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An Analysis of the Effects of a 30% Credit on the Expected Demand for High Efficiency Wood Pellet, Wood Chip, and Agricultural Residue Fueled Boilers: The Cost/Benefit to the Treasury, and the Jobs Created

The demand estimates in this analysis are based on the 30% tax credit on qualifying private sector high-efficiency biomass fueled boilers that are used to replace heating oil fueled boilers as proposed in

Senate Bill 1007: Biomass Thermal Utilization Act of 2013

Prepared by Dr. William Strauss, Chief Economist, Biomass Thermal Energy Council

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Executive Summary

A program of tax credits for high efficiency boilers that use biomass fuels such as wood pellets, wood chips, and agricultural residues will have very significant positive economic effects. The cost of the tax credits will be greatly outweighed by the increased tax revenues.

This paper describes how adding a tax credit for high efficiency biomass boilers to the existing tax code[1] will benefit the economy, create jobs, and will generate significantly more tax revenue than the cost of the credits. The program will also help increase the US's energy independence and reduce its need for foreign oil.

The table below summarizes the estimated tax effects of the program.

	Year 1	Year 2	Year 3	Year 4
Cost of Tax Credits to the Treasury	$0	$32,610,000	$41,778,000	$56,167,000
New Tax Revenues to the Treasury	$0	$29,909,000	$55,562,000	$99,712,000
Net Benefit (Cost) to the Treasury	**$0**	**($2,701,000)**	**$13,784,000**	**$43,545,000**

(The tax impacts are assumed to accrue in the year following each of the tax credit years.)

[1]See the proposed bill at http://www.govtrack.us/congress/bills/113/s1007/text and a summary at the end of this report.

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Overview

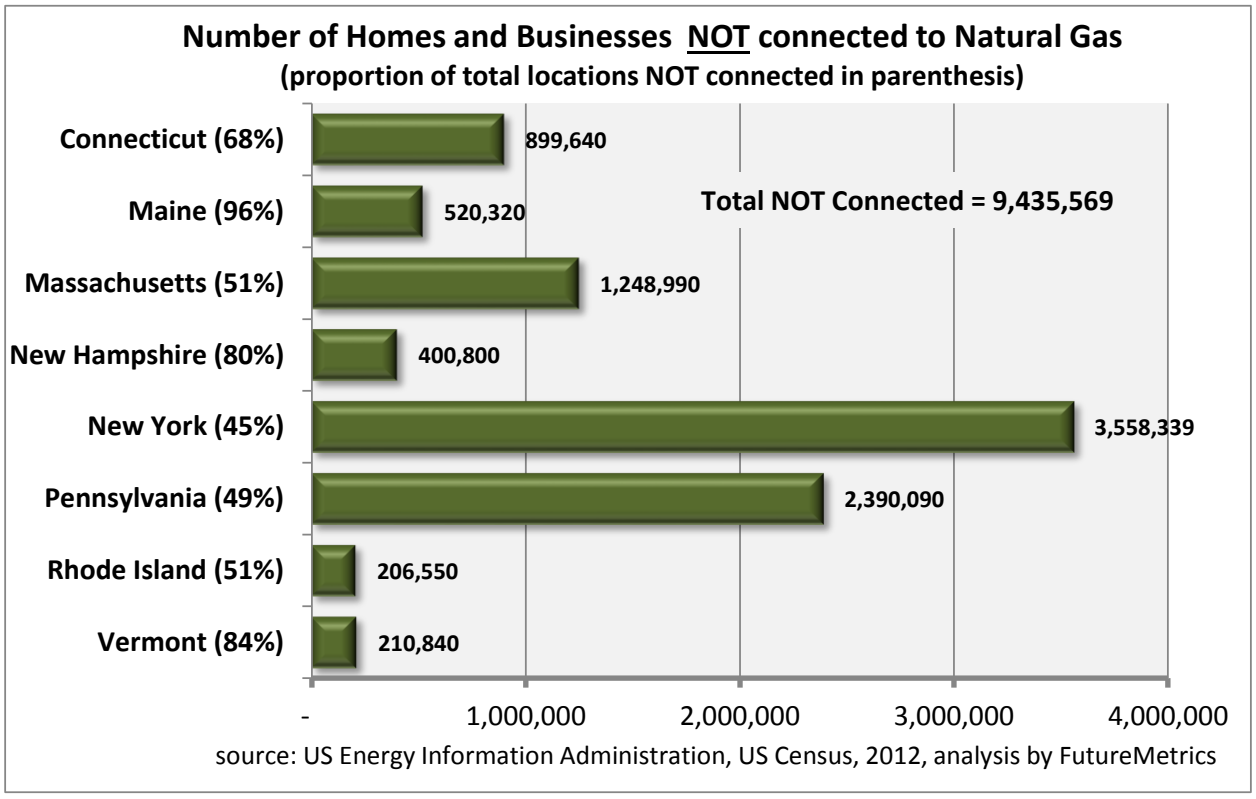
This brief white paper discusses the positive economic impacts of converting homes, businesses, and factories from heating oil or propane to refined wood pellet fuel, wood chips or other biomass fuels such as agricultural residues. The systems that would replace fossil fuel boilers must meet strict standards for efficiency and emissions.

