



## FutureMetrics LLC

8 Airport Road  
Bethel, ME 04217, USA

### Japan and South Korean Industrial Wood Pellet Markets:

#### Insights into their ability to pay for pellets

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By William Strauss, PhD, President, FutureMetrics

There have been many forecasts regarding potential wood pellet demand in Japan and South Korea. For demand to materialize and support stable supply, the price that is paid for the pellets must be high enough and have sufficient tenor to support the investments into new production capacity.

As FutureMetrics noted in an important white paper a few years ago<sup>1</sup>, the South Korean REC market is inherently unpredictable and thus, the ability to pay by S. Korean buyers is also unpredictable.

Japanese buyers, on the other hand, have a policy that produces a predictable revenue for power producers for a known length of time.

This short white paper will show a few scenarios that will provide insight into how the policies do or do not support the power producers' ability to pay for pellet fuel under sustainable and equitable long-term offtake agreements.

**South Korea** – As noted in the paper referenced in the footnote, FutureMetrics has been concerned about the stability of S. Korean demand for a number of years. Recent data continues to support our concerns. The chart on the next page shows that REC prices have collapsed<sup>2</sup>. Excess supply (and/or insufficient demand) has pushed the market price for a REC to under US\$52. In May of 2017 RECs were more than US\$112 (at the current exchange rate) or 115% higher than in September 2019.

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<sup>1</sup> "Why the South Korean Utilities May Never Engage in Long Term Offtake Agreements", May 2017.

<sup>2</sup> As of August 2019, only the average price for the month is published. High and low data are currently not available.

**FutureMetrics will be publishing a comprehensive report on the Japanese power markets in November 2019.**

The report will contain unique data gathered directly from Japanese language documents and spreadsheets by the report's principal author: FutureMetrics' Chief Researcher and Analyst, Annette Bossler.

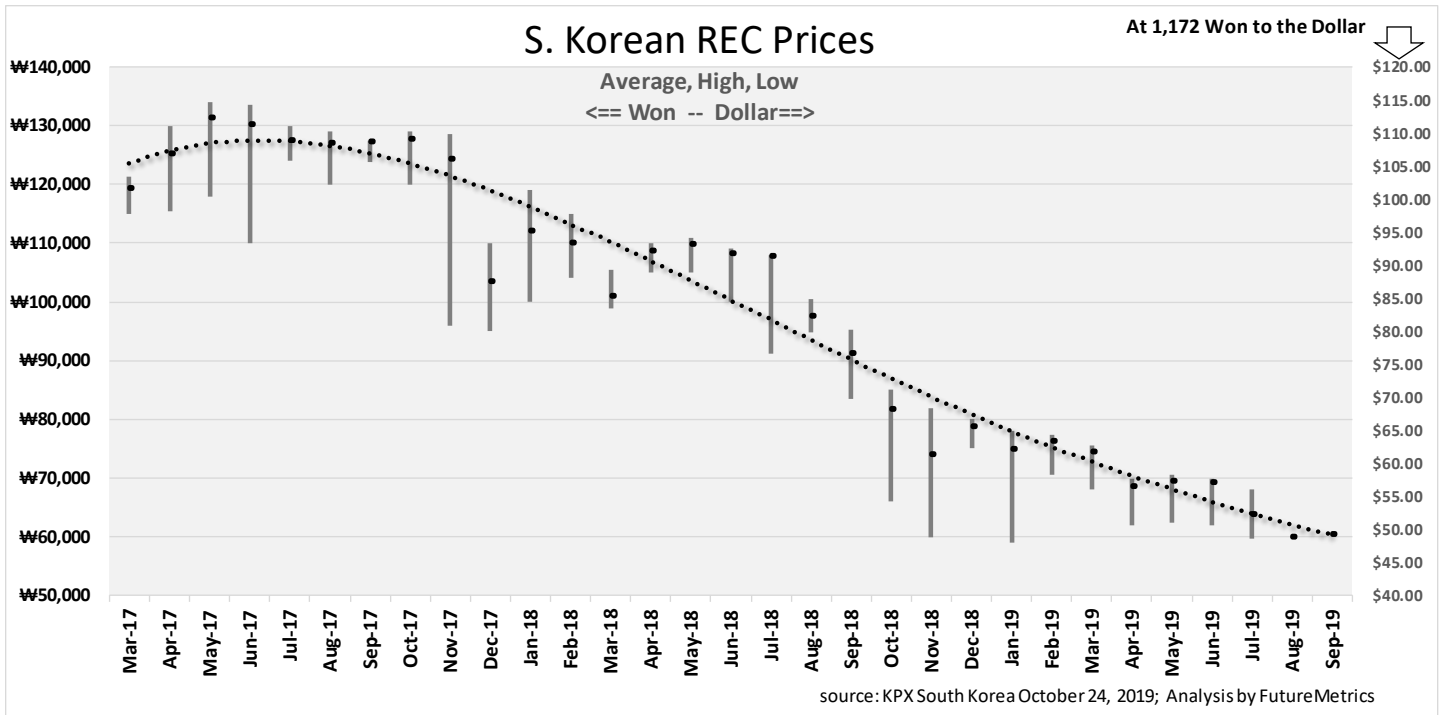
Topics include a comprehensive analysis of current and future demand for pellets, potential criteria for meeting sustainability requirements, an overview of ports that are importing pellets, an overview of how power markets are transitioning in Japan, and a number of other **topics relevant to understanding how to strategically plan for Japan's renewable energy transition.**

