

## Fireplace Retrofit Stove

Combustible biomass (AKA firewood) is a renewable resource that can help ween us of our dependence upon fossil fuels. Unfortunately fireplaces are notoriously inefficient, in that the chimneys usually suck more warm air out of the living spaces than the fires within them provide. So unless you build only large fires, and have the damper closed whenever a fire is not present, they are best left unused with the damper closed.

There are commercial inserts that can cover the fireplace opening, and provide more efficient burns. Another option is to do a custom retrofit such as the one described here. In this case, The roof of the fireplace is blocked off with sheet metal (I find it easier to use two overlapping pieces pop-riveted together, once they have been custom-trimmed and installed). A hole is cut to connect to a flue pipe.

Wood is fed into a vertical burn chamber equipped with both the air inlet and the flue exit at the bottom. This allows the wood to gravity-feed into a small intense high-efficiency fire. An air-tight lid prevents smoke from entering the living space.



Wait until the wood has burned down to a bed of coals a few inches deep and close the door before lifting the lid to add more fuel. This will prevent smoke from entering the room when recharging.

The bottom of the burn chamber is covered with brick, and elevated about 8" above the floor. This way ashes can simply be pushed into the next chamber for several days (often a week) before they need to be removed from the ash and exit chambers. A lid on top of the exit chamber (visible with its handle on the upper left of the photo) provides access for ash removal. This also gives direct access to the flue exit, so flame can be applied to start a draft before the main charge is ignited.

All-in-all, the features include:

1. High-efficiency smoke-free burn,
2. Incorporating an otherwise inefficient fireplace,
3. Major reduction in ash-handling (notice the "porch" in front of the door to catch ashes.)
4. Extended surface area to transfer heat into the living space,
5. Forcing the exhaust to spin through two circular chambers reduces the fine particulate emissions.