The white paper show how a federal tax credit of 30% for qualifying high efficiency residential and commercial/industrial biomass thermal energy systems would have very substantial positive economic impacts.

The substitution of sustainably sourced wood or other biomass fuels for heating oil and propane systems will have dramatic positive effect on the economies of thermal energy dependent states. Biomass fuels that are used in modern high efficiency boilers have the ability to lower the cost of heat by 40% to 60% versus heating oil.

Where natural gas is available, heating costs are already low. Where wood pellets, wood chips or other biomass fuels make sense is in areas that do not have natural gas, are cold, and have sufficient working forest or agricultural resources to sustainably supply biomass fuel demand.

As the following charts show, more than 20 million homes and businesses in the Northeast and Midwest are not connected to natural gas. Most of those homes and businesses are in lower density rural areas. Some proportion may become connected in the next 10 years but it is likely given the rural nature of the locations that most will not.



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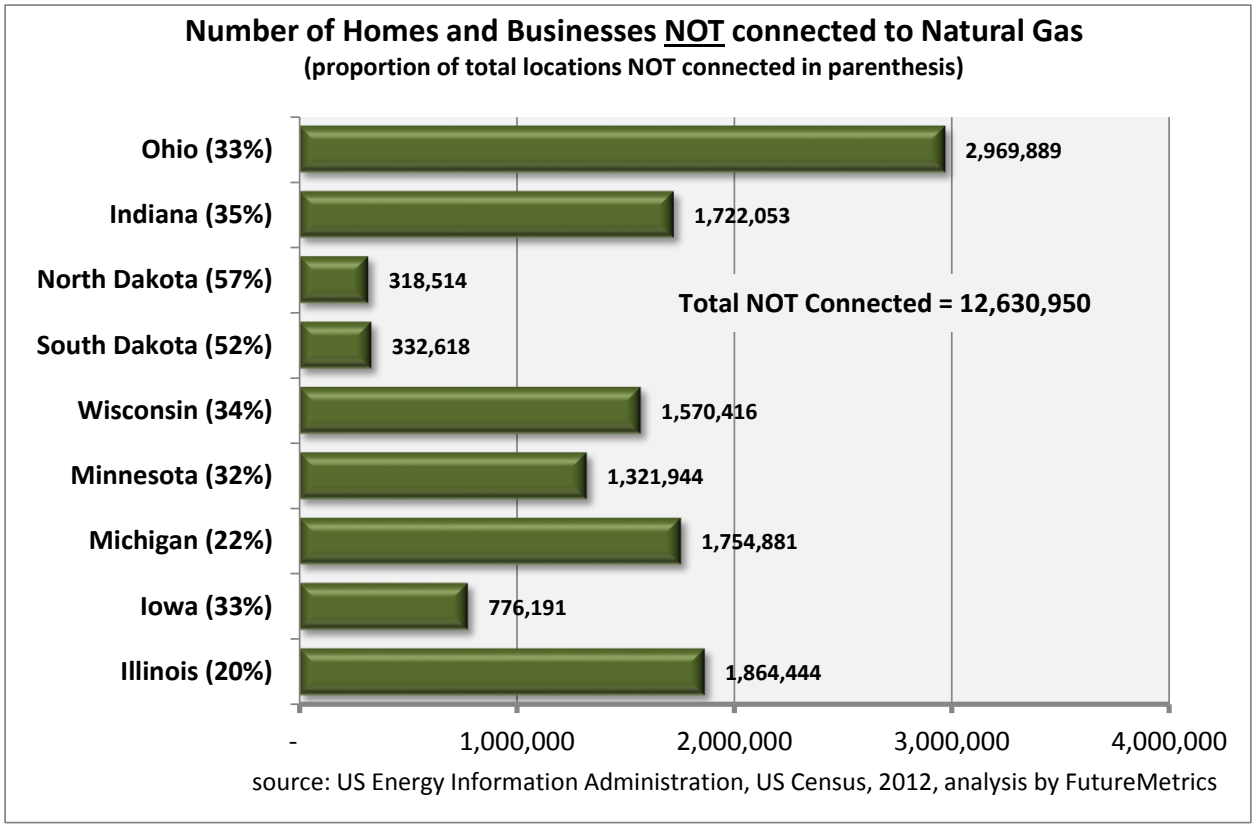

