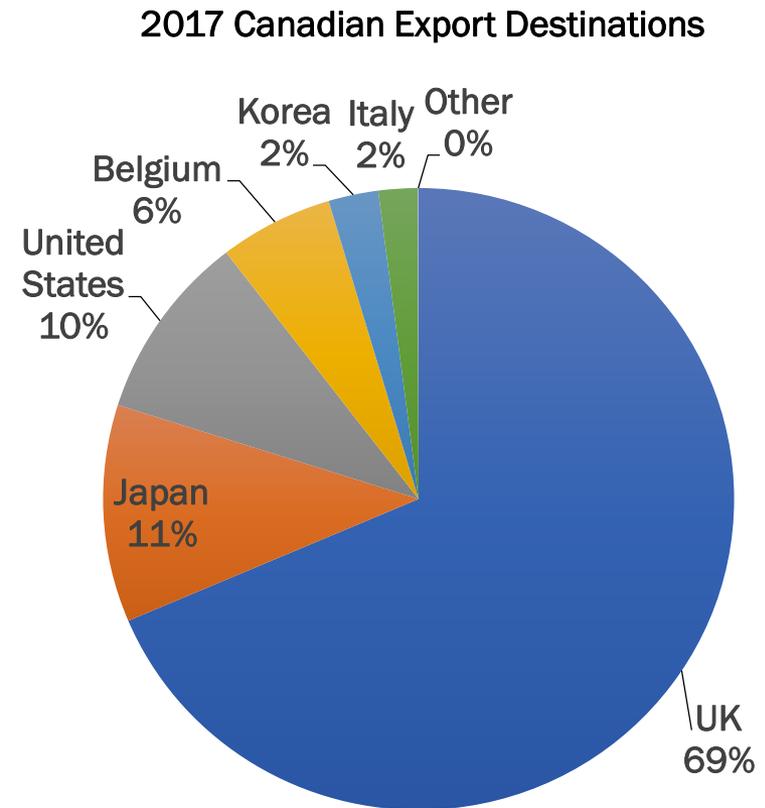
2017 US Pellet Export Destinations



Source: GTA

Canadian Pellet Exports

- Canadian pellet exports to the UK were down 10.5% from 2016 levels
- Exports to Japan were reported at 245,000 MT, down 10% from 2016. However, we believe there is an error in the trade data as Japanese imports of wood pellets from Canada were reported at 360,000 MT, a 30% increase from 2016. Industry sources corroborate the Japanese trade figures and FutureMetrics believes they are a more accurate indication of the market.
- Exports to US heating markets were up 24% to 210,000 MT.



Source: GTA

Export Markets Update

United Kingdom

Pellet demand in the United Kingdom expanded rapidly from 2012 to 2015 with the conversion of 3 x 660MW units at the Drax Power Station. After the third unit at Drax was converted, UK pellet demand has stabilized around 7 million MT/year. In 2017, the UK imported 6.8 million MT in 2017, 3% fewer than a year prior. However, the UK pellet market is poised for significant expansion in 2018 as EPH's 390 MW Lynemouth Power Station conversion is expected to commission throughout the first quarter. The Lynemouth station is expected to add an additional 1.4 million MT of pellet demand to the UK market. Moving forward, MGT Power's Teeside 299 MW CHP dedicated biomass plant will add yet another 1.5 million MT of demand, starting in 2020.

Denmark

Denmark's wood pellet imports jumped 50% in 2017 to a record 3.1 million MT. Much of the growth was a result of further conversions of central power stations by Danish utility Ørsted (formerly Dong Energy). Over the last several years additional pellet and woodchip conversions have taken place at Ørsted's Avedøre, Herning, Studstrup and Skaerbaek power plants. Ørsted has reduced its coal consumption from 6.2 million MT in 2006 to 1.1 million MT in 2017, and plans to eliminate all coal consumption by 2023. Most additional conversions plan to use woodchips or other low-grade material so further growth in wood pellet demand will likely be on a more moderate pace.

Belgium

Belgium's wood pellet imports increased 18% in 2017, to 1.1 million MT. Belgium's industrial pellet demand has remained relatively flat over the last 3 years around 1.1 million MT. We do not project a significant increase in Belgian pellet imports as several planned new power plants or conversions have failed to materialize over the last several years.

Netherlands

Wood pellet imports in the Netherlands increased significantly in 2017, jumping to 381,000 MT from 137,000 MT in 2016. The increase in demand came as utilities plan to resume co-firing at major power stations for the first time since 2012. The Netherlands had one of the largest industrial wood pellet markets prior to replacing their old subsidy scheme (the MEP) with the SDE+ scheme in 2012. Under the new scheme, sustainability criteria for biomass had to be established before co-firing subsidies could be granted. In 2015 criteria was established and utilities were allowed bid on co-firing subsidies, however none were successful. In 2016, with a higher budget available. RWE, Engie and Uniper were successful in securing subsidies that will allow them to co-fire up to 3.7 million MT annually.

