

# Wood Pellets in the US: Market Opportunities and Expected Growth

Presented by William Strauss  
President, FutureMetrics  
Co-founder, Maine Energy Systems



2014 Pellet Fuels Institute  
Annual Conference  
JULY 27 - 29, 2014 | ORLANDO, FL



# ***FutureMetrics LLC***

***Globally Respected Consultants in Wood  
Pellet Project Development***

8 Airport Road  
Bethel, ME 04217, USA

# FutureMetrics Services:

Expert advice, analysis, and strategic guidance for the wood pellet sector.

We combine data driven analysis with a depth of knowledge across the pellet sector to provide full spectrum reporting that enables our clients to make optimal decisions

## *Selection of Clients*



Photo courtesy of Alan Sherrard, Editor in Chief, Bioenergy International



Dr. William Strauss, President, FutureMetrics

**Recipient of the 2012 International Excellence in Bioenergy Award**

May, 2014  
Deal Valued at \$50.1 Million

---

**NEW ENGLAND**  
  
**WOOD PELLET**  
★  
Jaffrey, New Hampshire

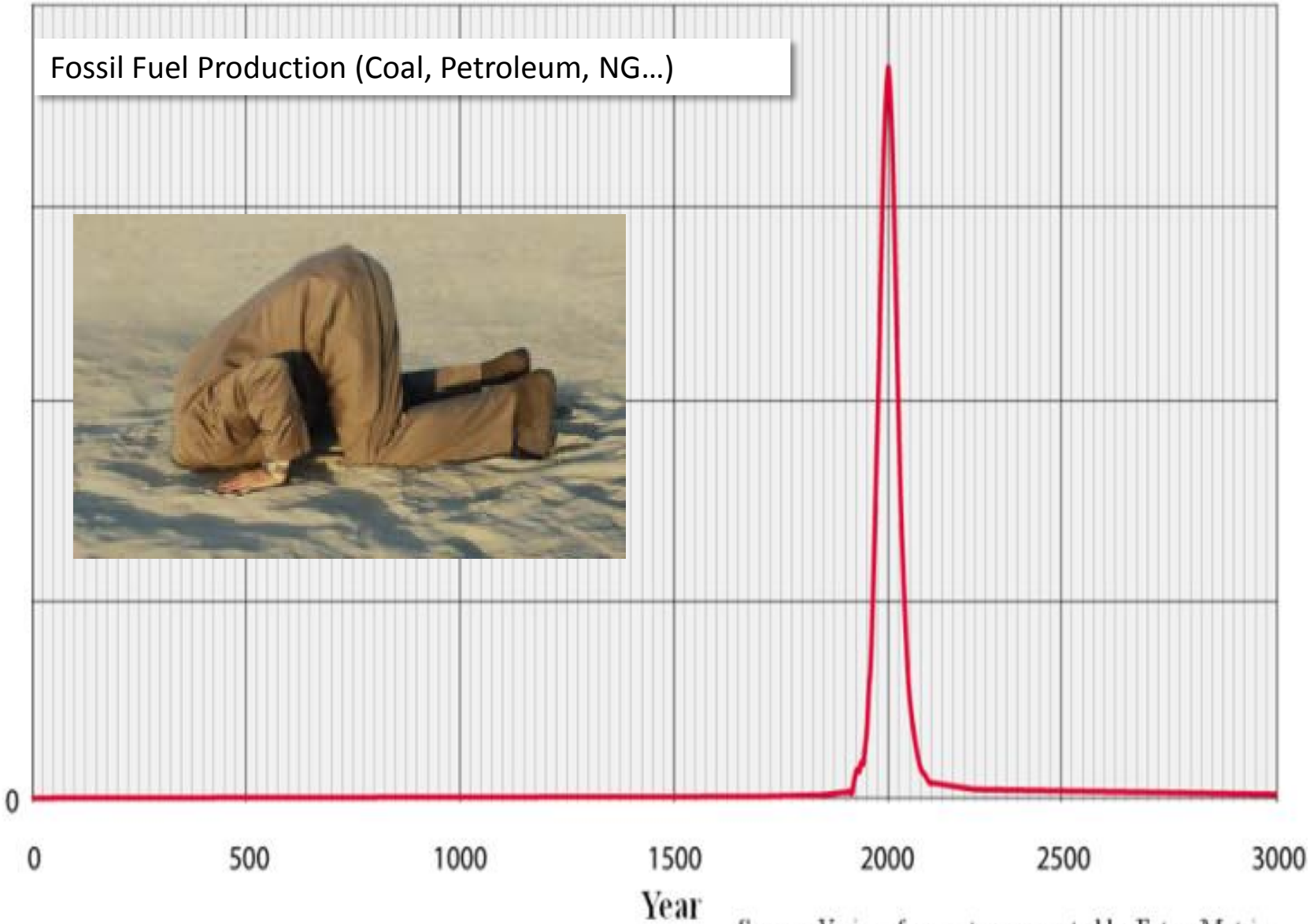
**HAS BEEN ACQUIRED BY**

  
Denver, Colorado

---

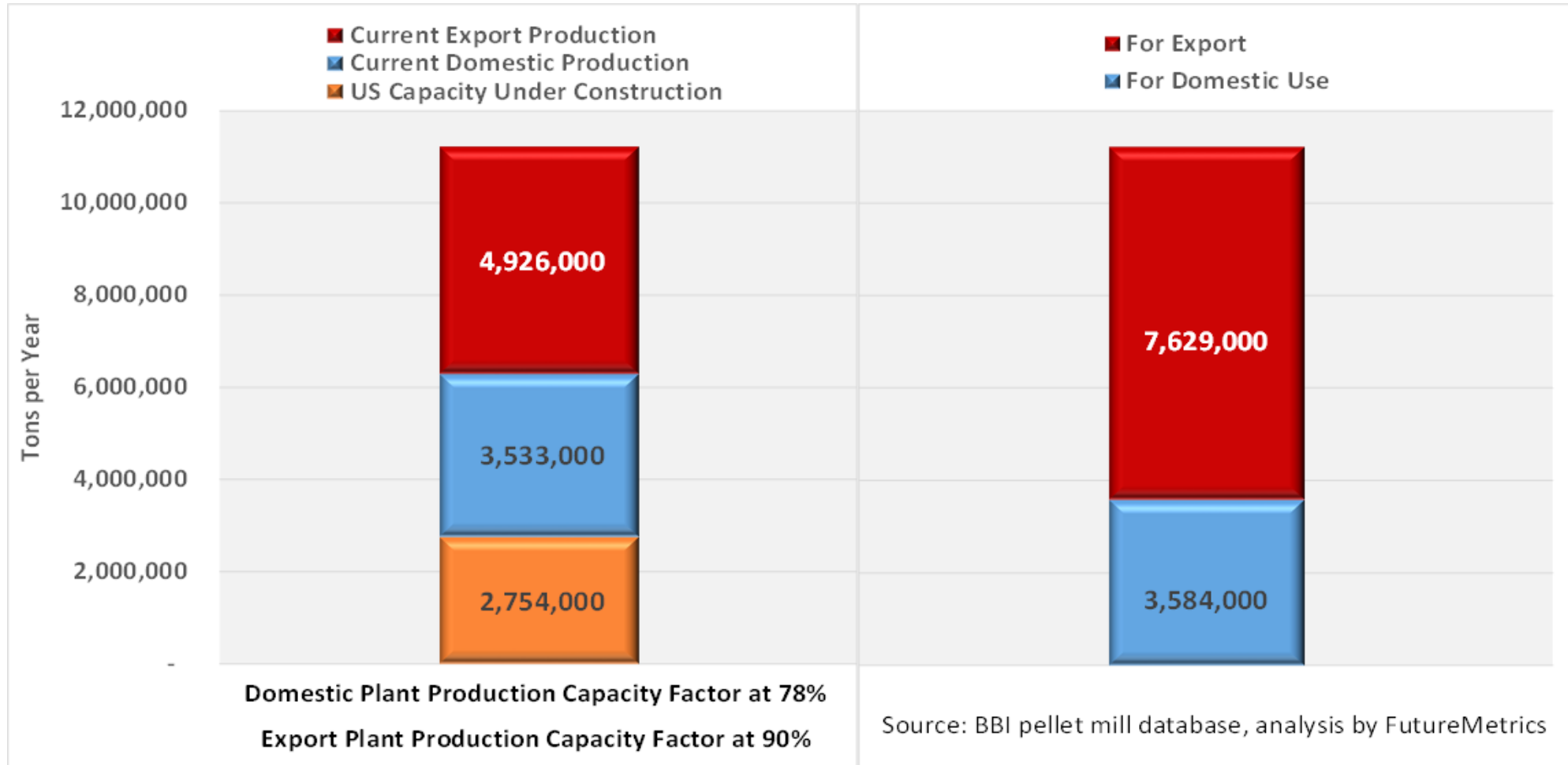
*FutureMetrics* and its consulting partners initiated the acquisition process and provided early stage advice, analysis, and due diligence for Rentech