The number of homes and businesses that can be converted is limited by the sustainability of the working forests that provide the feedstock for making pellets and chips.

Analysis by FutureMetrics shows that in the Northeast, about 19 million tons per year of woody biomass[2] can be sustainably harvested for refining into pellets or use as chips without impacting current demand and pricing for wood by traditional users like pulp and paper and lumber (note that Maine currently sustainably harvests about 17 million tons per year). The Midwest can also sustainably use about 18 million tons per year for pellet production or chips[3]. If all of that production went into pellets for residential use, it would allow the conversion of about 2.76 million homes in the Northeast and Midwest.

If all agricultural residues in the Midwest states were used for energy, they have to capacity to replace nearly 7% of the US's annual demand for fossil fuels[4].

This analysis covers the forecast for growth over the next three years. The tax credits are only in place until the end of 2016 (three years) but it is expected that the impact of the program will "jump start" the high efficiency biomass boiler market[5]. The expected demand at the end of 3 years is far below the sustainable boundary. If our forecasts

[2] See http://www.biomassthermal.org/resource/pdfs/heatne_vision_full.pdf
[3] See http://heatingthemidwest.org/wp-content/uploads//MidwestVision_Final_04212013.pdf
[4] Same as footnote 2.
[5] This has been the case in European countries such as Austria and Sweden where similar governmental policies have helped the sector gain a critical mass. See the chart of Austria's growth below.

of the effects of a tax credit on the biomass boiler markets are correct, new demand for biomass in 2016 will be about 400,000 tons per year; well below the sustainable harvesting limits.

As noted above, the conversion from heating oil or propane has very strong positive economic effects. The key difference between fossil fuels and wood pellets, wood chips, or agricultural residues is that the fuels are grown and refined within relative close proximity to the end user. Unlike heating oil for example, the dollars are not set to distant refineries and foreign countries.

The positive effects of conversion come from four sources; all of which act to keep money in the regional economies and create jobs and increased tax revenues. The effects are: (1) Money that would have been spent on heating oil or propane stays in the region. A significant proportion of that money leaves the country and goes to countries that supply petroleum to the US refineries in the Gulf States that make heating oil[6]. That money would then be spent on locally-made biomass fuel. Since wood pellets, wood chips, or agricultural fuels are in many regions 40% to 60% the cost of heating oil and propane alternatives, (2) home, business, and manufacturing heating bills are dramatically reduced and that extra disposable income is spent within the local economies generating sales and income tax revenues[7]. (3) The supply chain for biomass fuels creates new jobs for loggers, farmers, truckers, and biomass fuel manufacturers. That new income is also spent locally. And finally, (4) the sales and installation of thousands of heating systems supports and generates jobs, sales tax revenues and income tax revenues.