The report will be available for purchase on the FutureMetrics website in November 2019.

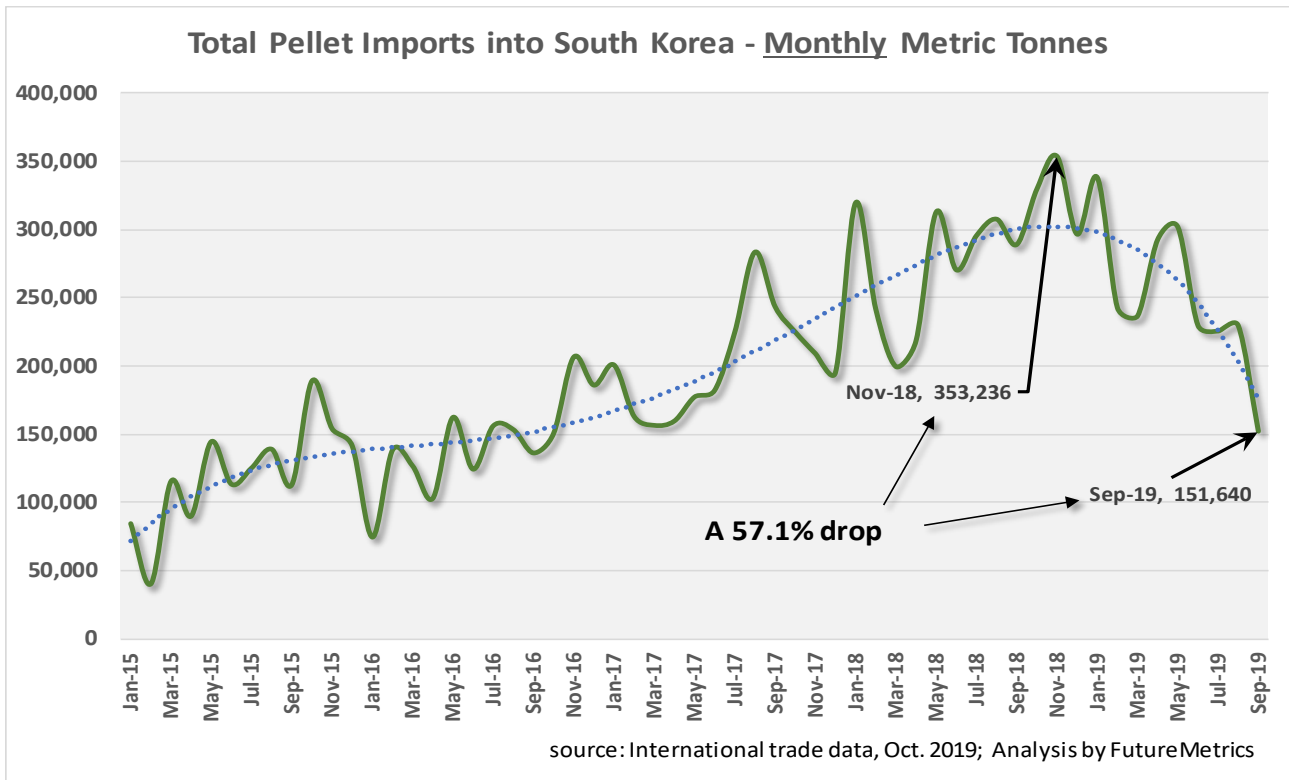


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The fall in REC prices has resulted in a dramatic drop in imports into S. Korea.

