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Riley Allen
Public Service Board
112 State St # 4
Montpelier, VT 05620-0001

July 21, 2009

Dear Mr. Allen,

I am writing to formally respond to two comments made during the All Fuels Efficiency Utility workshop at the Public Service Board on July 13.

John Plunkett, a consultant for Vermont Energy Investment Corporation, suggested that homeowners wrap their oil fired water heaters. The heating industry reiterates that any modifications or upgrades be done by certified heating fuel technicians as is required by the Vermont Fire and Building Safety Code. This is a similar recommendation issued by the Dept. of Energy. Airflow to the burner can not be obstructed. The top of the tank must be free of insulation as it is combustible and can interfere with the draft diverter. The practice is also outdated since most water heater storage tanks already have a high R-value of insulation that meet laboratory tested manufacturer specifications. While the measure suggested by Mr. Plunkett isn't appropriate, there are many ways that homeowners can reduce consumption of oilheat. Our industry has implemented these measures for decades. An average home that used more than 1,200 gallons of heating oil in 1989 now uses only 900 gallons, or 25% less. This decrease in usage is attributable to advances in equipment efficiency developed by the industry. The Fuel Savings Analysis Calculator is one of the few screening tools that can accurately assess savings associated with heating system upgrade or replacement. Other screening tools presented to the Public Service Board provide an incomplete and often inaccurate view due to their reliance on AFUE ratings. *See page 3.*

David Lamont, with the Department of Public Service, suggested that methane is an "insignificant" greenhouse gas. Methane is the primary component of natural gas which remains in the atmosphere for approximately 9-15 years and is over 20 times more effective in trapping heat in the atmosphere than carbon dioxide. These are facts that are not in dispute and are well documented on EPA's website— http://www.epa.gov/methane/. Methane— either moved from western Canada to Vermont or traveling in 100-year-old pipes in Boston— does in fact leak into the atmosphere and cause environmental damage. If evaluating total greenhouse gas emissions

associated with the production, distribution, and consumption of all fossil fuels, oilheat has a lower GHG footprint than other energy sources.

Furthermore, oilheat is on the path to becoming a renewable fuel. More and more heating oil in the supply stream is blended with biodiesel. Thanks to the advances in algae biodiesel production, we expect oilheat to become 20% renewable within ten years. Current research shows that BioHeat® at a B-20 blend will work in existing oilheat burners.

These points need to be reiterated in light of the comments from Mr. Lamont and Mr. Plunkett. Suggesting efficiency measures that achieve little efficiency and negatively impact public safety should be rejected, as well as establishing externality values that are inaccurate, incomplete and fuel biased.

Sincerely,

Matt Cota
Vermont Fuel Dealers Association

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AFUE ratings do more harm than good.

John D. Marran, P.E. Mechanical Engineer, Graduate of R.P.I. President of Energy Kinetics, Inc. and Designer of System 2000

When the government created AFUE (Annual Fuel Utilization Efficiency) ratings, they had a good plan.

However, AFUE ratings don't help consumers make educated decisions about a hot water heating system's efficiency because it only measures some chimney related losses. It's like saying highway driving is the miles per gallon you'll get all year when you know you'll be doing most of your driving around town.

AFUE doesn't take into account the running jacket losses (heat lost from a boiler with minimal insulation or a dry base boiler) (*"A"*) or the actual draft regulator losses which occur when the unit operates with a real chimney (*"C"*).

Where Fuel is Used (and lost) in 3 different heating systems

	Boiler with Tankless coil	Demand fired Unit w/Tank	System 2000
Annual Fuel Usage needed for Space & Hot Water	497 Gallons	497 Gallons	497 Gallons
Chimney Loss	123 Gallons	118 Gallons	78 Gallons
AFUE Rating	*86%*	*86%*	*87%*
Additional Non-AFUE losses			
(A) Jacket Loss	44 Gallons	42 Gallons	12 Gallons
(B) Standby Loss	131 Gallons	112 Gallons	6 Gallons
(C) Room Air Loss	85 Gallons	75 Gallons	6 Gallons
Annual Fuel Usage	880 Gallons/Yr.	844 Gallons/Yr.	599 Gallons/Yr.
Real Efficiency Of each system	56%	59%	83%

AFUE assumes boilers are like furnaces.

AFUE assumes that a boiler runs like a furnace which cools down between demand calls, doesn't operate all summer or most of the spring and fall. AFUE doesn't take into account the standby losses (*"B"*) from maintaining temperature for a tankless coil, which keeps the chimney warm or the draft regulator which pumps heated home air into the chimney. Nor does it consider jacket losses into a basement from a unit staying at 180º. Over the course of a year, actual efficiency for a boiler with tankless coil is in the 56% range.

Demand firing helps . . . but not much.

Many manufacturers recommend hot water storage tanks to provide a better supply of hot water than the tankless coil. They imply that there will be fuel savings because the boiler is cold start and will only be run on demand. That approach has a problem, because each time heat or hot water is called for, it can take 6 to 10 minutes to heat the boiler up to temperature. When the demand fired boiler shuts off, all that heat-up energy is left in the boiler so it acts almost like the boiler with a tankless coil. Cooling down gradually from 180º, its losses are similar to the tankless coil boiler including significant off cycle losses. It rarely operates at a cold start. Actual efficiency for the demand fired boiler with a domestic storage tank in a year is only slightly better, testing from 56% to 59%.

AFUE ignores over sizing effects.

The modern home frequently insulates the basement from the rest of the house and has better overall insulation with resultant small heat losses, so the boilers selected to provide adequate hot water recovery are considerably oversized.

The heat up energy of a typical cast iron boiler with 6 to 13 gallons of water in it is so great, relative to the heating load or meeting a 20 gallon hot water draw, that annual fuel efficiency drops even further. This is not reflected in the AFUE rating procedure, which assumes the boiler is only slightly larger than the calculated heat loss.

AFUE rating can be higher than steady state efficiency.

A final point of interest is that with careful laboratory testing to this procedure, it is possible to have an AFUE rating which is higher than steady state efficiency.

For delivered efficiency, System 2000 is the real winner.

Energy Kinetics System 2000 integrates a very compact, low mass (only 2-1/2 gallons water and 160 pounds of steel), heavily insulated boiler, domestic hot water tank and solid state System Energy Manager with energy recovery cycle.

The unique counter flow boiler design absorbs more heat from the flue gases for an 87% combustion efficiency. Its low mass can start delivering heat or hot water in just over 90 seconds from a cold start.

Additionally, instead of having heat in the unit at the end of a cycle, System 2000 recovers this energy and automatically distributes it to the home or stores it in the domestic hot water storage tank. This assures that it will be longer before there is another heat call for either heat or hot water.

And since the boiler only runs when there is a call for heat, standby losses are virtually eliminated.

The combustion produced by System 2000s patented chamber and boiler design is so stable that it is installed *without* a draft regulator—reducing infiltration—a significant home energy saving.

Compare Energy Kinetics System 2000 performance to the conventional boiler and you'll realize real fuel efficiency of 83%. When System 2000 operates, it runs at peak efficiency and with virtually no off cycle losses so over sizing concerns vanish.

It's time the heating industry had an accurate way to measure efficiency.

AFUE remains a misleading indicator that should be improved with an index that truly measures a hot water system's efficiency. The heating industry needs it and homeowners deserve it.