The Residential and Small Business Wood Pellet Boiler Market (chip and other biomass fuels such as agricultural residues are in the next section below)

The residential/small business pellet boiler market's potential for positive economic impacts is very large. If the US follows the growth trajectory for high efficiency pellet fueled central heating systems similar to that of the European nations which also used government incentives such as tax credits then the growth of the US is estimated as follows:

Estimated New Intallations and Fuel Requirements for Residential Pellet Boilers			
	Year 1	Year 2	Year 3
Residential Pellet Boiler			
New Homes	600	1,600	3,300
Total Homes	600	2,200	5,500
New Domestic Pellet Fuel Need per Year in Tons	5,400	14,400	29,700

The chart below shows the actual data from Austria.

[6] See report by FutureMetrics on heating oil and where it comes from at www.FutureMetrics.com.
[7] EIA data shows that 78% of every dollar spent on heating oil leaves the regional economies. Those dollars go to refiners (primarily in the Gulf states) or to petroleum producers; the majority of which are foreign nations.

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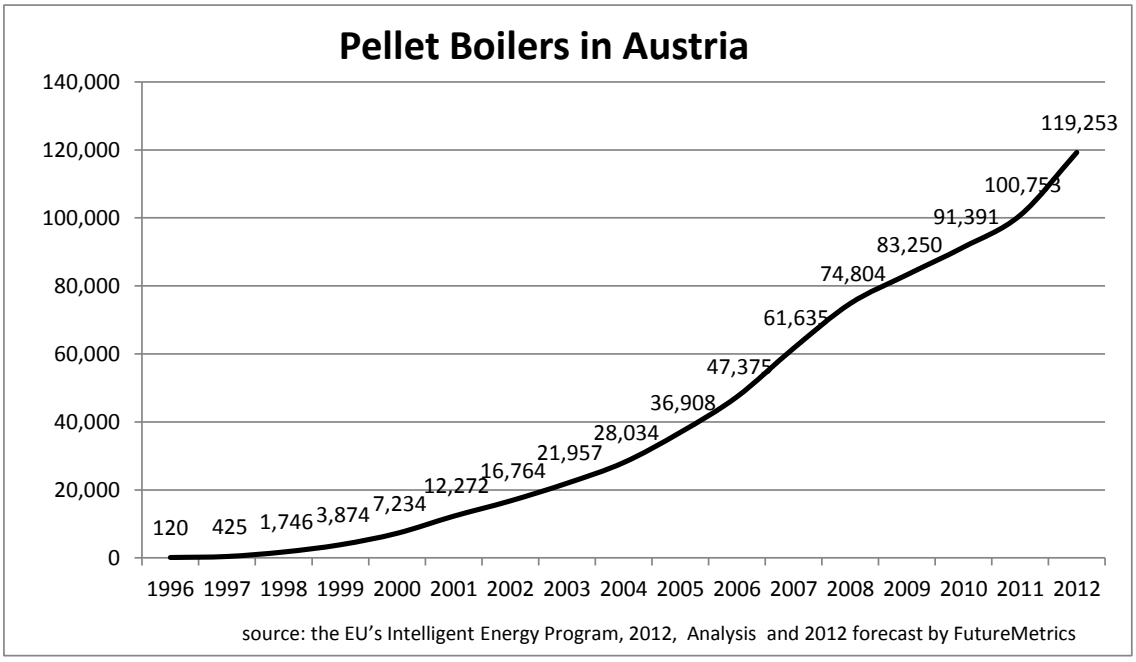
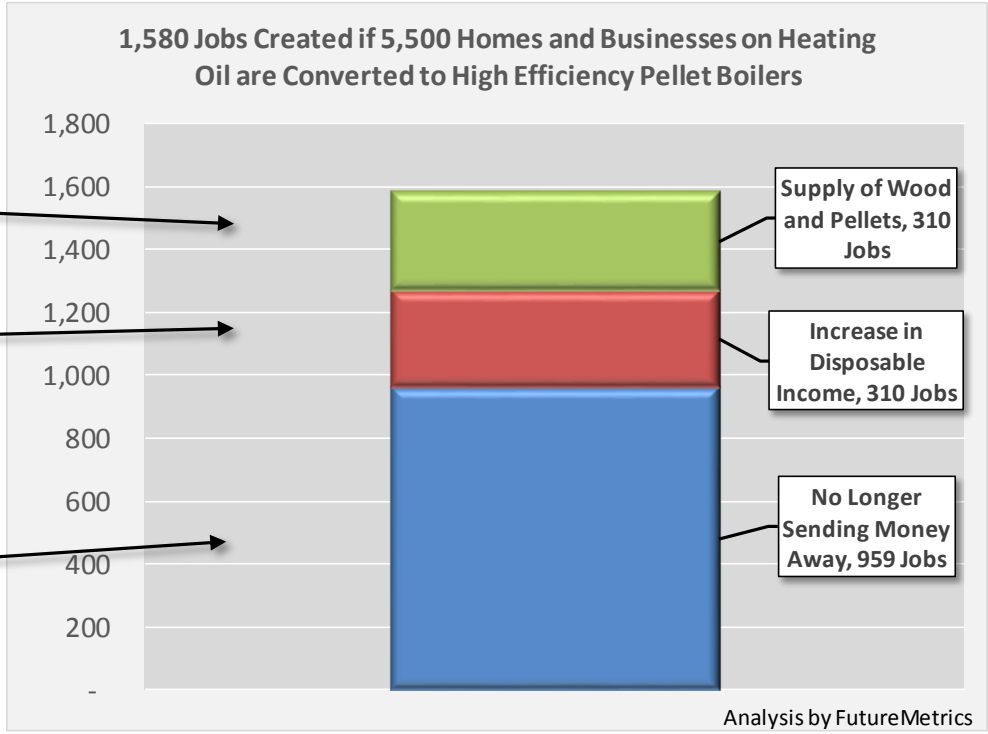