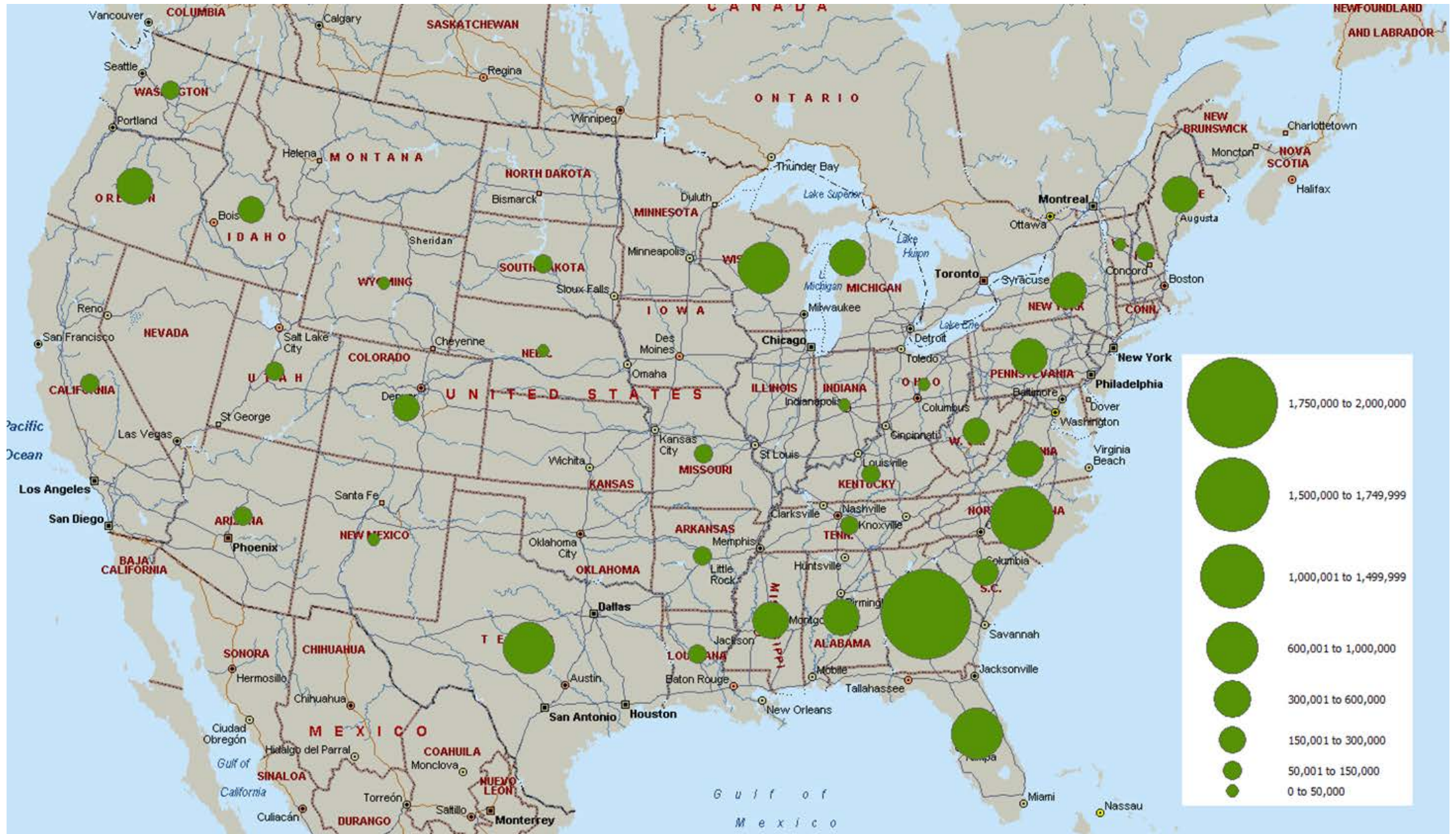
# Environmental, Social, Ecological, and Economic Sustainability



Source: Various forecasts aggregated by FutureMetrics.

# US Nameplate Capacity





## **Domestic Pellet Markets**

The domestic pellet markets are confined to the northern and mountainous states where there is a significant need for heating. The heating markets are competitive. There are often several brands sold in the same area.

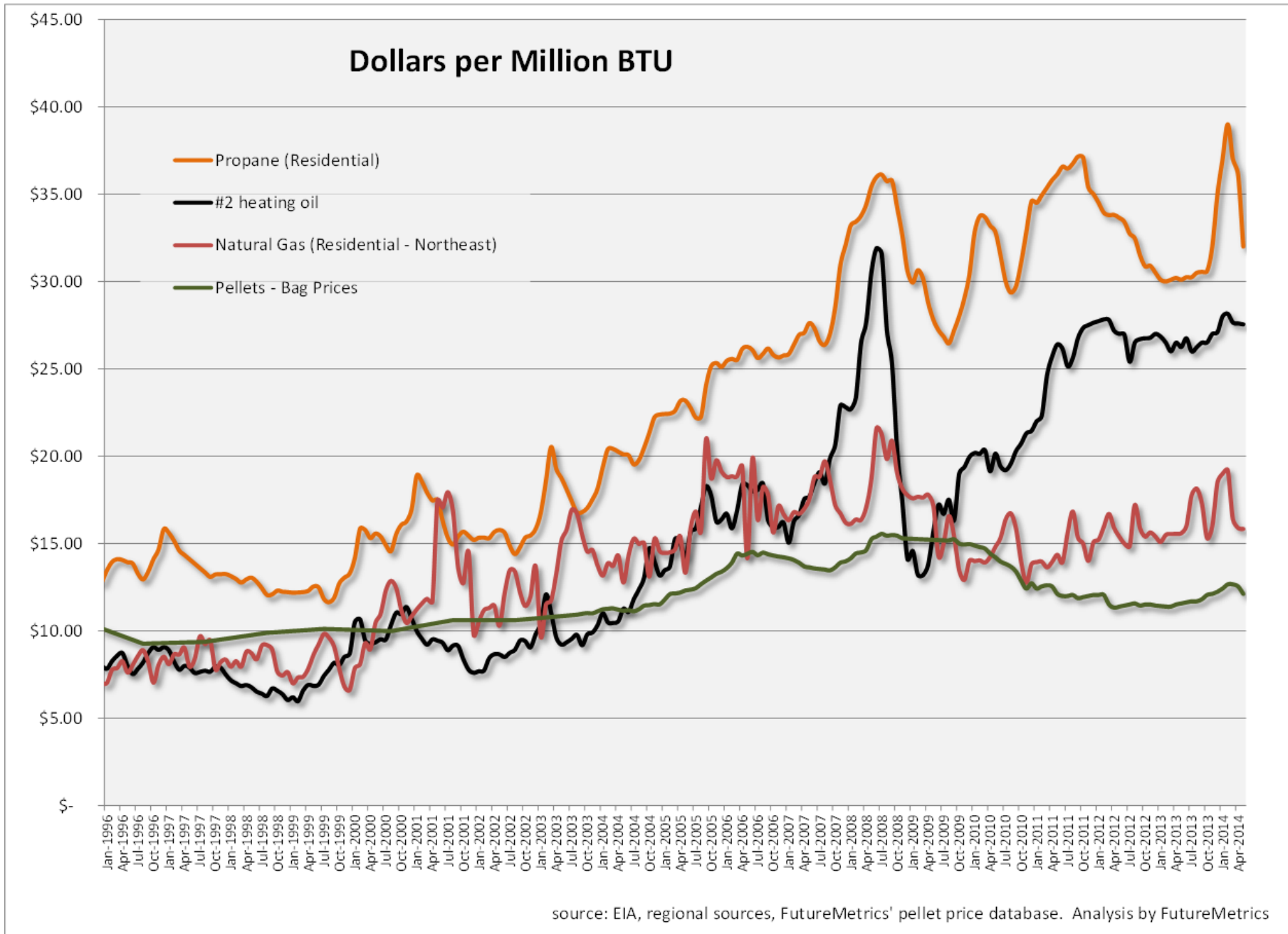
## **Industrial Pellet Export Markets**

The industrial pellet export market is driven by carbon mitigation policies. Pellets exported into the utility markets are, for the most part, sold under long-term bilateral contracts that contain an agreed upon volume and price and agreed upon price adjusters.

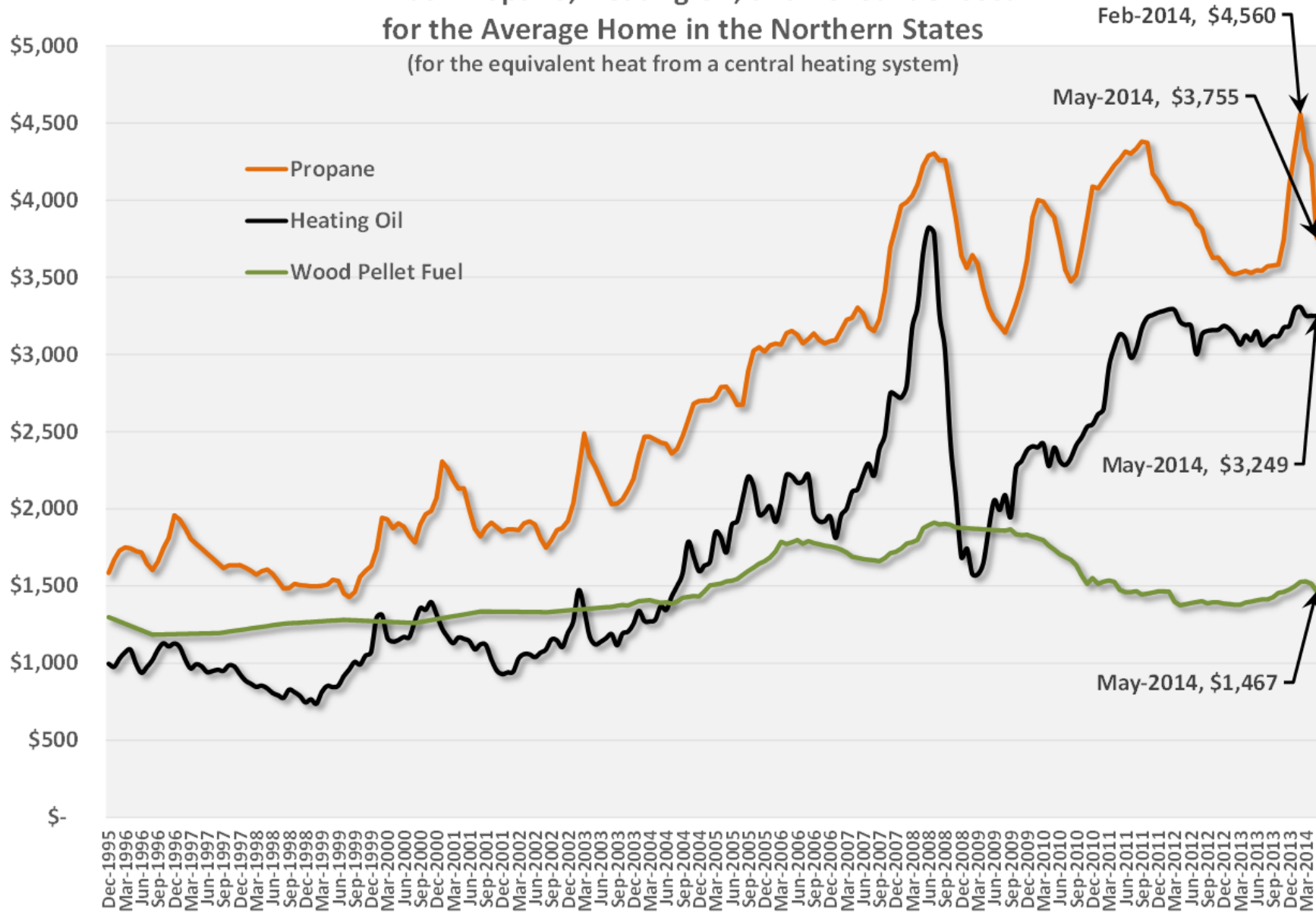
## **Industrial Pellet Domestic Markets**

