

An Analysis of the Expected Demand for Wood Pellet and Wood Chip Fueled Commercial and Industrial Boilers

The demand estimates in this analysis are based on a 30% tax credit on qualifying private sector commercial and industrial wood pellet and wood chip boilers that are used to replace thermal energy from heating oil fueled boilers.

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What is expected in the private commercial and industrial sector for wood pellet and wood chip fueled boilers?

The demand forecasts for commercial and industrial systems are divided into 6 cohorts. The cohorts are based on gross heat output and fuel type (pellets and clean chips).

Forecasting demand for commercial and industrial installations (from 100 to 5000 kw¹) requires the use of European data. Outside of 32 schools in New England that use wood chips there are fewer than 20 large wood chip or pellet fueled systems that are in operation in the US² that are heating office, institutional, or industrial buildings. The effects of European policy incentives affecting capital costs are assumed to have similar effects on the growth of the US market (the effects of carbon based costs are not included in the forecasts).

Growth rates in Europe for large systems have been estimated from the growth in the demand for fuel rather than from industry specific installation numbers. The growth rate of demand for pellet fuel and wood chips for large systems in Europe between 2002 and 2008 has been at an annualized rate of

¹ That is from 350,000 to 17,500,000 BTU/hr. That is the equivalent of using between 10,500 and 317,00 gallons of heating oil per year (assuming the systems run at an average of 48% capacity over the year).

² Based on research by the Biomass Energy Resource Center and information from Biomass Commodities Corp. Also, this analysis does not account for growth in traditional biomass to electricity facilities which typically use forest byproducts that are not suitable for refining into pellets or chips. The analysis does not include systems used in pulp and paper or saw mills.

24.10%³. Controlling for carbon taxation and cap and trade, it is estimated that 11.2% of the growth is from subsidies and/or tax incentives. The demand growth forecast for the US, adjusted for the removal of the carbon cost effects, assumes a similar growth rate in the demand for fuel if tax incentives are implemented here. The market will also be stimulated by increasing relative fuel costs vis-à-vis the gap in heating oil prices and pellet or chip fuels prices.

The growth rates of the six cohorts are not uniform. For the three pellet fueled cohorts, based on equipment pricing and delivery logistics, the optimal mix of pellet system sizes has been estimated with the constraint that the maximum amount of fuel used in any given year does not exceed the ability of the domestic market to produce the refined fuel (this takes into account demand for pellet systems by governmental buildings such as schools which will not qualify for the tax credits and are therefore not included in this demand forecast).

Chip fueled systems are not constrained by the limits imposed on pellet fueled systems by the amount of refined pellet fuel. Based on the growth in the expected gap between oil costs and wood chip costs and the effects of tax credits, the annualized aggregate growth in demand for new chip fuel will go from about 15,000 tons in the first year to about 542,000 tons in year five.

Installed Price Estimates for Equipment and Aggregate Estimated Total of Tax Credits

The cost of the equipment plus installation costs are shown in the table below⁴.

Cost Estimates and Fuel Usage					
Note: 1 kw = 3414 BTU	Cost (Installed including Fuel Storage and Delivery Systems)	Annual Fuel Consumption (Tons)	Fuel	Equivalent Oil (Gallons)	Current Fuel Cost/ton
Commercial/Industrial Pellet Boiler (100-500 kw)	\$200,000	253	Pellets	31,666	\$265
Commercial/Industrial Pellet Boiler (500-1000 kw)	\$350,000	633	Pellets	79,165	\$265
Commercial/Industrial Pellet Boiler (1000-5000 kw)	\$1,750,000	2533	Pellets	316,659	\$265
Commercial/Industrial Chip Boiler (100-500 kw)	\$280,000	405	Chips	31,666	\$65
Commercial/Industrial Chip Boiler (500-1000 kw)	\$490,000	1013	Chips	79,165	\$65
Commercial/Industrial Chip Boiler (1000-5000 kw)	\$2,450,000	4053	Chips	316,659	\$65

The expected growth in the market and the total pellet fuel required to meet the new demand is shown in the table below.

³ Data from the EU's Intelligent Energy Program. The growth was from 943,000 tons per year to 3,225,500 tons per year.

⁴ Cost and consumption data from New England Wood Pellet, Maine Energy Systems, Propell Energy, New England Energy Solutions, Thayer Corporation. These are median installed costs for a typical system including all fuel storage and handling equipment.

	2010	2011	2012	2013	2014
Commercial/Industrial Pellet Boiler (100-500 kw)					
New Installations	7	7	8	11	15
Total Installations	7	14	22	33	48
New Domestic Fuel Need per Year in Tons	1,800	1,700	2,100	2,700	3,800
Commercial/Industrial Pellet Boiler (500-1000 kw)					
New Installations	5	5	7	10	15
Total Installations	5	10	17	27	42
New Domestic Fuel Need per Year in Tons	3,200	3,400	4,400	6,200	9,300
Commercial/Industrial Pellet Boiler (1000-5000 kw)					
New Installations	1	2	3	5	11
Total Installations	1	3	5	11	22
New Domestic Fuel Need per Year in Tons	2,500	4,000	7,200	13,700	27,400
Commercial/Industrial Chip Boiler (100-500 kw)					
New Installations	4	6	11	19	38
Total Installations	4	10	21	40	78
New Domestic Fuel Need per Year in Tons	1,600	2,400	4,300	7,900	15,300
Commercial/Industrial Chip Boiler (500-1000 kw)					
New Installations	5	8	13	24	47
Total Installations	5	13	26	50	97
New Domestic Fuel Need per Year in Tons	5,100	7,600	13,300	24,600	47,700
Commercial/Industrial Chip Boiler (1000-5000 kw)					
New Installations	2	4	10	24	61
Total Installations	2	6	16	40	102
New Domestic Fuel Need per Year in Tons	8,100	17,000	40,000	97,900	248,700

The tax credits' costs are assumed to be realized in the year following accrual. The following table shows the estimated annual amounts of tax credits.