The chart below, which focuses specifically on pellet fuels, shows the jobs that would be created (or in some cases sustained from heating oil or propane delivery) by year 3 if the growth shown in the table above were achieved.

There are Three Pathways for Job Creation

- ✓ The sustainable management, harvest, transport, and refining of wood into pellets creates jobs.
- ✓ The dramatic cut in heating costs leaves, on average, $1,500 per year in the pockets of homes and businesses. Most of that money is spent in the local economy and creates commerce and jobs.
- ✓ The money that is spent on regionally-made heating fuel stays in region. The wealth and jobs that were "exported" to places like Venezuela and Saudi Arabia stays in the local economy.



Installed Price Estimates for Equipment and Aggregate Estimated Total of Tax Credits and Benefits for all types of Biomass Fueled Boilers

The last several pages of this white paper will look at the expected cost of tax credits to the treasury and the expected tax revenues that will appear due to the development of this market.

As with the jobs discussion above, the benefits come from supply chain jobs, increased disposable income, and the impacts of no longer exporting money out of the regional economy.

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

Cost Estimates (current pricing) and Fuel Usage - average for each cohort					
	Cost (Installed including Fuel Storage and Delivery Systems)	Annual Fuel Consumption (Tons)	Fuel	Equivlent Oil (Gallons)	Current Fuel Cost/ton
Residential Pellet Boiler	$16,000	9.0	Pellets	1,000	$225
Commercial/Industrial Pellet Boiler (100-500 kw)	$200,000	253	Pellets	28,147	$225
Commercial/Industrial Pellet Boiler (500-1000 kw)	$350,000	633	Pellets	70,369	$225
Commercial/Industrial Pellet Boiler (1000-5000 kw)	$1,750,000	2533	Pellets	281,474	$225
Commercial/Industrial **Chip or other Biomass Fuel** Boiler (100-500 kw)	$280,000	405	Biomass	28,147	$65
Commercial/Industrial **Chip or other Biomass Fuel** Boiler (500-1000 kw)	$490,000	1013	Biomass	70,369	$65
Commercial/Industrial **Chip pr other Biomass Fuel** Boiler (1000-5000 kw	$2,450,000	4053	Biomass	281,474	$65