A bit more on this later...



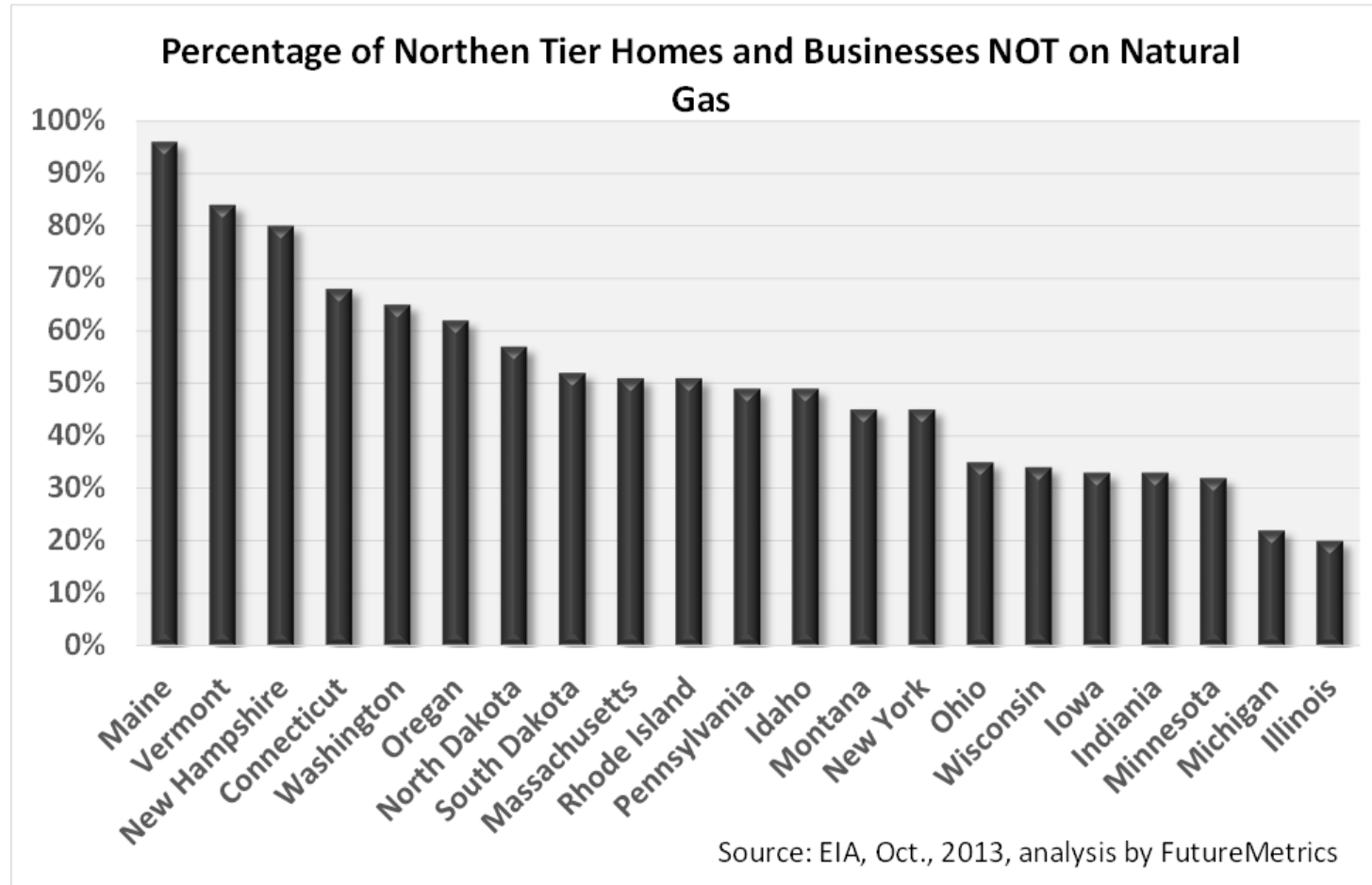


### Annual Propane, Heating Oil, and Pellet Fuel Cost for the Average Home in the Northern States (for the equivalent heat from a central heating system)



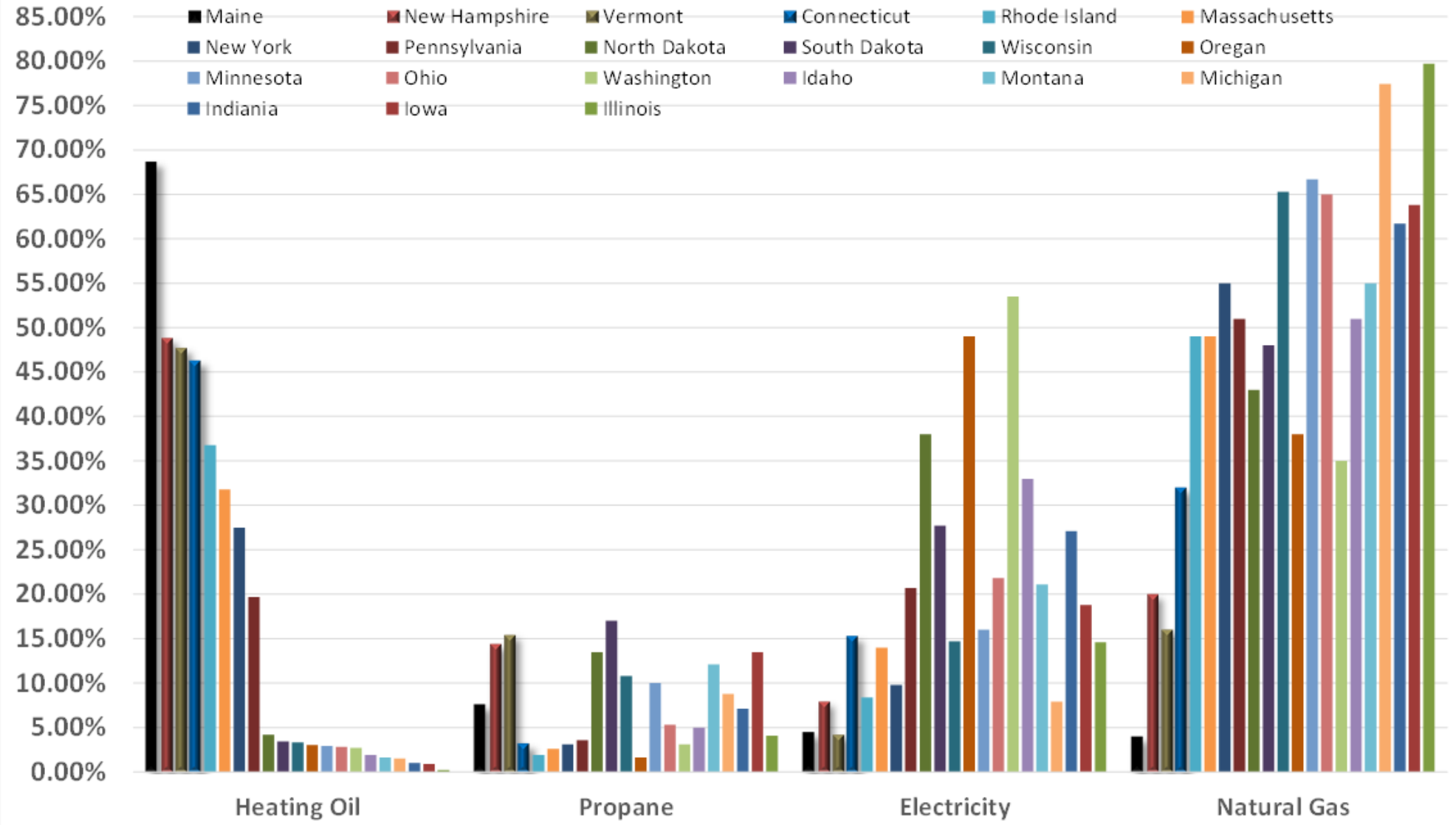
Source: EIA, 2014, Analysis by FutureMetrics

The states that will benefit the most from a conversion to premium wood pellet fuel are those with the higher use of heating oil or propane and the lack of natural gas infrastructure.