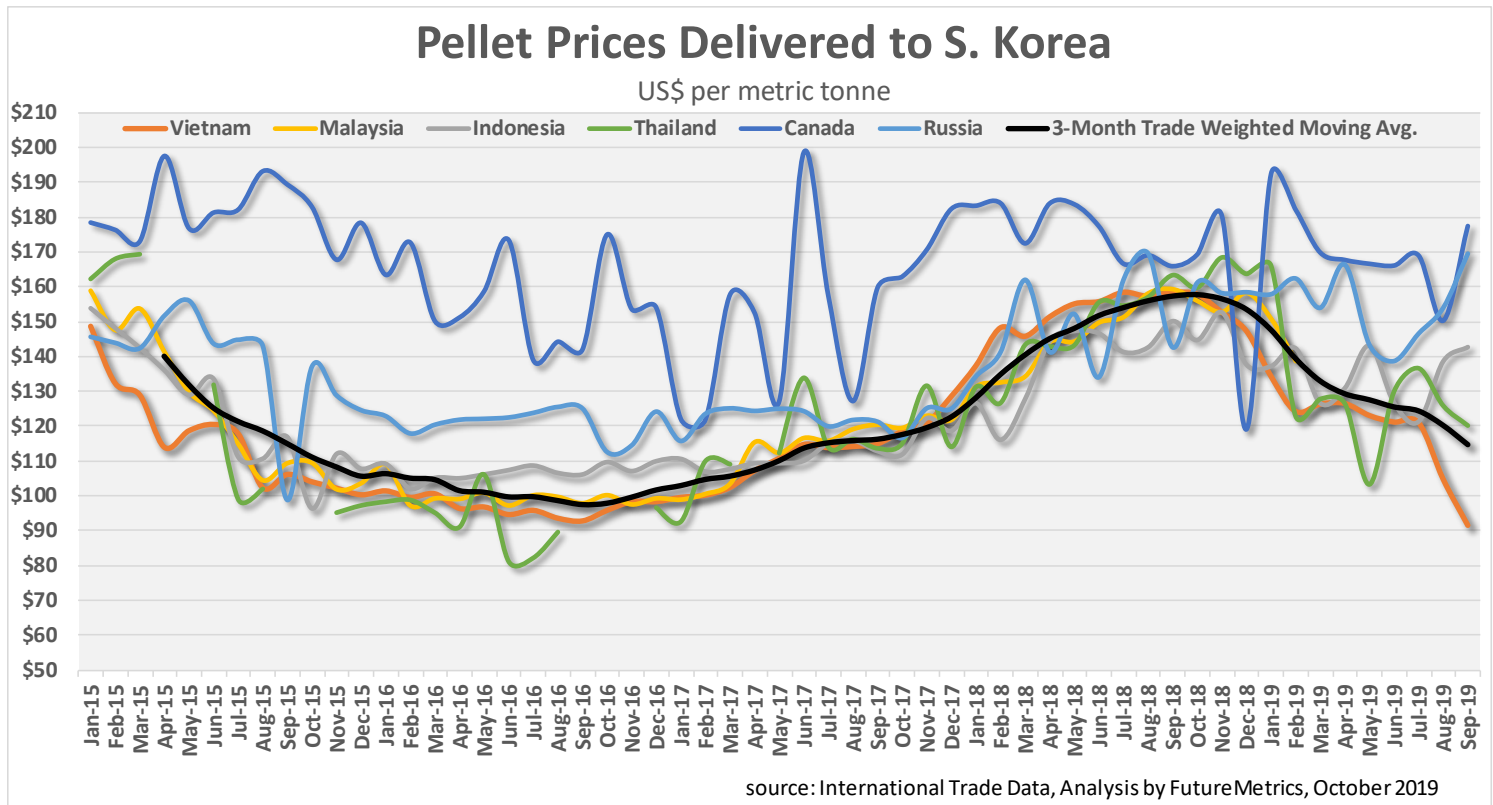




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And that fall in demand combined with slack supply has resulted in a steady fall in the trade weighted average price of pellets delivered to S. Korea.