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

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	Year 1	Year 2	Year 3
Commercial/Industrial **Pellet** Boiler (100-500 kw)			
New Installations	30	28	27
Total Installations	30	58	85
New Domestic Fuel Need per Year in Tons	7,600	7,200	6,900
Commercial/Industiral **Pellet** Boiler (500-1000 kw)			
New Installations	10	10	11
Total Installations	10	20	31
New Domestic Fuel Need per Year in Tons	6,300	6,600	7,000
Commercial/Industrial **Pellet** Boiler (1000-5000 kw)			
New Installations	2	3	5
Total Installations	2	5	10
New Domestic Fuel Need per Year in Tons	5,100	7,800	12,200
Commercial/Industrial **Chip or other Biomass Fuel** Boiler (100-500 kw)			
New Installations	5	6	6
Total Installations	5	11	17
New Domestic Fuel Need per Year in Tons	2,000	2,300	2,600
Commercial/Industrial **Chip or other Biomass Fuel** Boiler (500-1000 kw)			
New Installations	15	17	19
Total Installations	15	32	51
New Domestic Fuel Need per Year in Tons	15,200	17,200	19,800
Commercial/Industrial **Chip or other Biomass Fuel** Boiler (1000-5000 kw)			
New Installations	6	8	11
Total Installations	6	14	25
New Domestic Fuel Need per Year in Tons	24,300	32,300	43,700
	Year 1	Year 2	Year 3
Total New **Pellet** Fuel Need per Year in Tons	24,400	36,000	55,800
Total New **Pellet** Fuel Needed in Tons	24,400	60,400	116,200
Total New **Chip or other Biomass Fuel** Fuel Need per Year in Tons	41,500	51,800	66,100
Total New **Chip or other Biomass Fuel** Fuel Needed in Tons	41,500	93,300	159,400

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[8].

Amount of Tax Credits (recognized one year following)	Year 1	Year 2	Year 3	Year 4
Residential Pellet Boiler		$2,880,000	$7,680,000	$15,840,000
Commercial/Industrial Pellet Boiler (100-500 kw)		$1,800,000	$1,696,000	$1,631,000
Commercial/Industrial Pellet Boiler (500-1000 kw)		$7,350,000	$7,659,000	$8,134,000
Commercial/Industrial Pellet Boiler (1000-5000 kw)		$1,470,000	$2,267,000	$3,541,000
Commercial/Industrial Chip or other Biomass Fuel Boiler (100-500 kw)		$3,675,000	$4,153,000	$4,776,000
Commercial/Industrial Chip or other Biomass Fuel Boiler (500-1000 kw)		$11,025,000	$12,458,000	$14,327,000
Commercial/Industrial Chip pr other Biomass Fuel Boiler (1000-5000 kw)		$4,410,000	$5,865,000	$7,918,000
TOTAL		**$32,610,000**	**$41,778,000**	**$56,167,000**

The commerce that results from the installation, fuel supply chain, increased disposable income, and reduced exporting of money creates tax revenues.

Converting to domestically produced fuel will mean that $100,000,000 will not be spent on foreign oil by year 3[9].

[8] Some buyers may not have sufficient tax liabilities to fully realize the tax credit. These tables assume that the full 30% credit will be taken by all. Therefore these numbers represent the upper bound and the actual tax credit cost may be lower.

[9] The EIA data shows that about 78% of every dollar spent on heating oil leaves the regional economy. Some goes to refiners (mostly in the Gulf of Mexico area) and most goes to the petroleum producers. See http://www.futuremetrics.net/papers/Gulf%20Oil%20and%20the%20Northeastern%20United%20States%20Heating%20Oil%20Dependency.pdf

Amount that Would have been Spent on Heating Oil (78% exported)			
	Year 1	Year 2	Year 3
Residential Pellet Boiler	$2,190,000	$8,250,000	$22,982,000
Commercial/Industrial Pellet Boiler (100-500 kw)	$3,082,000	$6,150,000	$10,050,000
Commercial/Industrial Pellet Boiler (500-1000 kw)	$2,568,000	$5,388,000	$9,258,000
Commercial/Industrial Pellet Boiler (1000-5000 kw)	$2,055,000	$5,366,000	$11,645,000
Commercial/Industrial Chip or other Biomass Fuel Boiler (100-500 kw)	$514,000	$1,124,000	$2,017,000
Commercial/Industrial Chip or other Biomass Fuel Boiler (500-1000 kw)	$3,853,000	$8,431,000	$15,126,000
Commercial/Industrial Chip pr other Biomass Fuel Boiler (1000-5000 kw)	$6,164,000	$14,756,000	$29,113,000
TOTAL	**$20,426,000**	**$49,465,000**	**$100,191,000**

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 and chart on the following pages show 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 the program becomes net cash flow positive the federal treasury very quickly. Also note that not included in this analysis are the significant benefits to states' treasuries from income and sales taxes that result at the state levels from this program.