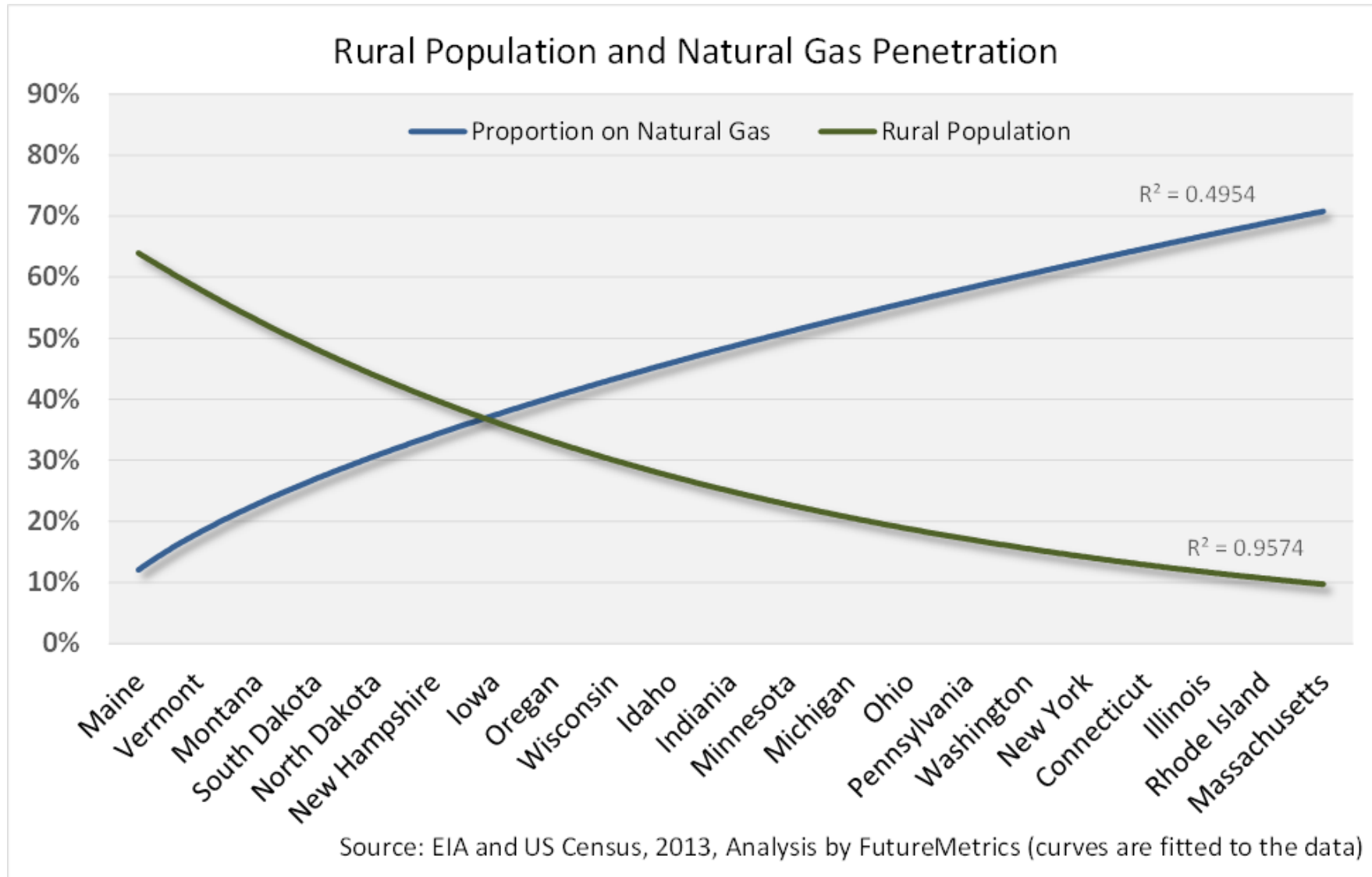
Fully automatic high efficiency wood pellet boilers are common in Europe. They are beginning to penetrate the markets in the US. For an example of that see Maine Energy Systems at [www.MaineEnergySystems.com](http://www.MaineEnergySystems.com).

### Heating Energy Source by State



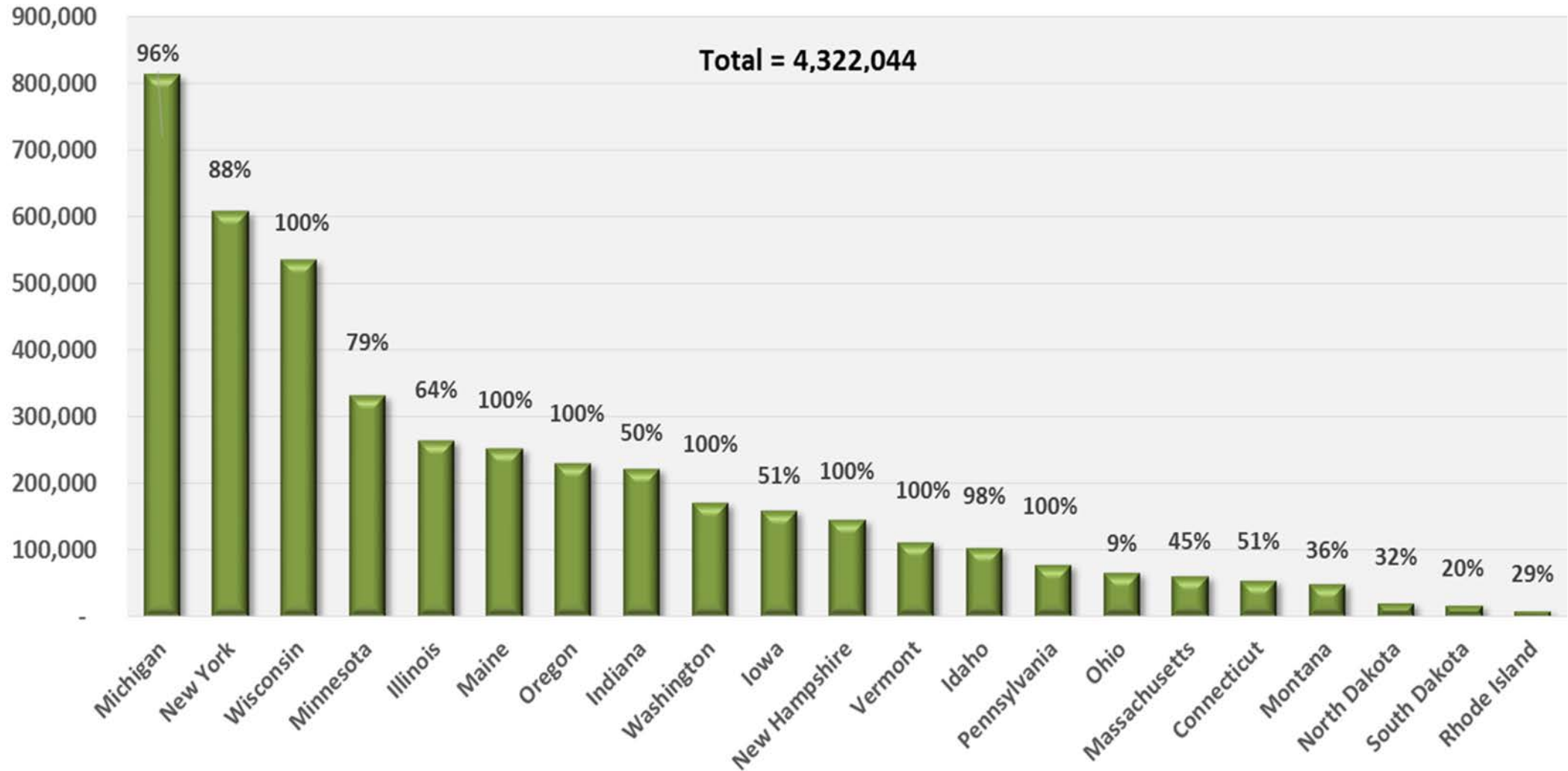
Source: EIA, October, 2013, Analysis by FutureMetrics

# Population Density Determines Where Natural Gas Goes



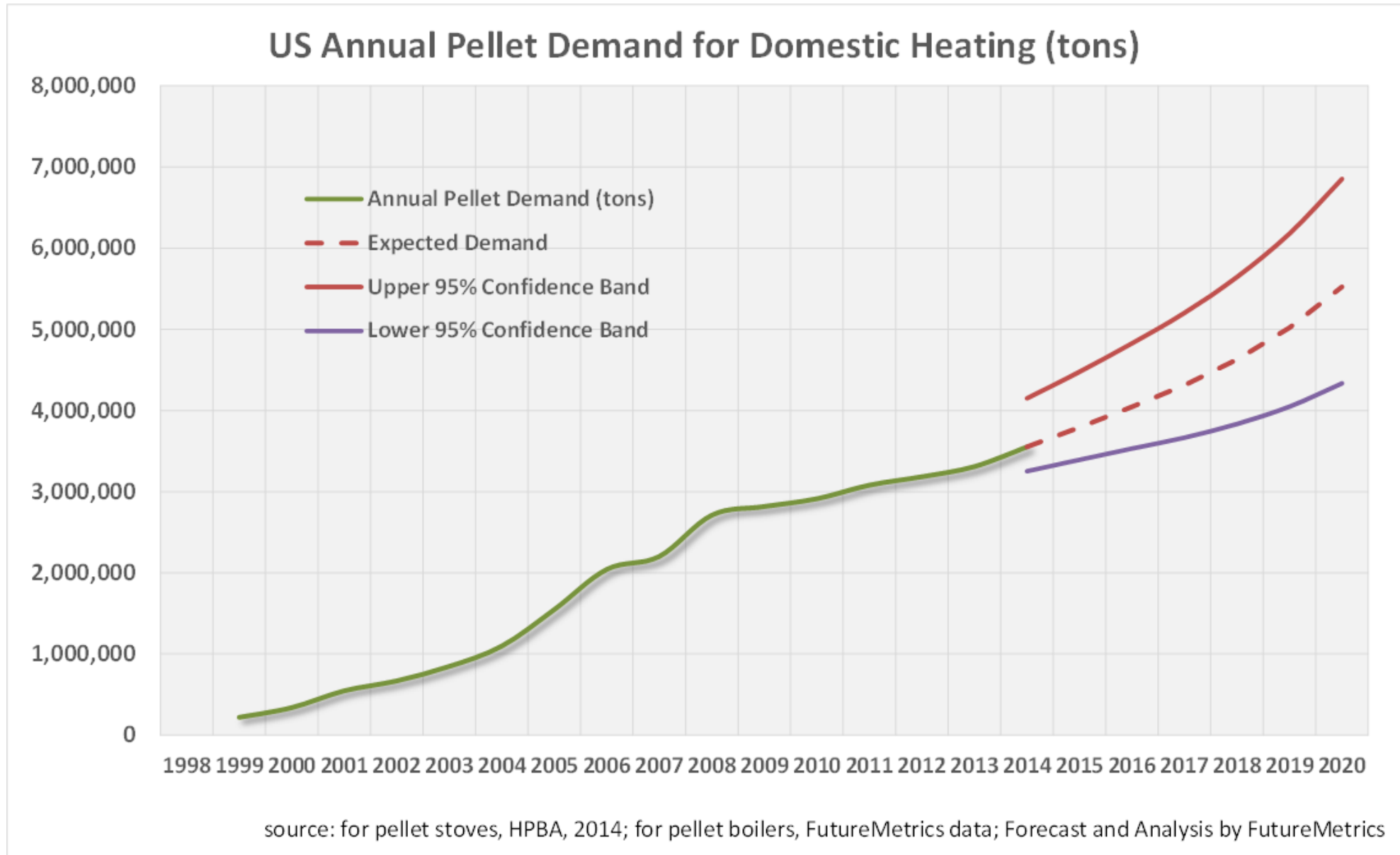
# The Market Potential for Wood Pellet Heating is Big

