



OUTDOOR WOOD-FIRED BOILERS

A Controversial Wood Heating Technology

What are Outdoor Wood-fired Boilers (OWBs)?

OWBs are residential or small commercial wood-fired water heaters that are located outdoors or are separated from the space being heated. The fires in the large fire boxes heat water that is circulated into the home through underground pipes. The energy is used to heat houses, shops, domestic hot water, greenhouses or for heating swimming pools or spas.

Why Is There Controversy?

OWBs tend to cause dense smoke that impacts neighbors who complain about nuisance and health problems. Most OWBs come equipped with very short stacks. The smoke from these low stacks disperses poorly. In addition, the owners often operate the OWBs to heat hot water or swimming pools during the summer when neighbors have their windows open and are trying to enjoy the outdoors.



What Causes OWBs To Smoke?

Most OWBs employ very primitive combustion technology. When the water circulating through the furnace reaches an upper set point (usually around 180°F) the air supply to the fire is cut-off, cooling the fire so the water will not overheat. The furnace operates in this “idle” mode until the water temperature hits a lower set point and the air supply is re-established. Under some conditions the OWB may be in idle mode far longer than in the operating mode. This type of operating causes very poor combustion and heavy foul smoke. Most of the smoke emitted is fine condensed organic material that does not burn under cool, oxygen starved conditions. In addition, many owners burn green wood full of moisture which also causes poor combustion. Wood from the outdoor winter wood pile may be very cold when loaded into the OWB causing an even colder fire.

Are OWBs Really Any Worse Than Indoor Woodstoves?

Yes. Newly manufactured indoor woodstoves are required to meet strict US EPA particulate emissions standards, 4.1 grams per hour for catalytic stoves and 7.5 g/hr for noncatalytic stoves. Certification tests are conducted in EPA approved laboratories. As expected, emissions during actual use are somewhat higher. In contrast, the New York State Attorney General’s office found that average emissions during laboratory testing of OWBs was 71.6 g/hr or roughly ten times the particulate emission rate from indoor woodstoves. Although older style indoor wood stoves emit

more than new certified stoves, they are still several times less polluting than OWBs. Due to the poor combustion conditions, it is also probable that OWBs emit proportionately more benzene, polycyclic aromatic hydrocarbons, formaldehyde and other toxic partial combustion products which have been linked to asthma, heart attacks and cancer.

Is Natural Wood Smoke Bad?

Yes, all wood smoke is bad, but the smoke from OWBs is worse due to the poor combustion and large amounts of smoke emitted. While smoke and gases from burning fossil fuels, such as oil, contain air pollutants like sulfur dioxide, the smoke from wood burning contains much higher levels of small particles. In fact, the vast majority of particulate emitted by OWBs is very fine (less than 2.5 microns in size) and can become trapped in the delicate air exchange sacs deep in your lungs when inhaled. Numerous studies have found strong relationships between high fine particulate levels and chronic lung diseases, cardiovascular disease and premature death. According to the American Lung Association, the fine particulate found in woodsmoke can be linked to higher school absenteeism, emergency room visits and hospitalizations for cardiopulmonary conditions, respiratory infections and asthma.

I Want To Burn Wood—What Should I Do?

- First, consider your neighbors. Burning wood in some dense residential neighborhoods may never be a good idea.
- Have an energy expert inspect your home. You may find that more insulation or other energy saving improvements may be a better investment than an expensive wood heating device.
- If you have an older non-certified wood stove, consider purchasing a cleaner, more efficient EPA certified woodstove or pellet stove.
- Consider an efficient indoor wood boiler that may include a large hot water storage tank. Operated properly, these units cycle less and burn hotter and cleaner.
- If you like the idea of an outdoor wood boiler, consider waiting until newer, more efficient units are on the market. Don't be fooled by the exaggerated efficiency claims by some manufacturers or dealers. It's a big investment; make it wisely.

For additional information about OWBs go to www.vtwoodsmoke.org on the internet or contact the Vermont Department of Environmental Conservation, Air Pollution Control Division.



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