Italy

Italy's wood pellet imports increased 9% to 1.8 million MT in 2017, though they remain below recent highs of 1.96 million MT in 2014. Italy is unique among major importers of wood pellets in that its imports are used for residential heating not the industrial replacement of coal. According to its 2017 report AEBIOM (the European bioenergy association) estimates there are more than 2.5 million pellet appliances installed in Italy.

Japan

Japan's wood pellet imports increased 46% to 510,000 MT in 2017. The Japanese market is poised for significant growth over the next decade as biomass power plants, supported by the country's Feed in Tarriff (FiT) system for renewable energy come on line. FutureMetrics projects that Japanese wood pellet demand will increase to 9.5 million MT in 2025. About half of that expected demand will come from dedicated biomass plants and half from cofiring at major coal facilities. In 2017 71% of Japan's supply came from Canada. Japanese buyers are interested in continuing to develop long term contracts and even vertically integrating in North America, as evidenced by Sumitomo Corporation's July acquisition of a 48% stake in Pacific Bionenergy. For more information about our outlook for wood pellet demand in Japan see FutureMetrics' [Japanese Biomass Outlook](#).

South Korea

South Korea imported a record 2.4 million MT of wood pellets in 2017. Nearly 90% of Korean wood pellet imports came from Southeast Asia, mainly Vietnam. Korean utilities co-fire wood pellets in major coal facilities in order to earn Renewable Energy Certificates (RECs) used to demonstrate compliance with the country's Renewable Portfolio Standard. Korean buyers have thus far been able to come to terms on long-term contracts with North American producers for two main reasons:

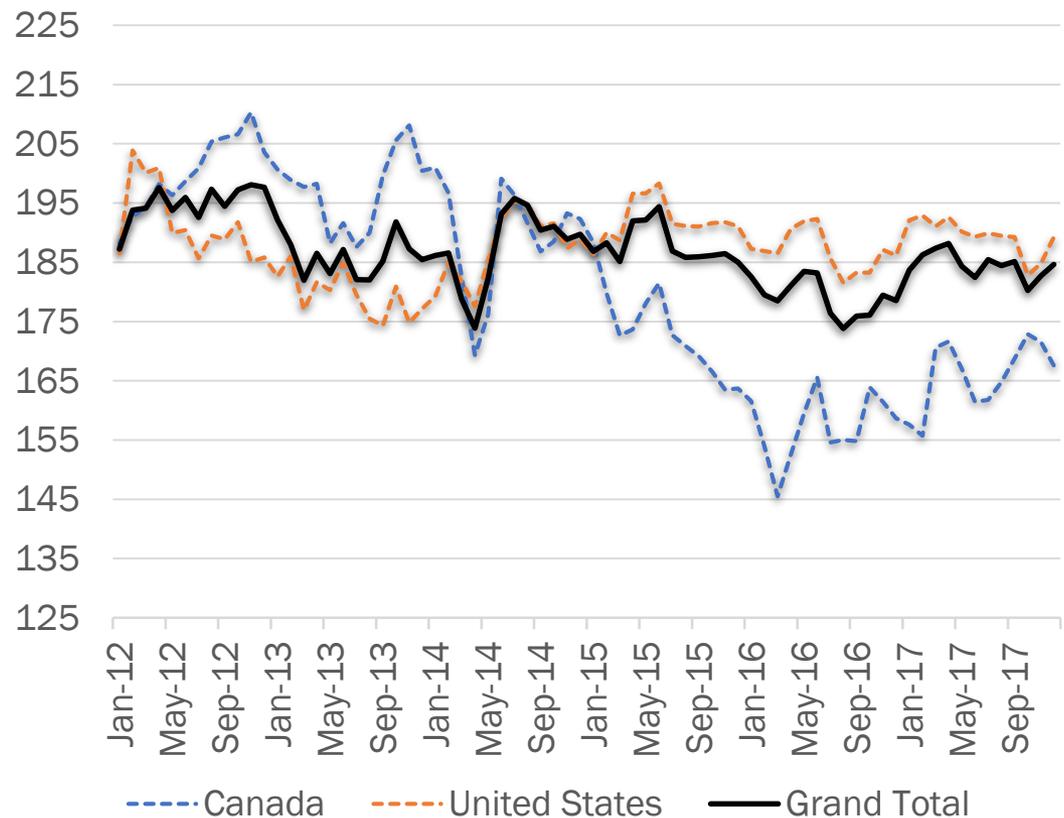
1. Depending on factors such as plant type and full firing vs co-firing pellets earn 1.0-1.5 RECs/MWh. Regulators have indicated that those rates could be reduced.
2. RECs are tradable, creating a great deal of market uncertainty regarding their future value
3. As part of an anti-corruption measure, major Korean utilities need to purchase fuel through a public tendering system, limiting their ability to enter into long-term bilateral contracts.

Pellet Export Prices

There are spot markets for wood pellets, however the vast majority of industrial wood pellets sold from North America are under long-term bilateral contracts. These contracts are typically, though not always, in local currency, which helps explain why the average contract price from Canada is now significantly lower than from the United States – since the Canadian dollar is comparatively weak (though it has recovered some recently).