Households in Rural Areas Not on Natural Gas Adjusted for Each State's Sustainable Growth of Pellet Quality Wood  
(percents show proportion of rural homes that can be converted by each state's sustainable resource - assumes no interstate pellet trade)

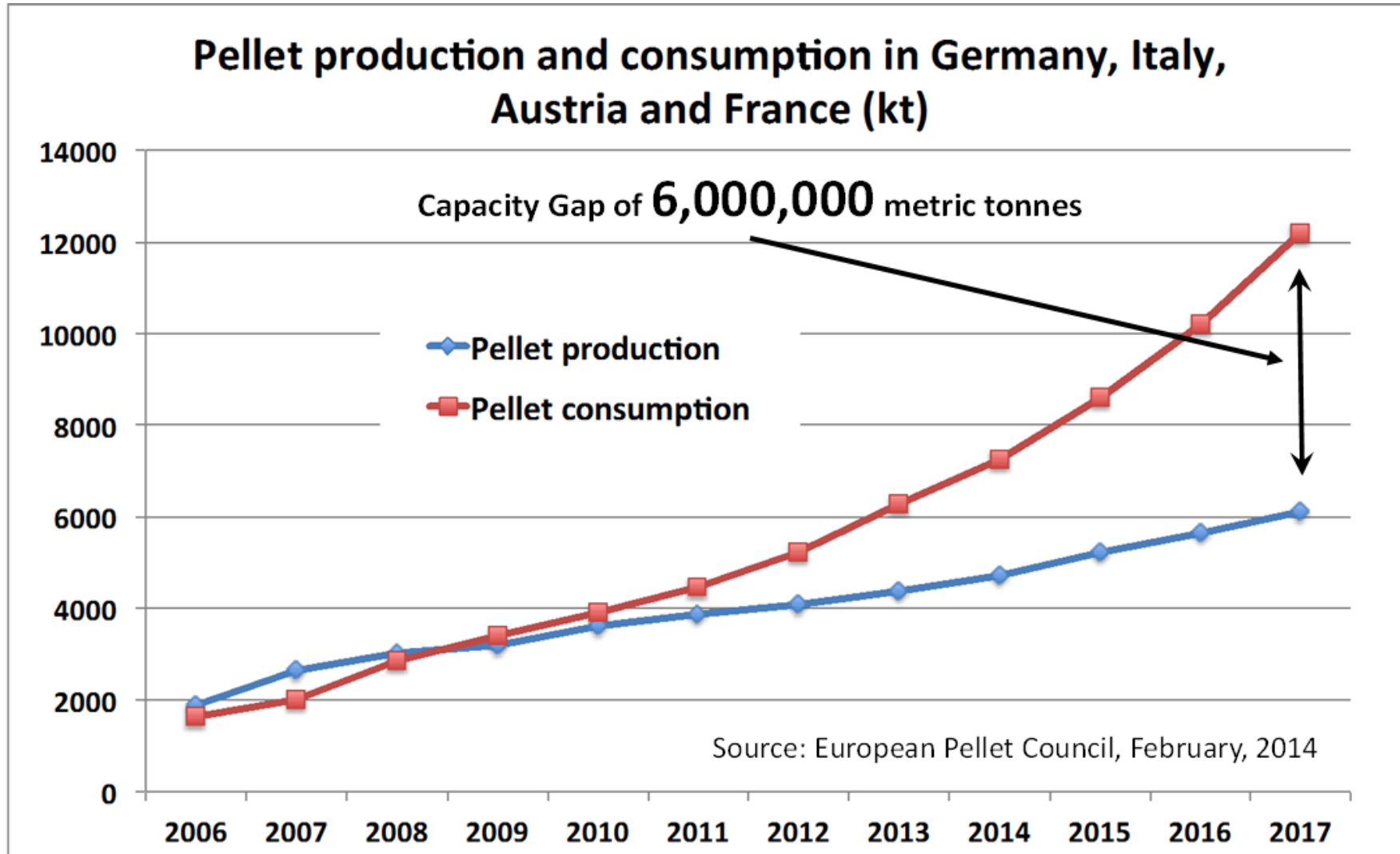


source: EIA, US Census and US Forest Service Inventory Data, 2014, Analysis by FutureMetrics

The forecast is for 67% growth from 2013 to 2020 (3.3 to 5.5 million tons)