Conclusion

A federal tax credit program that provides a 30% credit for the installed cost of qualifying high efficiency biomass fueled boilers will have significant positive impacts for job creation. It will also be more than self-sustaining in terms of the net cash flows to the federal treasury after the first year in which the tax effects impact the treasury.

[Table and Chart on Following Pages]

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Analysis of Taxable Cash Flow	Year 1	Year 2	Year 3	Year 4
Purchase and Installation (net of value added)				
Residential Pellet Boiler	$6,659,000	$18,111,000	$38,102,000	$93,037,000
Commercial/Industrial Pellet Boiler (100-500 kw)	$4,162,000	$3,999,000	$3,924,000	$5,251,000
Commercial/Industrial Pellet Boiler (500-1000 kw)	$2,428,000	$2,580,000	$2,795,000	$4,025,000
Commercial/Industrial Pellet Boiler (1000-5000 kw)	$2,428,000	$3,818,000	$6,083,000	$11,864,000
Commercial/Industrial Chip or other Biomass Fuel Boiler (100-500 kw)	$971,000	$1,119,000	$1,313,000	$2,009,000
Commercial/Industrial Chip or other Biomass Fuel Boiler (500-1000 kw)	$5,098,000	$5,876,000	$6,892,000	$10,545,000
Commercial/Industrial Chip pr other Biomass Fuel Boiler (1000-5000 kw	$10,196,000	$13,832,000	$19,046,000	$33,026,000
TOTAL	$31,942,000	$49,335,000	$78,155,000	$159,757,000
Purchases of Biomass Fuel	$8,814,000	$21,894,000	$42,063,000	$82,140,000
78% of Fuel Purchase is an Incremental Addition	$6,875,000	$17,077,000	$32,809,000	$64,069,000
Savings on Fuel that Creates New Commerce	$11,031,000	$26,192,000	$55,222,000	$114,810,000
New Tax Revenue (2X Multiplier, 30% tax rate)	$0	$29,909,000	$55,562,000	$99,712,000
Amount of Tax Credits	$0	$32,610,000	$41,778,000	$56,167,000
Net Revenue (Cost) to the Treasury	**$0**	**($2,701,000)**	**$13,784,000**	**$43,545,000**

