WOOD BURNING & HEAT-BOOSTER

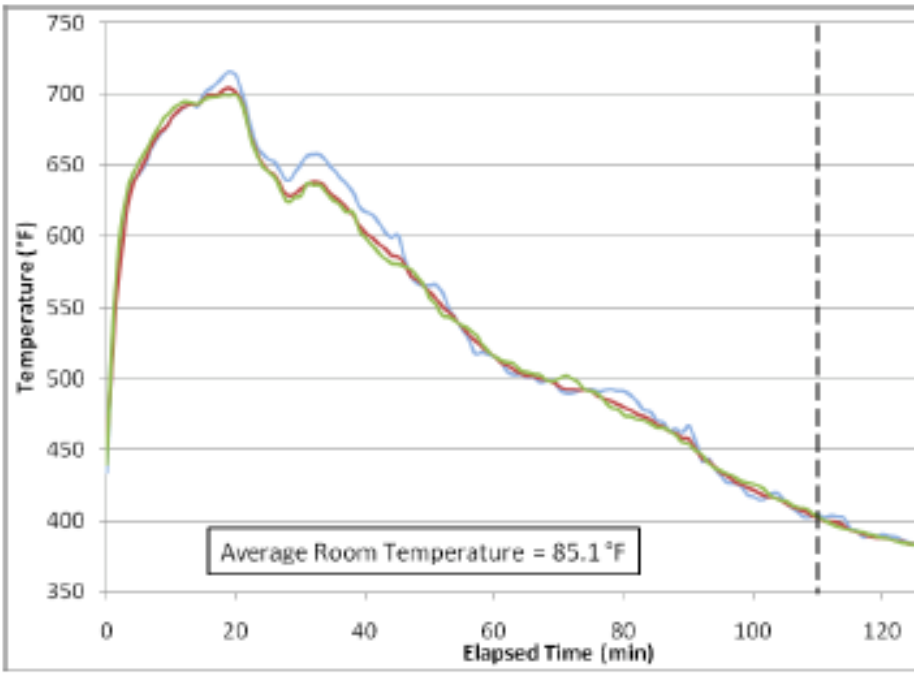
1. **Use only well seasoned and dry hardwoods.** This minimizes creosote formation and increases combustion temperatures. Energy used to evaporate water is wasted and reduces combustion temperature.

2. **Do not fully load stove with wood and set to low fire, as this creates starved air conditions that result in incomplete combustion and creosote formation.** Heat-Booster system is only intended for use with wood stoves operating with excess air. If there is visible smoke, then there is not enough air for complete combustion. It is much better to have a few gently burning logs arranged for air access. Then add one log at a time as indicated by dropping temperature on top of stove near flue exit collar. Hot burns with excess air will often produce more heat than is required. Even more heat is released when a Heat-Booster system is installed. Do not cut back air supply to create a smoldering fire! Instead, install a heat sink such as a large masonry structure or an insulated water tank from which heat can be released as required at a later time.

3. A small wood stove fitted with a Heat-Booster system will put out more than sufficient heat in most cases. Output can more than double in some cases.

4. Older, non EPA type wood stoves, operated with sufficient air (no visible smoke at normal operating temperatures) burn as clean or cleaner than EPA stoves operating with insufficient air. Energy efficiency (% of energy in wood not going up the chimney in the form of hot gases) is typically in the 60% or less range for non-EPA type stoves operating with excess air. Most of the energy in the hot flue gases can be recovered with the Heat-Booster system.

5. **Install temperature indicating devices to monitor your system.** Stem type thermometers provide more accurate temperatures than external magnetic mount types. Place one stem type thermometer just above Heat-Booster unit. Place a magnetic mount thermometer on top of stove near flue gas exit collar. A properly operated (minimum but sufficient excess air) non-EPA type wood stove will show a temperature of 350°C - 400°C (~700°F) at flue gas exit and 80°C - 100°C (200°F) after Heat-Booster unit. There must be no visible smoke. Add one log when temperature drops to ~250°C (~525°F). Smaller logs will burn better than large ones. Mixing of large and small logs improves burning. Some types of wood do not burn as well as others and mixing can help in these situations. A typical “high” burn is shown below:



The temperature curve shows that fuel must be added once every hour if temperature is to be maintained in the desired range. Use temperature on stove top as an operating guide. Also, observe chimney top to see if any visible emissions are present. White or blue smoke indicate incomplete combustion due to lack of air or low temperatures. A water vapour plume may be visible during very cold conditions. There should be no water vapour plume after wood has burned for a while and only char or carbon is left. Hot air temperature is also a good indicator. **Monitor your exhaust gases.**

6. **Use draft inducers.** A draft inducer eliminates poor draft conditions and provides additional draft that allows operation of catalytic devices that otherwise create too much pressure drop (restriction to flow). One benefit of available strong draft is that a given amount of combustion air can be introduced at a higher velocity to create turbulence. The catalyst (when operated at proper temperature and excess air) will burn residual combustibles such as soot (PM), hydrocarbons and carbon monoxide. Trace concentrations of organic chemicals will also be reduced.

   There are two kinds of draft inducers: Venturi type and blowers. Each has its advantages and disadvantages. Venturi device does not contact flue gases with electric motors or wiring. Instead, air from a local or remote blower is used as driving force to induce a negative pressure at top of chimney. Blower type draft inducers have a squirrel cage type impeller in the flue gas path and an electric motor well above the impeller. Motor and wiring must be protected from high temperatures. Advantage is that less power is required for draft inducement.

