

Outdoor Wood Boilers

Outdoor Wood Boilers (OWB), are also known as outdoor water stoves and outdoor wood furnaces, are used as outdoor residential heaters. These boilers have wood burning fireboxes surrounded by a water reservoir vented by a chimney stack. The combustion of the wood in the firebox heats the water in the surrounding reservoir and the heated water is pumped to the residence. OWB units can also supply residential hot water. The water capacity ranges from 60 gallons to 764 gallons.

The operational design creates long periods where the fire smolders and creosote is formed due to very poor combustion. Foul smoke is created as a result and it is emitted as 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. The smoke created from these outdoor wood burning units can contain several pollutants that are harmful to breathe, including fine particle pollution such as $PM_{2.5}$ in addition to VOC and NOx.

This area source has many unknowns and variables associated with it including the OWB unit sales data in Ohio. Therefore, several assumptions are made in agreement with the Great Lake States in order to formulate a homogeneous inventory for the region.

The assumptions are as follows:

- 100% of wood combusted in non-certified units.
- OWB units to be 90% in rural counties and 10% in urban counties
- 11.68 cords of wood consumption per unit per year (includes heating efficiency of 30-40%)
- 5 months heating season = 3650 hours (24/7)
- $PM_{2.5}$ emissions factor (g/kg wood) = 13.82 (Average of indoor and outdoor) or 27.64 lb/ton of wood

The methodology requires that total number of OWB sold in Ohio be apportioned to each county based on rural or urban designation while observing the 9:1 ratio in area sales. Total emissions obtained from this category are subtracted from the Residential Wood Combustion category (discussed below) to allow for accurate emissions from the indoor wood burning units.

References:

[Environmental Chemistry.com](http://www.environmentalchemistry.com) viewed on Feb 8th, 2007.

(WashingtonState, Department of Ecology) viewed on Feb 8th, 2007

http://www.ecy.wa.gov/programs/air/AOP_Permits/Boiler/Outdoor_Boilers_home.html

U.S. Environmental Protection Agency. Reducing Pollution from Outdoor Wood-Fired Hydronic Heaters. [Fact Sheet](#)