Amount of Tax Credits (recognized one year following)	2010	2011	2012	2013	2014
Commercial/Industrial Pellet Boiler (100-500 kw)		\$420,000	\$404,000	\$490,000	\$641,000
Commercial/Industrial Pellet Boiler (500-1000 kw)		\$3,675,000	\$3,903,000	\$5,121,000	\$7,210,000
Commercial/Industrial Pellet Boiler (1000-5000 kw)		\$735,000	\$1,148,000	\$2,080,000	\$3,969,000
Commercial/Industrial Chip Boiler (100-500 kw)		\$2,940,000	\$4,410,000	\$7,718,000	\$14,247,000
Commercial/Industrial Chip Boiler (500-1000 kw)		\$3,675,000	\$5,513,000	\$9,647,000	\$17,808,000
Commercial/Industrial Chip Boiler (1000-5000 kw)		\$1,470,000	\$3,087,000	\$7,254,000	\$17,744,000
TOTAL		\$12,915,000	\$18,465,000	\$32,310,000	\$61,619,000

It should be noted that new tax revenues will be created. Converting to domestically produced fuel will mean that \$325,000,000 will not be spent on foreign oil over the 5 years from 2010 to 2014. That money will remain in the regional economy and will engender multiplier effects that will generate commerce, jobs, and taxes. The money spent on new installations will also create jobs and taxes.

The table on the following page shows the estimated net tax effects based on the assumption that all tax costs and all tax revenues associated with the income produced from the commerce associated with the sale and installation of the equipment, the sale of domestically produced fuel, and the additional commerce created from the fuel savings adding to disposable income happen in the year following

The values for some of the equipment are adjusted to reflect the average proportion of the equipment that is manufactured non-domestically and therefore does not create domestic income. The fuel sales income calculation includes an adjustment for the loss of income to the regional heating oil contractors. The fuel savings calculation assumes that 95% of the aggregate savings in fuel costs are used for either consumption or investment. The assumed tax rate is 30%.

Note that after the tax credit program expires, the net new tax revenues more than offset the accumulated deficit.

Analysis of Taxable Cash Flow	2010	2011	2012	2013	2014	2015	2016
Purchase and Installation (net of value added)							
Commercial/Industrial Pellet Boiler (100-500 kw)	\$971,000	\$953,000	\$1,178,000	\$1,572,000	\$2,251,000	\$0	\$0
Commercial/Industrial Pellet Boiler (500-1 000 kw)	\$1,214,000	\$1,315,000	\$1,760,000	\$2,527,000	\$3,877,000	\$0	\$0
Commercial/Industrial Pellet Boiler (1000-5000 kw)	\$1,214,000	\$1,934,000	\$3,574,000	\$6,956,000	\$14,219,000	\$0	\$0
Commercial/Industrial Chip Boiler (100-500 kw)	\$777,000	\$1,189,000	\$2,122,000	\$3,995,000	\$7,913,000	\$0	\$0
Commercial/Industrial Chip Boiler (500-1000 kw)	\$1,699,000	\$2,600,000	\$4,641,000	\$8,738,000	\$17,310,000	\$0	\$0
Commercial/Industrial Chip Boiler (1000-5000 kw)	\$3,399,000	\$7,280,000	\$17,450,000	\$43,536,000	\$112,882,000	\$0	\$0
TOTAL	\$9,274,000	\$15,271,000	\$30,725,000	\$67,324,000	\$158,452,000	\$0	\$0
Purchases of Biothermal Fuel	\$2,941,000	\$7,377,000	\$15,630,000	\$32,516,000	\$70,088,000	\$72,893,000	\$75,808,000
78% of Fuel Purchase that is Incremental Addition	\$2,294,000	\$5,754,000	\$12,191,000	\$25,362,000	\$54,669,000	\$56,857,000	\$59,130,000
Savings on Fuel that Creates New Commerce	\$1,872,000	\$7,175,000	\$19,122,000	\$45,648,000	\$111,882,000	\$130,022,000	\$140,128,000
New Tax Revenue (1.2X Multiplier, 30% tax rate)	\$0	\$4,838,000	\$10,152,000	\$22,334,000	\$49,800,000	\$117,001,000	\$67,276,000
Amount of Tax Credits	\$0	\$12,915,000	\$18,465,000	\$32,310,000	\$61,619,000	\$127,052,000	\$0
Net Revenue (Cost) to the Treasury	\$0	(\$8,077,000)	(\$8,313,000)	(\$9,976,000)	(\$11,819,000)	(\$10,051,000)	\$67,276,000
Cumulative Net	\$0	(\$8,077,000)	(\$16,390,000)	(\$26,366,000)	(\$38,185,000)	(\$48,236,000)	\$19,040,000