For 2017, FutureMetrics North American pellet export price index was \$184/MT (CIF, Western Europe and UK), up 2.7% from 2016. The average price of wood pellets from the United States delivered to Western Europe in 2017 was \$189/MT, up 1% from 2016. The average price from Canada was \$167/MT, up 6.6% from 2016.

North American Pellet Export Contracted Prices
USD/MT CIF Western Europe



Source: GTA, FutureMetrics

North American Industrial Export Economics

The spread between spot and contract prices is a good indicator of market conditions and the relative competitiveness of North American pellet suppliers. In January 2017, that spread was at its highest level, with spot prices, indicated by *Argus Biomass Markets CIF ARA* index around \$112/MT and average prices from North America, landed in the UK, Belgium and Denmark at \$184/MT. Throughout 2017, that spread narrowed significantly, dropping to ~\$20 in December.

The narrowing of the spread was caused by two main factors, improved conditions in the European market, and a weakened US dollar.

At the start of 2017, European pellet markets were coming off of multiple warm winters and slower-than-anticipated development in Industrial markets, leading to an over-supply in the market. For US producers, compounding the weak spot market was the strength of the US dollar.

Throughout 2017, spot market prices improved with help from increased demand in Denmark, the anticipation of growth in UK and Dutch markets, and a more normal winter. From a US perspective, the dollar also depreciated significantly, from 1.05 usd/eur and 1.30 usd/gbp at the start of 2017 to 1.23 and 1.35, respectively.



Source: Argus, FutureMetrics

Domestic Pellet Market Update

“Better, but not great”

The 2017-2018 pellet heating season started out on much firmer ground than the previous two years. According to EIA data, inventory levels in October were 34% lower than the previous year. Producers reported strong pre-season buying in response to low prices being offered in an effort to clear the glut of inventory that had built over the last two years.

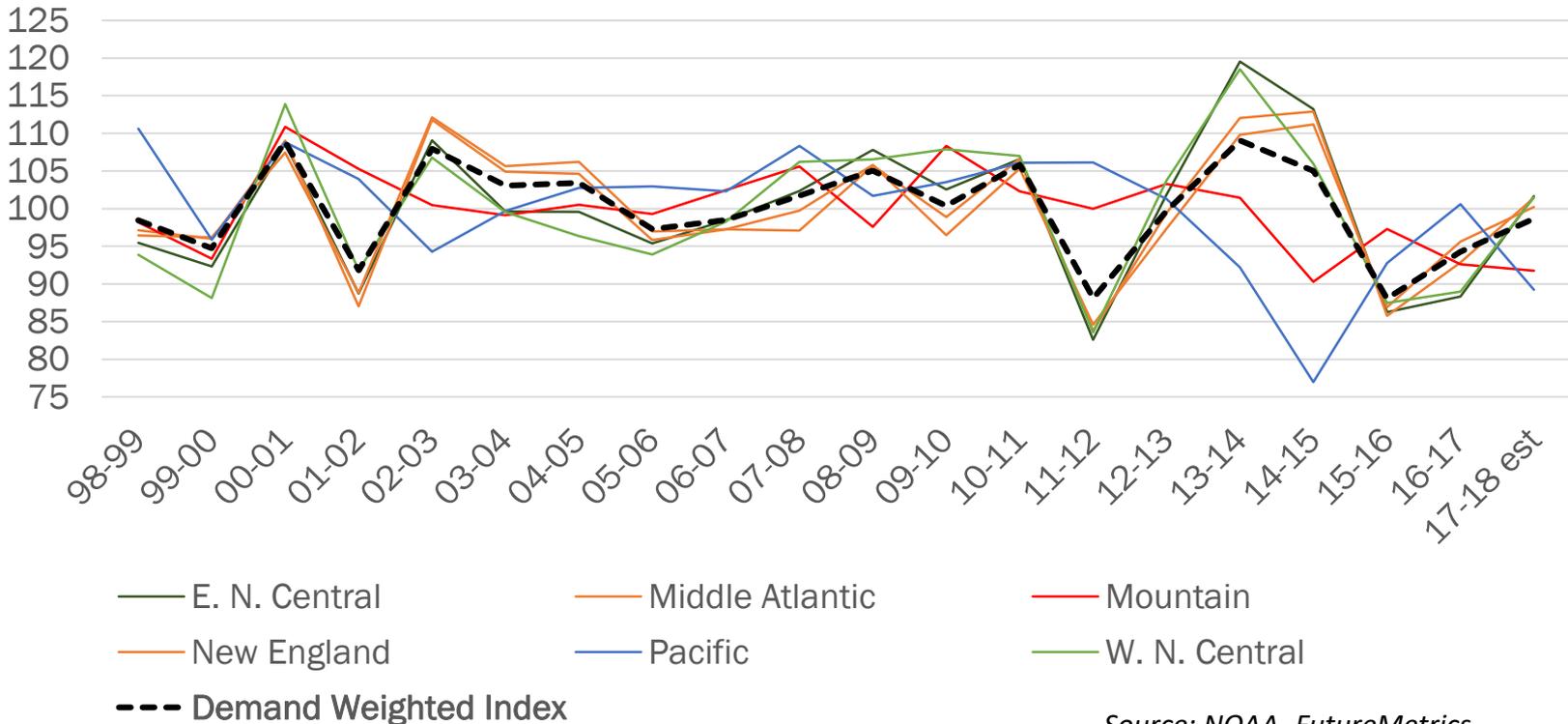
Aside from being better positioned from an inventory standpoint, pellet producers got some much-needed relief from external factors at the start of the heating season: a moderate recovery in oil prices and one of the coldest Decembers on record in the Northeast. Heating oil prices in Maine averaged \$2.82/gal in January, the highest price since September 2014 and 23% higher than a year prior (63% higher than two years ago). Based on heating degree day (HDD) statistics this past December was the coldest in New England since 2000 and the third coldest over the last 30 years.