In September 2019, FutureMetrics' estimated prices for pellets delivered (not FOB) from Vietnam (the orange line in the chart above) reached the lowest price recorded (US\$91.63 at current FX) since the pellet trade took off in 2015. Vietnam has 60% to 70% of the S. Korea pellet market share, so drops in demand from S. Korea have a strong impact on Vietnam pellet producers<sup>3</sup>.

The low REC prices have changed the cash flows for existing co-firing plants. But the major change is due to the new REC weightings (see table below). The combination of low REC prices and the generation of only ½ REC per MWh for full conversions and new build power stations, and zero RECs/MWh for any new co-firing has impacted the current and future S. Korean market for wood pellets both in terms of volume demanded and the prices that S. Korean buyers are willing to pay.

<sup>3</sup> See the FutureMetrics white paper, "Recent Developments in the South Korean Industrial Wood Pellet Markets", published July 29, 2019 for more on the impact to Vietnam producers.



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South Korea REC Weighting per MWh Generated			
<b>Wood Pellets</b>			
New build dedicated		1.5	
	Operational		1.5
	To start within 6 months		1.5
	To start by June 2019		1.0
	To start after June 2019		0.5
Dedicated conversion		1.0	
	Operational		1.0
	Planned		0.5
Co-firing		1.0	
	Operational		1.0
	Planned		0.0

For a REC price of ₩60,000 and for new full firing of wood pellets projects (0.5 REC/MWh), the breakeven cost of the pellets delivered to the power station is about \$135 per tonne. That cost includes the pellet producer's gate price, mill-to-port and port storage and loading costs, shipping costs, and port-to-power plant costs<sup>4</sup>. The current trade weighted import price shown in the chart on the previous page (which does not include S. Korean port charges and internal logistics to the power station), is below that. This is mostly on the backs of Vietnam producers who are experiencing record low prices. If REC prices fall to ₩45,000, the breakeven cost of pellets delivered to the power station falls to about \$123/tonne.

As the S. Korea RPS<sup>5</sup> requirements ramp up to 10% in 2023 (from 6% in 2019 and 7% in 2020), demand by the major utilities for renewable solid fuel may increase. This could rebalance the supply and demand for RECs and firm up REC prices for a period of time.

But uncertainty regarding REC prices and how S. Korea may again change the rules will likely prevent most S. Korean generators from engaging in long-term offtake agreements for substantial quantities of pellets.

This is not the case with Japan

**Japan** – The Japanese feed-in-tariff (FiT) provides a stable foundation for biomass demand. FiT approved projects receive a fixed revenue per kWh for 20 years from the start of generation. The forthcoming report by FutureMetrics referenced on page one of this white paper will contain details regarding expected future demand from the independent power producers (IPPs) and potentially from the major utilities. For the

<sup>4</sup> Derived using the [FutureMetrics online dashboard](#). The dashboard is free to use at this [LINK](#). The dashboard requires Adobe Flash to be enabled on the web browser.