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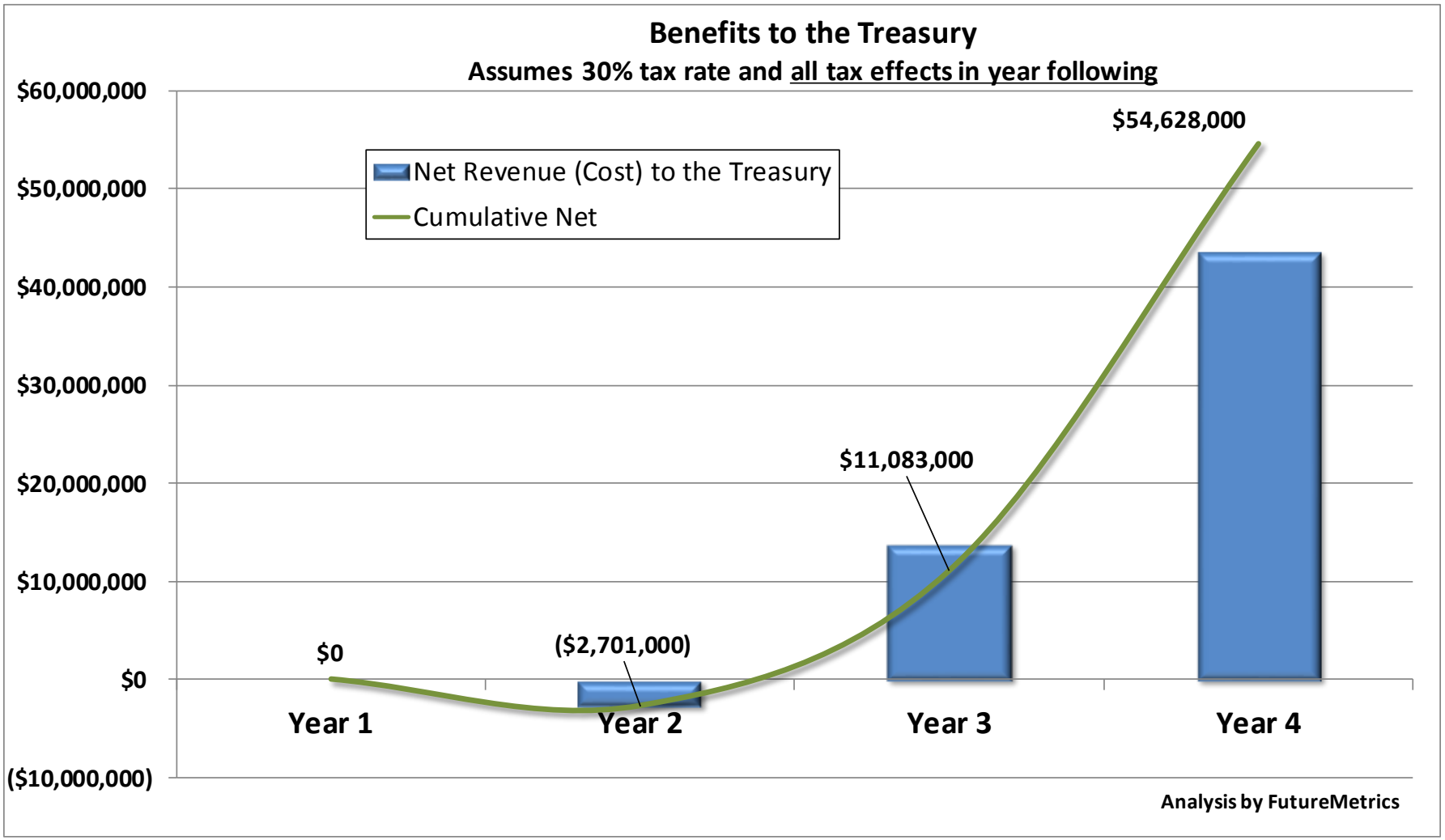

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Federal Incentives for High Efficiency Biomass Heating Investments

I. Section 25D IRS Code – Residential Renewable Energy Investment Tax Credit

Background: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US37F&re=1&ee=1

Currently eligible technologies: Solar Water Heat, Photovoltaics, Wind, Fuel Cells, Geothermal Heat Pumps, Other Solar-Electric Technologies, Fuel Cells using Renewable Fuels

Proposed credit: 30% of installed capital cost of high efficiency (>75%) biomass thermal, no cap, authorized through 2016

II. Section 48 IRS Code – Business (Commercial/Industrial) Renewable Energy Investment Tax Credit

Background: http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=US02F&re=1&ee=1

Currently eligible technologies: Solar Water Heat, Solar Space Heat, Solar Thermal Electric, Solar Thermal Process Heat, Photovoltaics, Landfill Gas, Wind, Biomass, Hydroelectric, Geothermal Electric, Fuel Cells, Geothermal Heat Pumps, Municipal Solid Waste, CHP/Cogeneration, Solar Hybrid Lighting, Hydrokinetic Power (i.e., Flowing Water), Anaerobic Digestion, Small Hydroelectric, Tidal Energy, Wave Energy, Ocean Thermal, Fuel Cells using Renewable Fuels, Microturbines, Geothermal Direct-Use

Proposed credit: - If biomass thermal system 65 to 80% thermal output efficiency - 15% of installed capital cost, no cap, authorized through 2016 - if biomass thermal system >80% thermal output efficiency – 30% of installed capital cost, no cap, authorized through 2016