Following the strong start to the heating season, temperatures, along with pellet demand, have moderated. While this past December may have been exceptionally cold, February was unseasonably mild. In fact, it was the warmest February recorded since 1990. In totality, the 2017-2018 pellet heating season will likely end with HDDs near historical norms. FutureMetrics' HDD Index, a weighted national index of HDDs based on regional contribution to total demand (Figure on slide 14) is estimated at 98.7 for 2017-2018 – slightly below “normal”, but significantly better than the last two years.

Extended cold in the North could set producers in for a strong off-season

A warm February may have seemed like an early end to the pellet heating season, but pellet producers may benefit from an extended heating season with a cold and stormy March, particularly in the mid-Atlantic and southern New England. At this time of year, big box stores are setting up for yard and garden equipment and are not likely to replenish inventories once depleted. This could drive consumers to local hearth and home, feed, or hardware stores which may benefit producers with more diversified and local accounts.

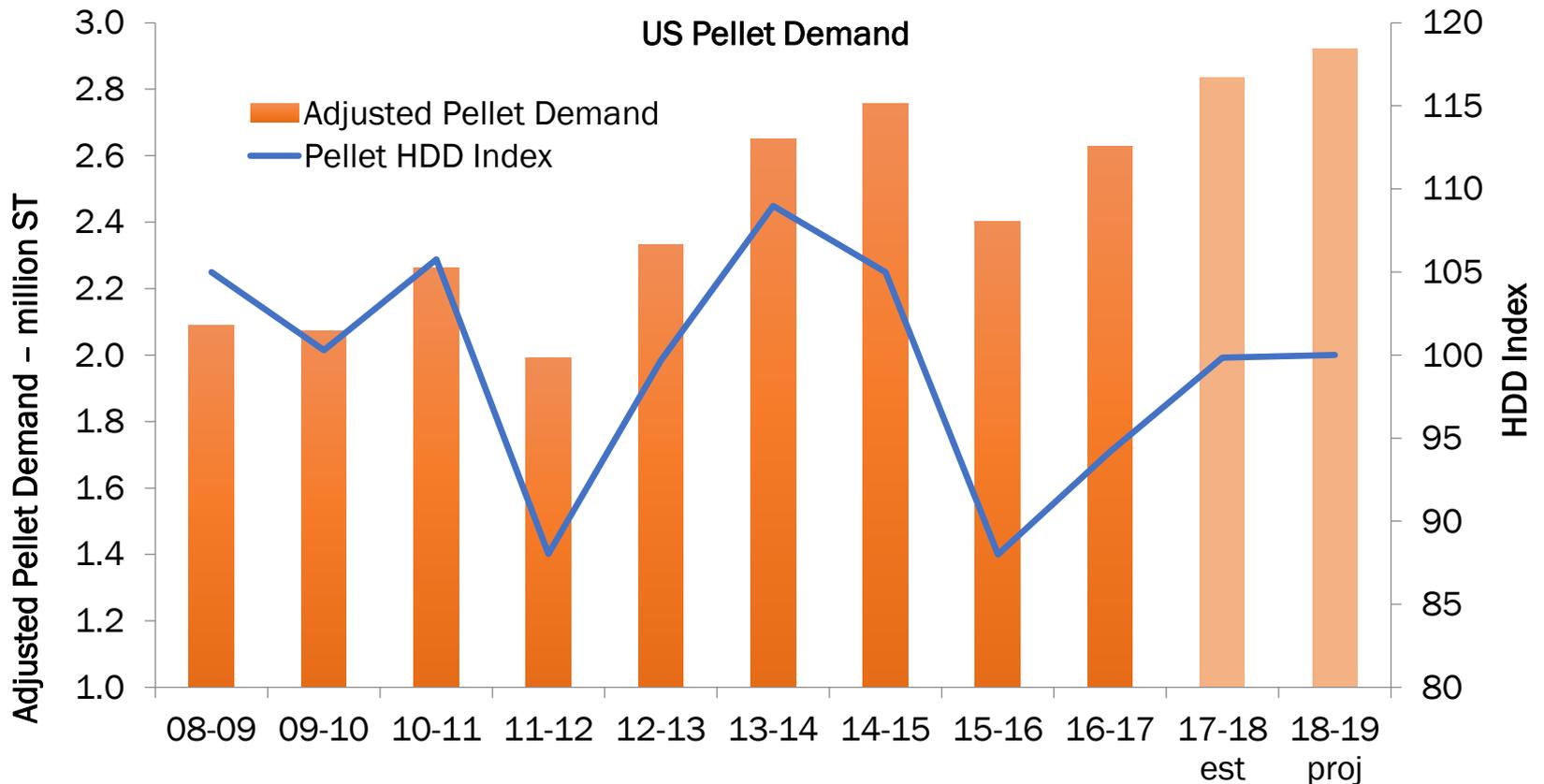
FutureMetrics Pellet HDD Index



Source: NOAA, FutureMetrics

Extended cold in the North could set producers in for a strong off-season

US pellet demand is estimated at a 2.8 million ST for the 2017-2018 heating season, an 8% increase from last year, mostly reflective of improved market conditions in New England, which carries a higher weight in our demand index than any other region. Pellet demand is projected to increase moderately in 2018-2019, though market fundamentals are currently playing a small role in demand in any given season, when compared to the role of weather.



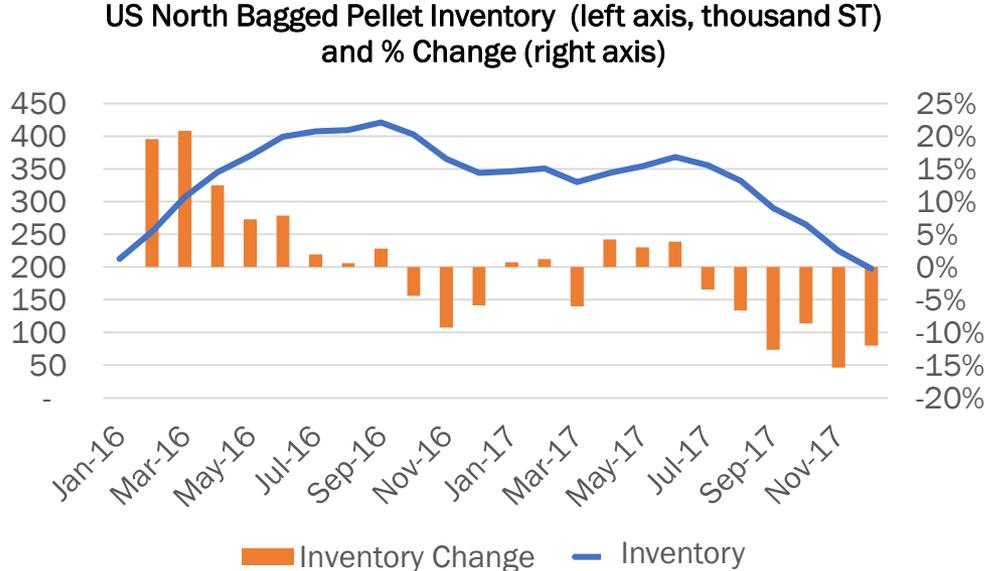
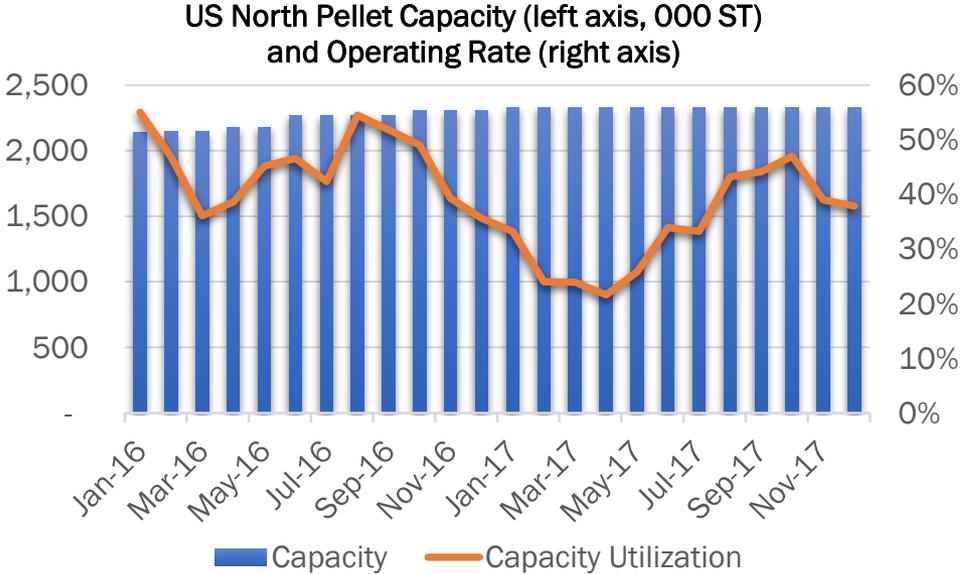
Source: HPBA, FutureMetrics

Northeast / North Central Production

In the December EIA survey, capacity utilization in the “East,” which includes the Northeast as well as North Central regions, was at 38%. While up from recent lows of 22% in April. This level is far below what FutureMetrics estimates would be indicative of a healthy market. Industry-wide, we estimate the domestic market (excluding industrial export mills) would be considered at full production with capacity utilizations of about 80% of nameplate.

