

Air Curtain Burners

What are Air Curtain Burners?

Air Curtain Burners (ACBs) are incinerators which use fan-forced air to improve combustion. ACBs are used for burning combustibles, mainly wood, in various applications in the US and Canada. Their use is generally limited to relatively small-scale burning, often in the suburban fringe, because of relatively high capital and operating costs and relatively low capacity limits.

ACBs work by blowing high velocity air across and down over the wood, creating an air curtain on top and a rotational turbulence within the firebox. This provides an oxygen enriched environment that accelerates the combustion process, similar to the effect of fanning a fire. The temperature within the firebox is usually above 1000°C. The high velocity air over the firebox creates an air curtain that traps unburned particulate until it is completely consumed. There are two types of ACBs available: above-ground fire boxes and in-ground trench systems.

This comparison uses information about ACBs made by America's biggest ACB manufacturer, Air Burners LLC. The largest above-ground ACB, Model 3-327, is approximately 12 m long, 3.6 m wide and 3 m high and weighs about 22 tonnes. An 88 hp diesel engine powers the blower system, with a fuel consumption of approximately 15.75 litres per hour. Wood is cut to an appropriate length by a chain saw operator and then lifted into the firebox by an excavator loader. The burning capacity is quoted as 6–10 tonnes of wood per hour. The price of the latest design is not available, but earlier models were quoted at US \$114,000.

In-ground burning ACBs blow air into a specially dug trench via a manifold. The capital cost of these units is lower than the above-ground units, but the throughput of wood is about the same. This system is considered as being less reliable in reducing particulate incineration as the process is likely to be influenced by the quality of the trench construction and ambient conditions. The static location adds to the operating cost if wood has to be transported to the trench. Another disadvantage is that the trench fills with ash, requiring new trenches to be dug.

Are Air Curtain Burners suitable for dealing with forest residues in Tasmania?

There are two major factors which make ACBs unsuitable for dealing with forest residues in Tasmania – cost and logistical hurdles. The cost of using ACBs is estimated to be around 10 times the cost of planned burns carried out by the forest industry; the current costs of planned forestry burns amount to about \$7 million per year and the cost of ACBs would inflate this cost to about \$70 million per year (Chuter 2008a).

The logistical arrangements necessary to replace planned burning with ACBs are considerable. In 2008, approximately 31,000 hectares were burnt in 579 separate locations across the state by the forest industry, the Parks and Wildlife Service and Hobart City Council (Chuter 2008b). Extrapolating from limited data on residual biomass (Slijepcevic 2001), it is estimated that about 3 million tonnes

of solid wood fuel was burnt, excluding fine fuels, peat and duff. It would require 43 of the largest machines available to work around the clock for a year to deal with the solid wood fuel from 2008 (Chuter 2008c).

The logistical arrangements are further complicated by the periods of the year when wet ground conditions prevent fuel collection, and road conditions prevent transport and establishment of burners. These conditions are common during winter, which would mean that ACBs could not operate for around three months of the year. Consequently, the number of burners would need to be increased by 25 per cent to around 53 to carry out the year's prescribed burns.

A further consideration would be the reduced productivity arising from increased soil compaction caused by additional traffic.

References:

Chuter, R 2008a *Cost comparison between Air Curtain Burners and in situ slash burning*, Forest Practices Authority, Hobart.

Chuter, R 2008b *Review of the implementation and effectiveness of the 2008 interim fire management/smoke dispersal guidelines*, Forest Practices Authority, Hobart.

Chuter, R 2008c *Review of literature pertaining to Air Curtain Burners*, Forest Practices Authority, Hobart.

Slijepcevic, A 2001, Loss of carbon during controlled regeneration burns in *Eucalyptus obliqua* forest, *Tasforests* 13 (2)281-287.

Manufacturer's Websites:

Air Burners LLC: <http://www.airburners.com/>

McPherson Systems, Inc. <http://www.mcphersys.com>