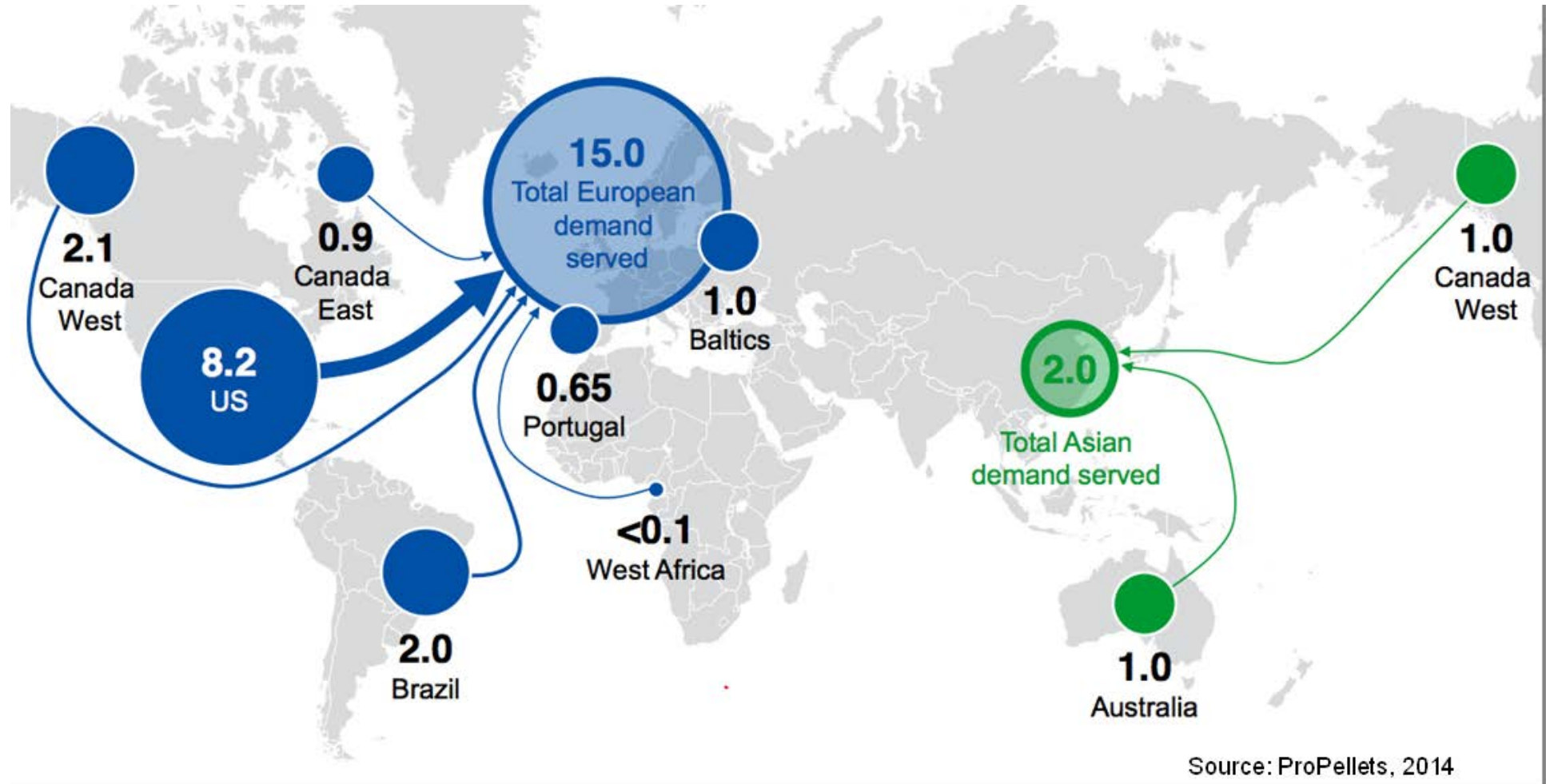


# Premium (EnPlus) Pellets for Export!





# International Industrial Pellet Markets

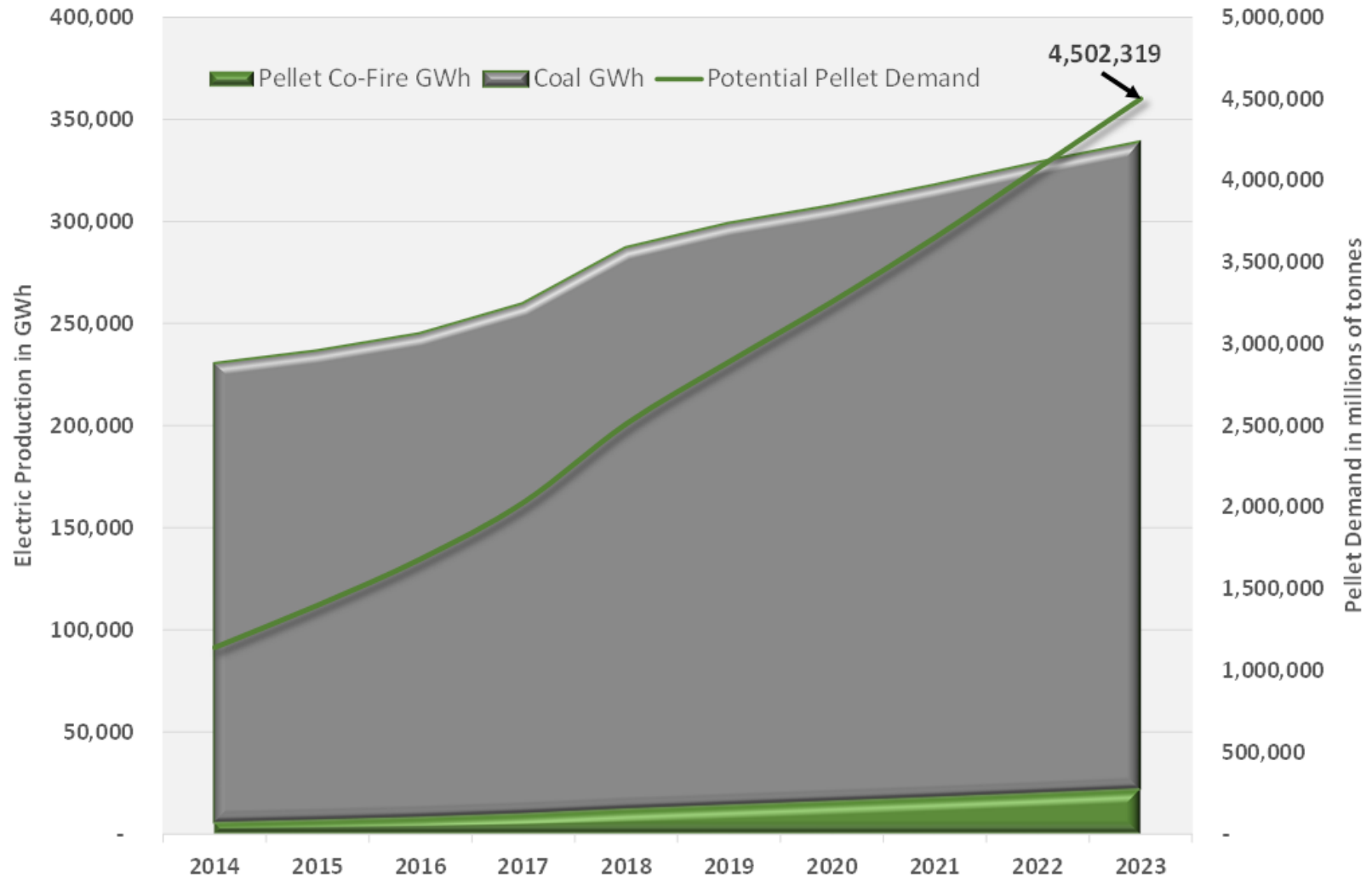


**The Drax station (4000 MW) produces about 7% of the total power in the UK. It is currently running one of the lines (650 MW) on 100% pellets. The second line is currently co-firing and will move to 100% pellets later in 2014. The third line is expected come online in the spring of 2016. Each line uses 2.5 million mtons per year.**

**When all three lines are running the plant will need a 50,000 tonne shipload every 2.8 days.**

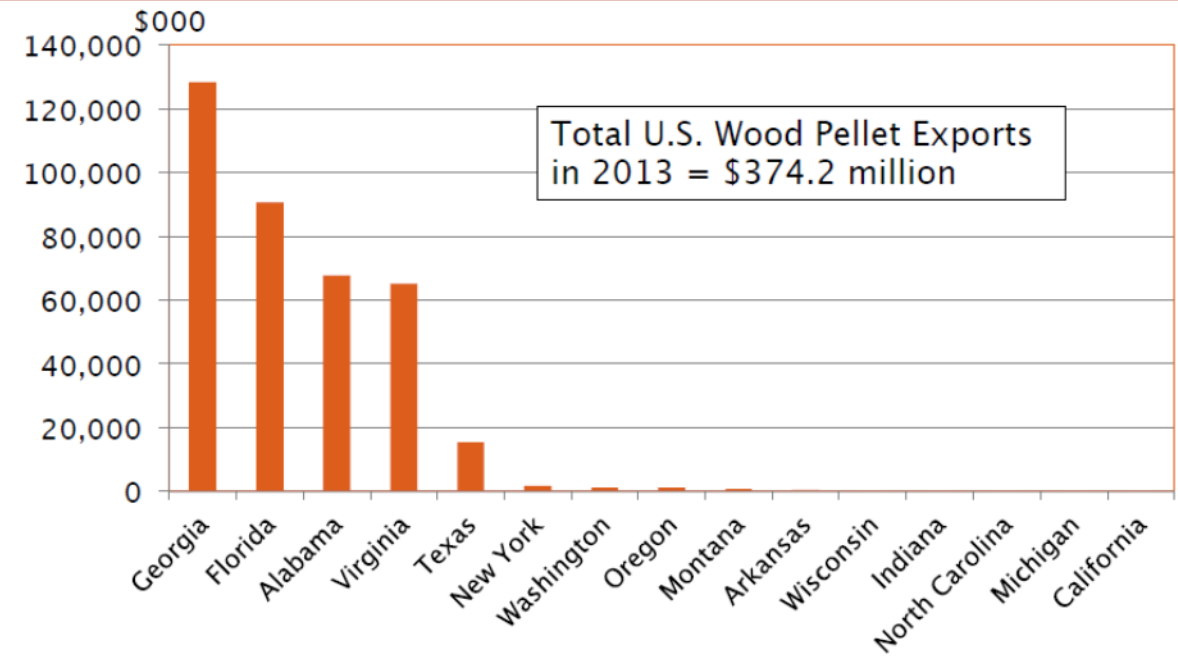


### South Korea Power Production from Coal and Potential Demand for Pellet Co-firing



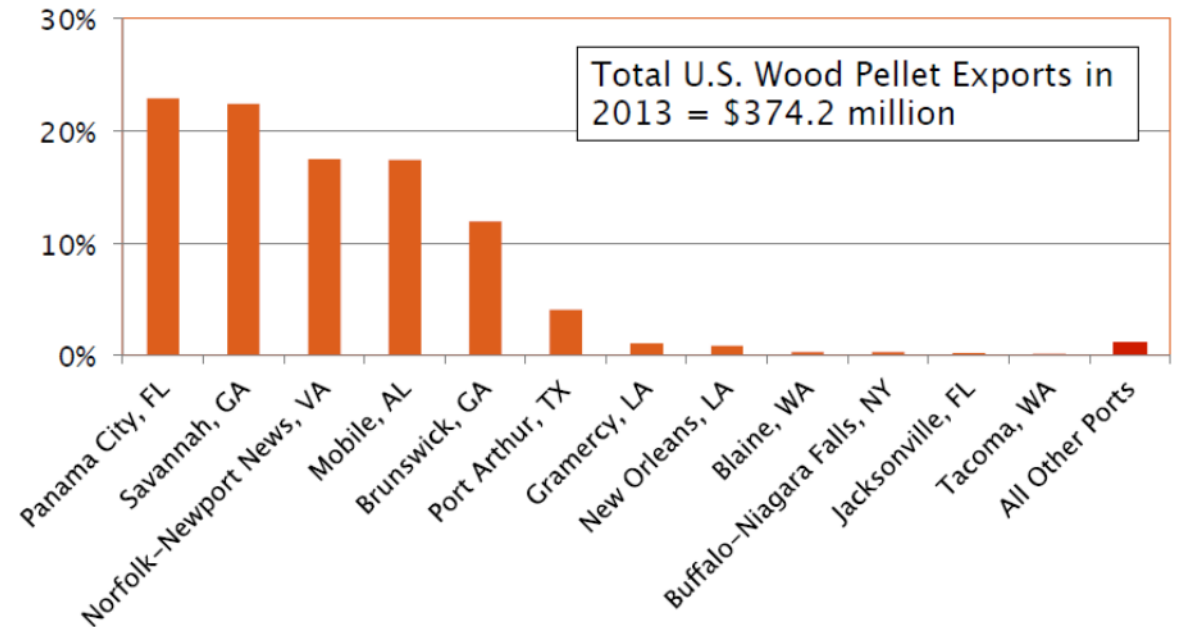
Coal dem and data by RISI March, 2014, analysis based on work by Seth Walker, RISI