We project that when figures for January are released, capacity utilization will have increased moderately. However, some producers reported outages in February and early March as demand moderated throughout late January and February.

Inventory levels in the North are starting to come under control and have fallen for 6 straight months and are now under 200,000 ST for the first time since the EIA survey began.



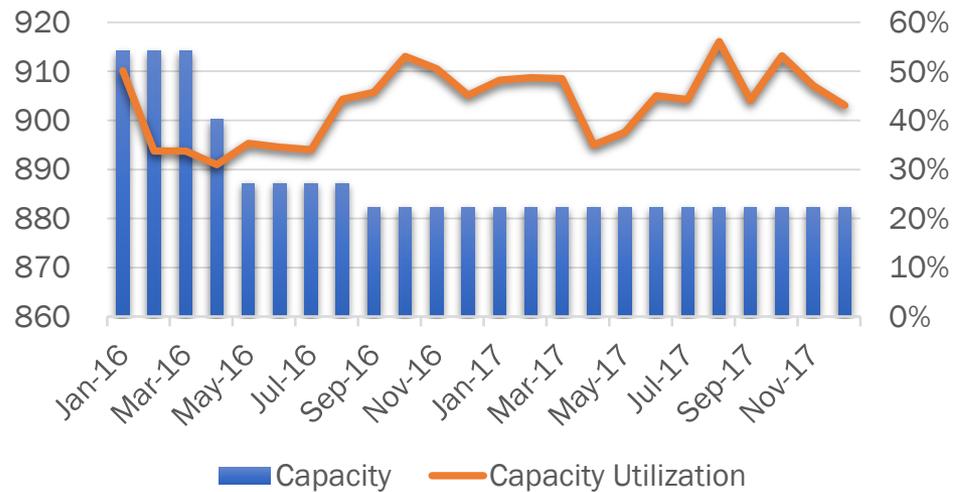
Source: EIA, FutureMetrics

West Production

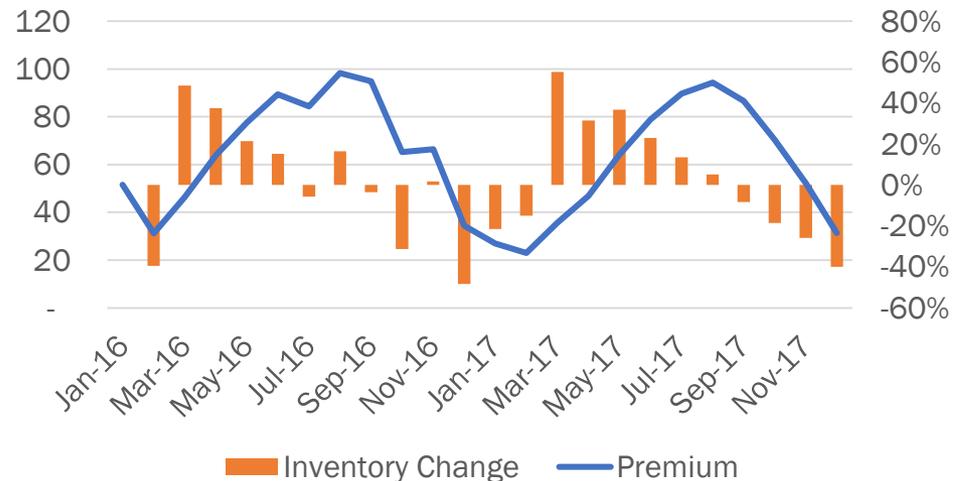
Production data for December indicates that levels will be down only moderately in 2017-18 compared to last year, despite a significantly warmer winter. Some of the reason for only a moderate decline has to do with the quality of pellets being produced in the West, as some premium softwood pellets, particularly Douglas fir, carry a large price premium allowing producers to maintain production levels and ship to other regions when needed. Some local mills that produce commodity-grade mixed feedstock pellets will likely have reduced their production levels compared to a year ago.

The West has been in a significantly better inventory position when compared to the “East” over the past two seasons, with inventory levels peaking in August and dropping throughout the heating season.