7. **Inspect your system often.** Check for creosote on top of Heat-Booster heat exchanger. This is where the results of improper burning will be noticed first. Clean with a steel wire brush if necessary. Dry, loose ash indicates proper combustion.

8. Consider using optional catalytic module to minimize emissions and to obtain maximum energy efficiency. The catalyst slides in and out of flue gas path to facilitate startup and loading of fuel. Insert catalyst when specified operating temperature has been reached.This is in the 200°C or 400°F range. **A catalytic converter also keeps heat exchanger clean.**

9. Do not start Heat-Booster blower until at least 125°C has been reached at top of unit. This is to prevent condensation of water and products of incomplete combustion.

10. Use outside air for combustion if possible. Tight houses can create draft problems.

11. Some chimney configurations are problematic under certain wind conditions. Pressure gradients can force flue gases back into chimney. It is common to experience problems when top of chimney is not well above highest roof-line. Building codes are concerned with fire safety, not proper draft. Consult an expert before installing chimneys or designing your new home.

12. DO NOT use Heat-Booster energy recovery systems with smoldering fires. Creosote will foul the heat exchanger and flue gas flow may be restricted. Surveys have revealed that approximately 80% of those who use wood stoves for comfort heating do not know how to burn wood properly.

13. The benefits of burning good dry hardwood with excess air is **complete combustion** at high temperature. Use Heat-Booster to recover energy from the flue gases to increase energy efficiency. Less than half the wood will be required compared to conventional systems. It is common to recover up to 45,000 BTU/h (12 kW) from flue gases. This is one large log every hour.
    Heat-Booster supplies a high efficiency unit and an economy model (20% of high efficiency unit).

“Burn wood hot and easy!”

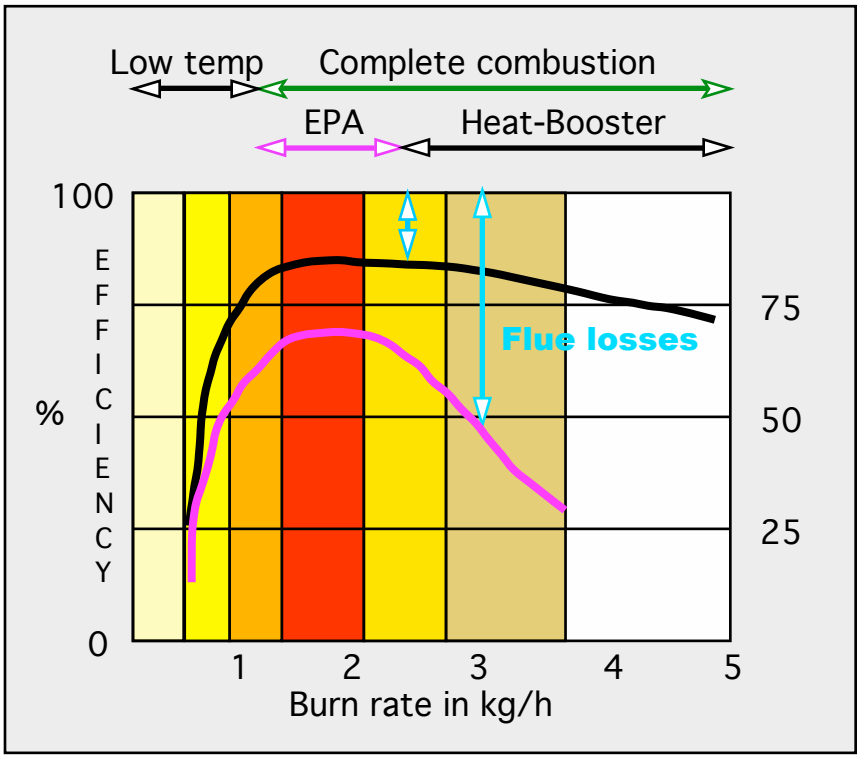
http://heat-booster.com

ABOUT WOODSTOVE EFFICIENCY

The only meaningful efficiency measure is thermal efficiency (TE). TE means the percentage of energy in the wood that is transfered into the room(s) heated. Maximization of TE requires that a number of combustion and heat transfer principles be incorporated in the wood burning appliance:

1. Firebrick insulated firebox to maintain high temperatures
2. High temperatures with sufficient excess air to complete combustion of all fuel
3. Heat transfer system matched to burning rate range

Woodstove manufacturers like to claim “efficiencies” of 75% or higher. What they do not tell you is that this number does not apply to all burn rates. There are very significant heat losses from woodstoves operating at high firing rates. This is shown here:



EPA type woodstoves do a decent job of completing combustion and reducing smoke pollution. Thermal efficiency decreases with increasing burn rates for all woodstoves. This is shown above as flue losses. The Heat-Booster system recovers most of the heat that is lost with the hot flue gases. Use of catalyst completes combustion and a very efficient heat exchanger recovers available heat. A Draft-Booster on top of chimney is used to make sure draft is good under all weather conditions, and because flue gases are cooled down to the 100°C-150°C range. Draft-Booster also compensates for pressure drops through catalyst and heat exchanger.

Heat-Booster catalytic modules ship with an integrated catalytic element. The second element facilitates easy change and cleaning of catalyst. Just replace dirty (ash) catalyst with the other catalyst that has been cleaned by rinsing under hot running water (and allowed to dry). We recommend that catalyst be exchanged every time ash is removed from firebox. Catalyst change is easy: Pull out catalyst element from drawer, replace with cleaned catalyst and push in drawer. This takes less than 30 seconds.

“Exciting Energy Saving Products”