# Wood Pellet Exports by State, 2013



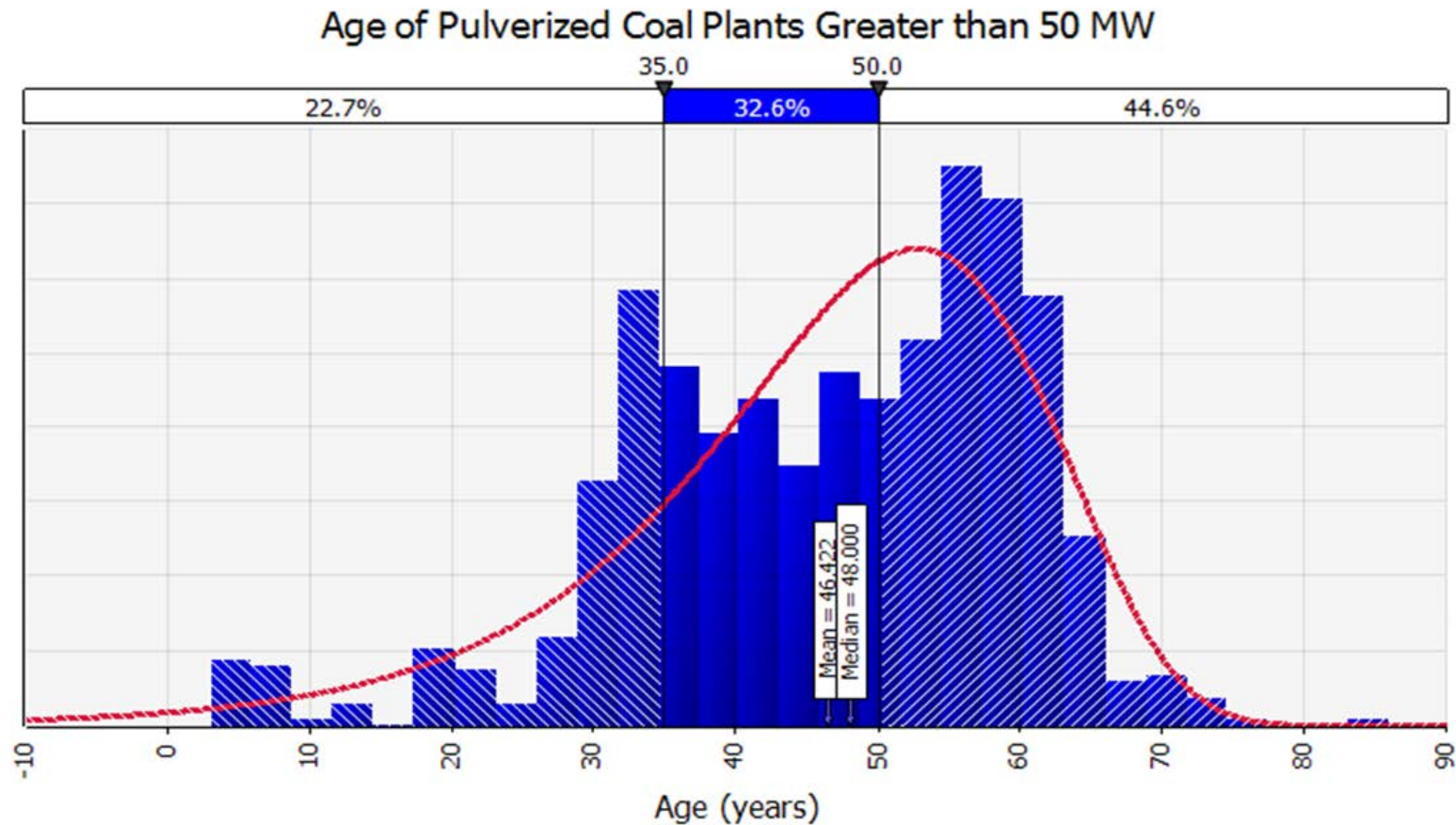
Data from the US International Trade Commission, 2014

# U.S. Wood Pellet Exports by U.S. Port, 2013



## Domestic Markets for Industrial Pellets in Power Plants!!

Converting an older pulverized coal power plant to wood pellet fuel results in a cost per megawatt-hour (MWh) that is surprisingly low and very competitive relative to other power generation methods.



As the chart shows, 77.3% of the plants are older than 35 years.

## **Fuel cost is not the largest component of the total cost of generation**

If it were, then wind, solar, and nuclear, with free or very low cost fuel, would provide cheap electricity. The primary component of the total cost of generation is the amortized capital costs of building the generating facility.

The analysis assumes that any conversion from coal to wood pellet fuel will be plants that are older than 35 years. In that case, the only new major capital cost for a conversion from pulverized coal to wood pellet fuel would be the fuel storage and handling systems

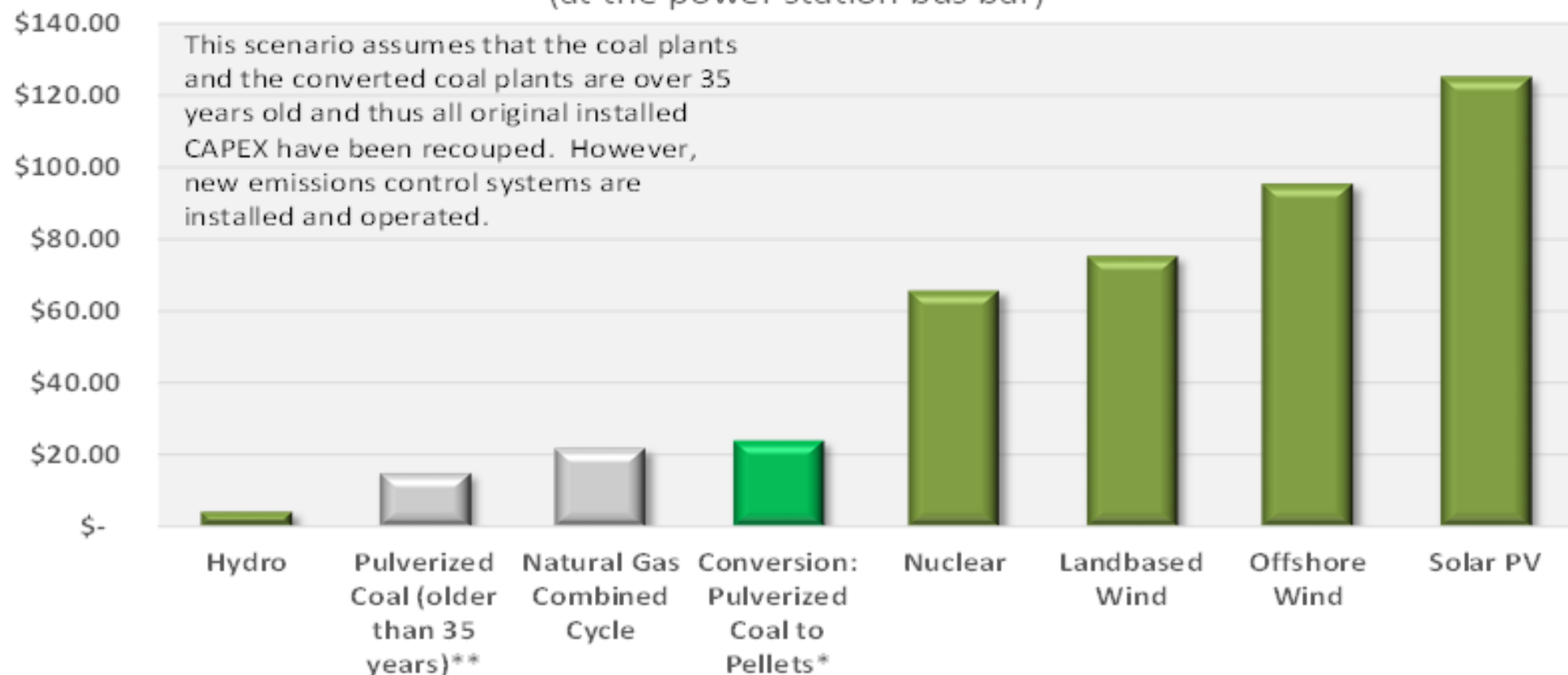
Green shading for low carbon solutions						Utility Natural Gas at	Coal at	Pellets at		
						\$5.50 per MMBTU	\$2.60 per MMBTU	\$175.00 per ton	or \$9.72 per MMBTU	
						Costs amortized over 35 years				
						at 6.00%				
	Construction, Conversion, or New Pollution Control Cost per kW	Size (MW)	Capacity Factor	Install Cost	Annual Capital Cost Amortization	Annual Output (MWh <sub>e</sub> )	Fixed Capital Cost per MWh <sub>e</sub>	Fixed and Variable O&M per MWh <sub>e</sub>	Fuel Cost per MWh <sub>e</sub>	Total Cost per MWh <sub>e</sub> (at the power station bus bar)
Hydro	\$ -	1000	90.0%	\$ -	\$ -	7,884,000	\$ -	\$ 4.10	\$ -	\$ 4.10
Pulverized Coal (older than 35 years)**	\$ 380	610	85.0%	\$ 231,800,000	\$ 15,988,141	4,542,060	\$ 3.52	\$ 5.60	\$ 5.77	\$ 14.89
Natural Gas Combined Cycle	\$ 1,230	580	90.0%	\$ 713,400,000	\$ 49,205,951	4,572,720	\$ 10.76	\$ 1.70	\$ 9.38	\$ 21.84
Conversion: Pulverized Coal to Pellets*	\$ 210	600	85.0%	\$ 126,000,000	\$ 8,690,706	4,467,600	\$ 1.95	\$ 5.50	\$ 16.59	\$ 24.03
Nuclear	\$ 6,100	1125	90.0%	\$ 6,862,500,000	\$ 473,333,107	8,869,500	\$ 53.37	\$ 11.80	\$ 0.60	\$ 65.76
Landbased Wind	\$ 1,980	50	25.0%	\$ 99,000,000	\$ 6,828,412	109,500	\$ 62.36	\$ 13.00	\$ -	\$ 75.36
Offshore Wind	\$ 3,230	50	35.0%	\$ 161,500,000	\$ 11,139,278	153,300	\$ 72.66	\$ 22.80	\$ -	\$ 95.46
Solar PV	\$ 4,340	100	30.0%	\$ 434,000,000	\$ 29,934,655	262,800	\$ 113.91	\$ 11.40	\$ -	\$ 125.31

\*Assumes CAPEX is only for the conversion since the plants are over 35 years old and all installed CAPEX costs have been recouped.