US West Pellet Capacity (left axis, thousand ST) and Operating Rate (right axis)



US West Bagged Pellet Inventory (left axis, thousand ST) and % Change (right axis)



Source: EIA, FutureMetrics

South Production

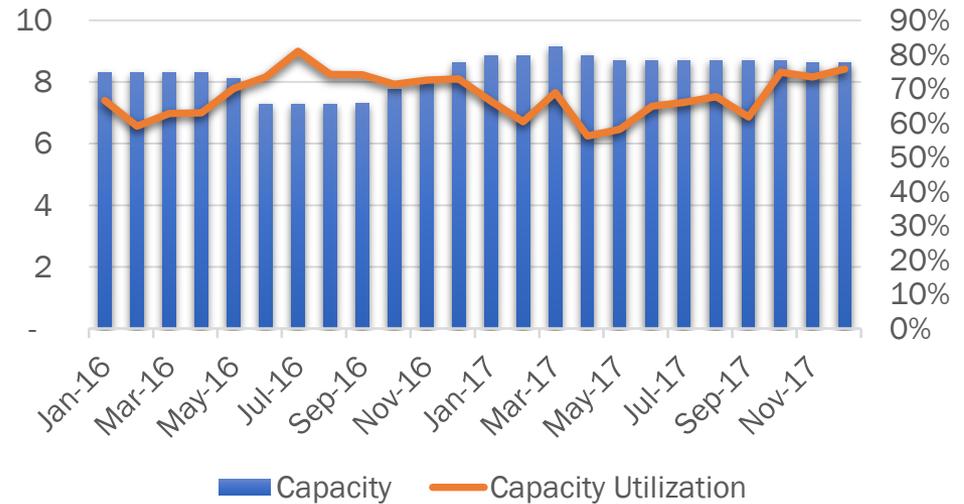
US South pellet capacity utilization has increase from a low of 56% in April of last year to 76% in December – a trend reflective of broader improvement in global industrial pellet markets.

Virtually all current wood pellet production in the US South is for the industrial export market (95% in 2017 according to EIA survey results). US South industrial pellet production reached 5.5 million MT in 2017, a 5.2% increase from 2016.

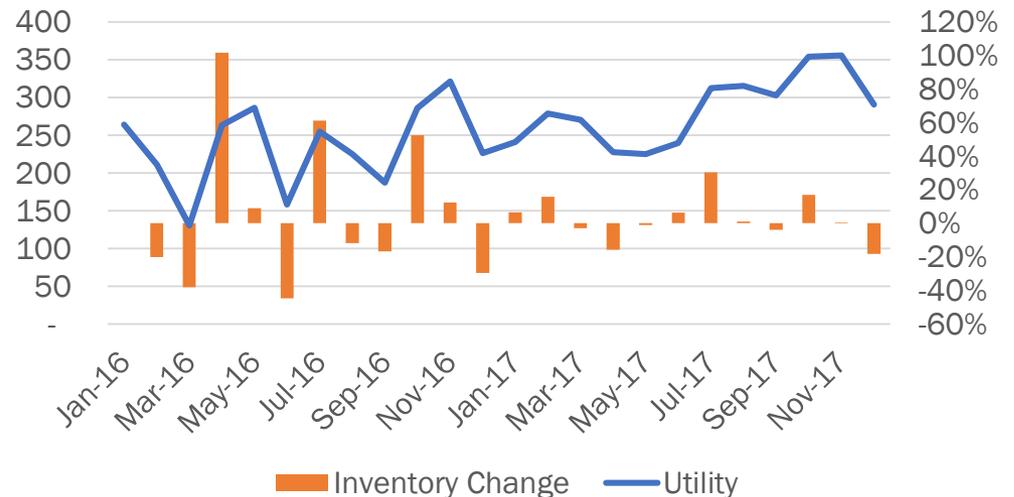
Capacity expansions in 2017 included the restart of Westervelt’s Aliceville, AL mill and the completion of commissioning at Enviva’s Sampson, NC mill.

Announced capacity expansions that FutureMetrics believes are viable are currently limited to Enviva’s 600,000 MT/year mill in Hamlet, NC

US South Pellet Capacity (left axis, million ST) and Operating Rate (right axis)



US South Industrial Pellet Inventory (left axis, thousand ST) and % Change (right axis)



Source: EIA, FutureMetrics

New England Pellet Pricing

FutureMetrics' New England Pellet Price Index started in 1995 and tracks bagged pellet prices in Northern New England.

FutureMetrics has recently expanded data collection elsewhere in New England and now also collects data on retailers, regions, brands, and other information. More analysis from this new survey is located on the next slide. *

FutureMetrics' New England Pellet Price Index was \$259 in February 2018, up 10% from the low of last off-season, in June, and 1.6% higher than this time last year.

*Please contact FutureMetrics if you are interested in more granular information or custom analysis based on our new survey.



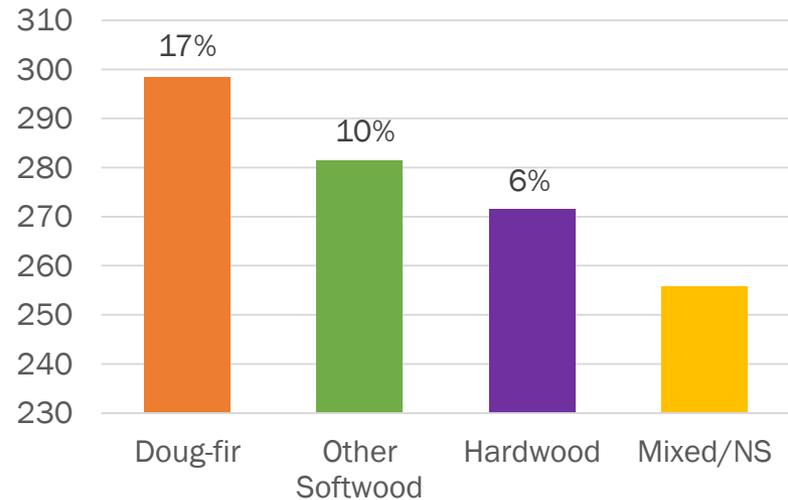
Source: FutureMetrics

New England pellet prices vary significantly based on the type of pellets being sold and the region in which they are sold.