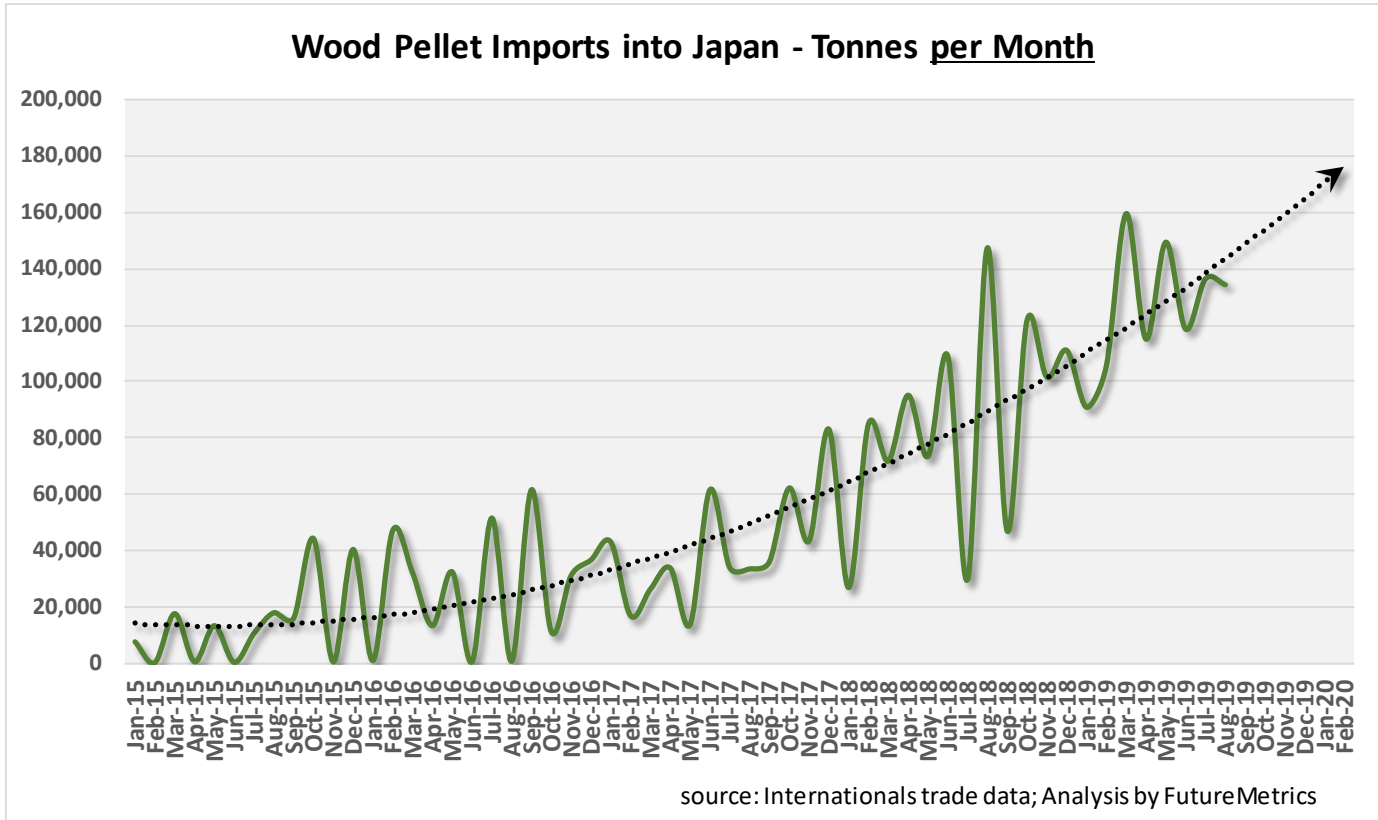
<sup>5</sup> Renewable portfolio standards. [HERE](#)



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already FiT approved IPPs<sup>6</sup>, demand could exceed 4.5 million tonnes per year by 2023-24 (an average of about 375,000 tonnes per month). As the chart below shows, Japanese demand has recently averaged about 125,000 tonnes per month.



The ability to pay by Japanese buyers is supported by the known top line revenue from the FiT. Most of the IPP projects currently operating or in the construction pipeline will receive ¥24/kWh. That is about US\$0.23/kWh or US\$229/MWh at current exchange rates.

The FiT rate is fixed for 20 years. Therefore, inflation risk has to be considered by both the buyer and the producer (more on this below). But at \$229/MWh, FutureMetrics estimates that there is a large buffer between the revenues from power sales and the cost of generation.

Assuming a gate price at the pellet factory in the year 2020 of \$145/tonne and transport costs that result in the cost per tonnes delivered to the power station to be about \$200, and assuming a 2.0% per year pellet price escalator, the IPP would be expected to have positive cash flow every year between 2020 and 2040 (the 20-year duration of the FiT).