\*\* New CAPEX is for emissions controls for SO<sub>2</sub>, NO<sub>x</sub>, and mercury. Higher O&M cost are for operating the flue gas control systems. Values from a number of plant case studies.

Source of Data: "Levelized Cost and Levelized Avoided Cost of New Generation Resources in the AEO", 2014, EIA, April 2014; "Cost and Performance Data for Power Generation Technologies", Prepared for NREL by Black & Veatch, February, 2012; Analysis by FutureMetrics

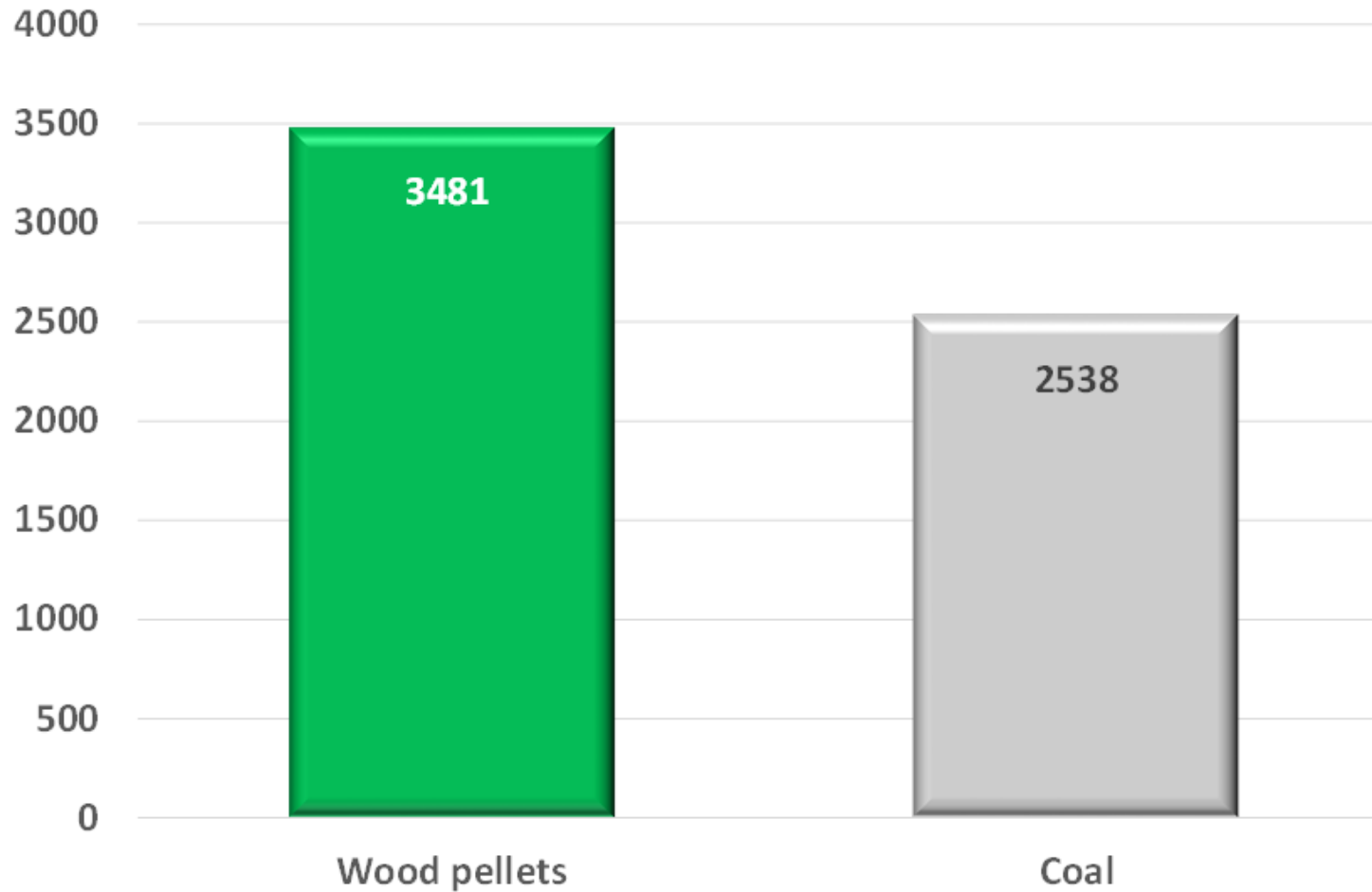
### Total Cost per MWh<sub>e</sub> (at the power station bus bar)



source: see table above; Analysis by FutureMetrics

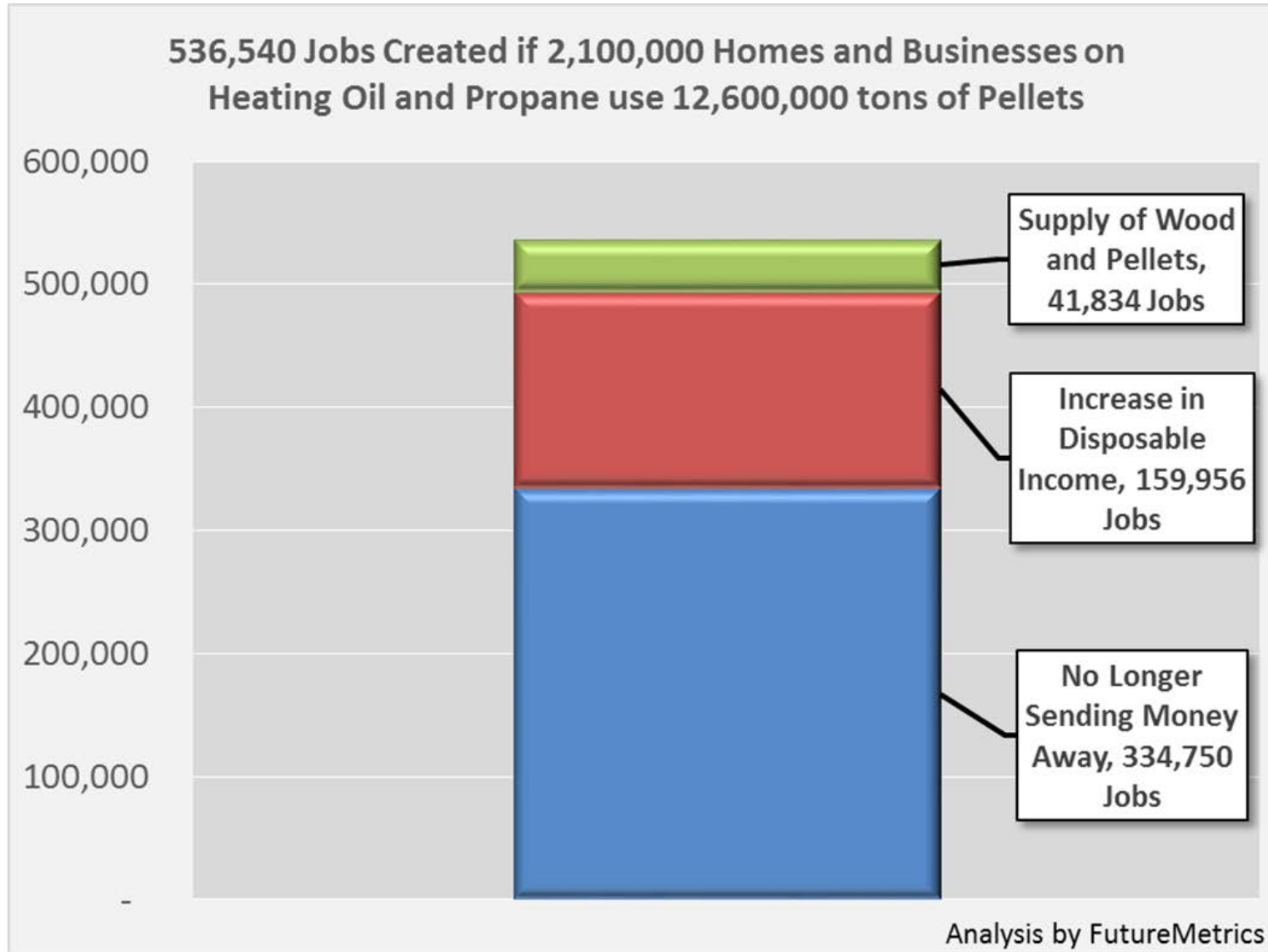


### Total Jobs Created to Supply Fuel to a 500 MW Power Plant



Analysis on pellet jobs by FutureMetrics using IMPLAN. Data on coal employment from "U.S. Coal Exports: National and State Economic Contributions", Ernst & Young, May, 2013. Both include direct, indirect, and induced jobs. Analysis by FutureMetrics

# Back to the US domestic heating markets... JOBS!



**The fundamentals are there for robust growth in the North American wood pellet markets.**

- **There is huge market potential in the US heating markets.**
- **There are significant capacity gaps expected in the international markets for industrial and heating pellets.**
- **The US power markets can generate low carbon, base load, dispatchable, low cost, job creating power easily with wood pellet fuel.**

## **The critical questions:**

- **How much sustainable pellet quality wood is available?**
- **What is the highest and best use (heating, power, export)?**

Thank You!

William Strauss

My home in western Maine is in  
this photo.

All of the forest you see is SFI  
certified and is managed and  
used for for timber harvesting.