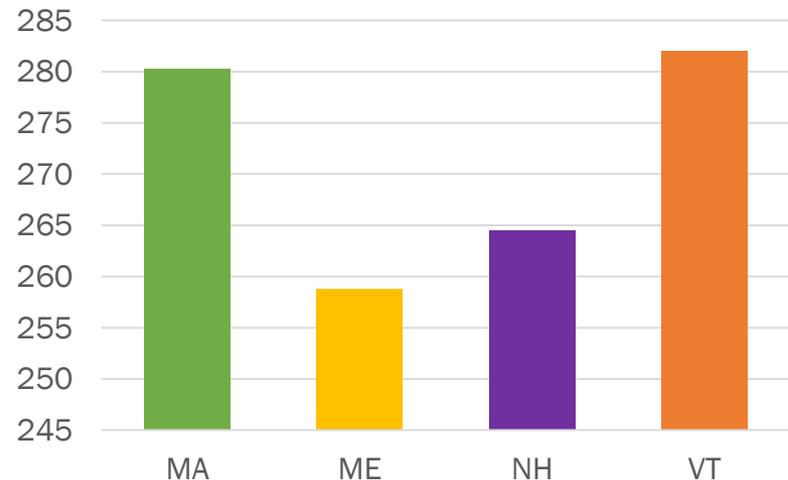
Douglas-fir pellets, which are shipped from the West coast or British Columbia, have a loyal following and carry the strongest premium in the region (17% when compared to mixed or species not specified pellets). Other types of softwood pellets, which are typically energy dense and have low ash content, also had a significant premium (10%). Interestingly, pellets branded as hardwood also carried a premium over species not specified, likely due to many New Englander's affinity with hardwood fire wood.

Pellet prices in Maine and New Hampshire were significantly less expensive than those in Massachusetts and Vermont. There are no pellet mills in Massachusetts so there is an added shipping cost to get to the region. In Vermont, the only in state pellet mill whose prices were captured in this survey was Vermont Wood Pellets, an ultra-premium softwood brand.

New England Pellet Prices by Species
\$/ton



New England Pellet Prices by State
\$/ton



Source: FutureMetrics

Competing Fuel Prices

Competing fuel prices have returned to the hierarchy that has become the norm over the last decade. Pellets show a comparative cost advantage over heating oil, propane, kerosene and electricity, but little to no savings when compared to natural gas. During much of the 2015-16 and 2016-17 heating seasons, heating oil was actually cheaper than wood pellets (figure to right). Pellet producers are happy that trend has reversed during the 2017-18 heating season.

Comparative Heating Fuel Prices 1/29/18

| | Units | \$/unit | \$/MMBTU |
|-------------|--------|---------|----------|
| Cord Wood | cord | 250 | 11.36 |
| Pellets | ton | 260 | 15.64 |
| Natural Gas | therm | 1.69 | 16.93 |
| Heating Oil | gallon | 2.95 | 21.27 |
| Kerosene | gallon | 3.57 | 26.44 |
| Propane | gallon | 2.82 | 30.88 |
| Electricity | kWh | 0.175 | 51.29 |

Source: Maine Governor's Office

New England Heating Oil Prices
\$/gal (left) and \$/ton pellets equivalent (right)



Source: Maine Governor's Office, FutureMetrics

Upcoming Events and Announcements

- FutureMetrics' William Strauss will be attending and giving the opening keynote address at the Wood Bioenergy Conference, April 11-12 in Atlanta.
- FutureMetrics' William Strauss, John Swaan, Seth Walker and Laurenz Schmidt will be attending the upcoming Argus Biomass 2018, April 17-19 in London
 - William Strauss will also be presenting about Korean and Japanese demand
 - Seth Walker will be presenting during Argus' first dedicated woodchip trade date
- FutureMetrics' William Strauss, John Swaan and Seth Walker will be in Tokyo for the 9th Biomass Pellets Trade & Power Conference, May 15-18
- FutureMetrics' William Strauss, John Swaan and Seth Walker will be in Prince George for the 8th Canadian Bioeconomy Conference and Exhibition
 - Seth Walker will be presenting
- FutureMetrics' *Japanese Biomass Outlook* and *Technical and Economic Analysis of Steam Exploded Pellets – An Independent Review of Arbaflame Technology* by FutureMetrics are available for purchase [on our website here.](#)

FutureMetrics North American Pellet Market Quarterly

Published during the last month of each quarter.