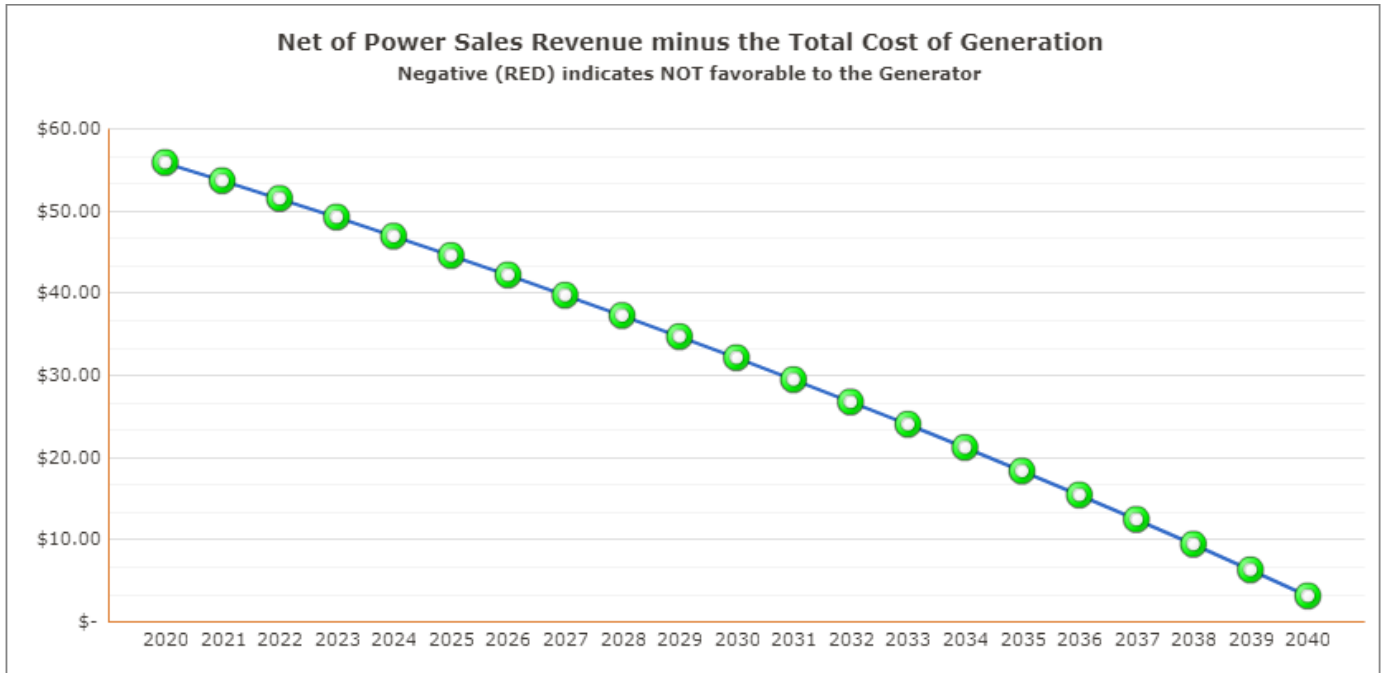
<sup>6</sup> The FiT program has been updated and it is unlikely, under its current rules, that any further wood pellet fueled power plants will receive the FiT.



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The chart below, from the FutureMetrics online dashboard, shows that under those assumptions, the IPP has positive net cash flow in the mid-\$50 per MWh range in 2020. As the delivered pellet prices increase due to the annual escalator, given that the top line revenue is fixed, the margins shrink to nearly zero in 2040.



### Estimated Price of Delivered Pellets - Gate Price plus transport costs from mill to power station

2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
\$201	\$205	\$209	\$213	\$217	\$221	\$226	\$230	\$235	\$240	\$245	\$249	\$254	\$259	\$265	\$270	\$275	\$281	\$287	\$292	\$298

Japanese policy offers certainty. IPPs can engage in long-term contracts. And based on the assumptions input into the FutureMetrics dashboard for this example, it would appear that a delivered to the power plant price of \$200 per tonne in 2020 with a 2.0% per year escalation in the price of pellets offers enough buffer for the IPP to at least engage in a 10 year contract with no risk of losing money.

The ability to pay a high enough price to support a gate price that yields positive cash flows for the pellet producer, and the ability to engage in a 10-plus year agreement to buy pellets, provides the foundation for the development of pellet factories dedicated to supplying the Japanese buyer.

