

# Outdoor Wood-fired Boilers



## A Message from the Spokane Regional Clean Air Agency

The Spokane Regional Clean Air Agency (Spokane Clean Air) prepared this fact sheet to inform potential purchasers of the air quality rules related to the purchase, installation and operation of Outdoor Wood-fired Boilers.

### Background

Outdoor wood-fired boilers cannot be legally sold in the state of Washington at this time. If you have any questions about outdoor wood-fired boilers, please contact us.

With the rising cost of heating oil, more Washington residents are looking to wood as a source of heat and hot water. But not all wood heat is the same. While indoor wood stoves have been tested and certified by EPA for emissions since 1990, outdoor wood boilers (OWBs) are not. OWBs cause dense smoke and have very short smoke stacks, so the smoke is released at levels where people breathe it. This smoke endangers your health and that of your family and neighbors, as well as harming the environment. Even the cleanest outdoor wood-fired boilers are 3 to 5 times more polluting than a certified wood stove meeting Washington emission standards.

### What are Outdoor Wood-fired Boilers?

OWBs are 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 may be used to heat houses, shops, domestic hot water, greenhouses, swimming pools and spas. Indoor installed boilers are a variation of an OWB. They are in the same legal category as OWBs, and subject to the same regulations.

### Are OWBs legal in Washington?

Not at this time. However, Ecology is willing to consider allowing OWBs to be sold in Washington if the manufacturers can prove they meet Washington's emission standards.

To prove an OWB meets Washington's standards, a manufacturer must:

- ✓ have the device tested using a test method that Ecology considers adequate and acceptable; and
- ✓ submit test results to Ecology showing the OWB emits no more than 4.5 grams of fine particles per hour.



The U.S. Environmental Protection Agency has a voluntary program for manufacturers of outdoor wood-fired boilers. Boilers that are accepted into this program meet stricter guidelines and pollute less. However, even these boilers pollute too much to be allowed in Washington. You can find more information on this program at <http://www.epa.gov/owhh/models.htm>.

### 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 operating mode.

-over-

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. Burning wood with too much water content (20% moisture or less is required by state law) can also cause 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 worse than indoor wood stoves?

Yes. Newly manufactured indoor wood stoves are required to meet strict Washington State particle emissions standards, 2.5 grams per hour for catalytic stoves and 4.5 grams per hour for noncatalytic stoves. In contrast, tests done by the Northeast States for Coordinated Air Use Management (NESCAUM) found that the average fine particle emissions (a particularly harmful pollutant) from one OWB are equivalent to the emissions from 22 EPA certified wood stoves, 205 oil furnaces, or as many as 8,000 natural gas furnaces. One OWB can emit as much fine particle matter as four heavy duty diesel trucks on a grams per hour basis. The smallest OWB has the potential to emit almost one and one-half tons of particulate matter every year. Although older style indoor wood stoves emit more than new certified stoves, they are still several times less polluting than OWBs. Due to their 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 Harmful?

Yes, all wood smoke is harmful. Fine particles from smoke emissions can be carried deep into the lungs and can be responsible for significant health problems, including asthma, lung diseases, heart diseases and death. These particles can also increase the risks of certain types of cancer. Breathing smoke is especially harmful for sensitive populations, including children, the elderly, and people with heart and lung ailments. It is estimated that fine particle air pollution costs citizens of Washington State hundreds of millions of dollars each year in health care costs and lost productivity due to illness.

### If I want to burn wood, what should I do?

- ✓ First, consider your neighbors. Burning wood in 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 natural gas, propane, pellet or EPA certified woodstove.

### References

Washington State Department of Ecology's website:  
[www.ecy.wa.gov](http://www.ecy.wa.gov)

EPA's Outdoor wood-fired boiler web site:  
[www.epa.gov/owhh/](http://www.epa.gov/owhh/)

Vermont's wood-fired boilers web site:  
[www.vtwoodsmoke.org/](http://www.vtwoodsmoke.org/)