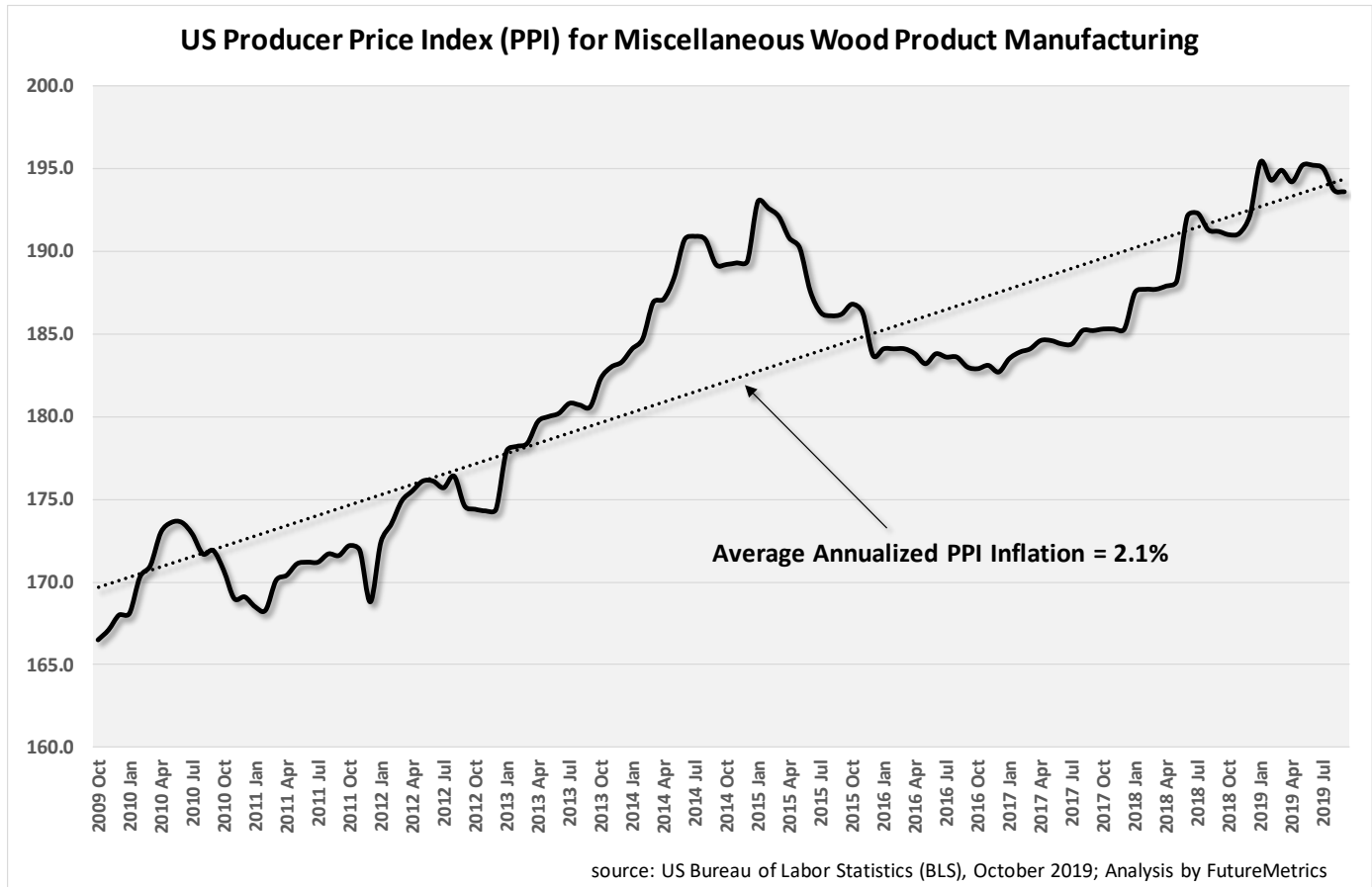
The annual price adjustment provides a shield to the producer from external macro and microeconomic market forces that will likely cause the input costs for pellet production to rise over the term of the agreement. That inflation risk has to be considered in a long-term agreement. The chart below shows the US producer price index for miscellaneous wood products manufacturing (there is no index for pellet



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manufacturing). Over the past 10 years, producers have experienced an average annual increase in costs of about 2.1%.



What inflation will be over the next 10 plus years is not known. But it is likely that input costs to pellet producers will increase. For example, a significant portion of the cost of delivered wood fiber to the pellet factory is from the cost of the diesel fuel used in harvest and transport. As diesel fuel prices increase, wood costs for the pellet producer will increase.

Fortunately, the Japanese FiT provides a high enough top line revenue per MWh to allow the IPPs to engage in long-term offtake agreements that contain terms that work for both the producer and the buyer.

Unfortunately, under current policy, the South Korean RPS does not.