

CCA-Treated wood disposed in landfills and life-cycle trade-offs with waste-to-energy and MSW landfill disposal

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Abstract

Chromated copper arsenate (CCA)-treated wood is a preservative treated wood construction product that grew in use in the 1970s for both residential and industrial applications. Although some countries have banned the use of the product for some applications, others have not, and the product continues to enter the waste stream from construction, demolition and remodeling projects. CCA-treated wood as a solid waste is managed in various ways throughout the world. In the US, CCA-treated wood is disposed primarily within landfills; however some of the wood is combusted in waste-to-energy (WTE) facilities. In other countries, the predominant disposal option for wood, sometimes including CCA-treated wood, is combustion for the production of energy. This paper presents an estimate of the quantity of CCA-treated wood entering the disposal stream in the US, as well as an examination of the trade-offs between land-filling and WTE combustion of CCA-treated wood through a life-cycle assessment and decision support tool (MSW DST). Based upon production statistics, the estimated life span and the phaseout of CCA-treated wood, recent disposal projections estimate the peak US disposal rate to occur in 2008, at 9.7 million m³. CCA-treated wood, when disposed with construction and demolition (C&D) debris and municipal solid waste (MSW), has been found to increase arsenic and chromium concentrations in leachate. For this reason, and because MSW landfills are lined, MSW landfills have been recommended as a preferred disposal option over unlined C&D debris landfills. Between landfilling and WTE for the same mass of CCA-treated wood, WTE is more expensive (nearly twice the cost), but when operated in accordance with US Environmental Protection Agency (US EPA) regulations, it produces energy and does not emit fossil carbon emissions. If the wood is managed via WTE, less landfill area is required, which could be an influential trade-off in some countries. Although metals are concentrated in the ash in the WTE scenario, the MSW landfill scenario releases a greater amount of arsenic from leachate in a more dilute form. The WTE scenario releases more chromium from the ash on an annual basis. The WTE facility and subsequent ash disposal greatly concentrates the chromium, often oxidizing it to the more toxic and mobile Cr(VI) form. Elevated arsenic and chromium concentrations in the ash leachate may increase leachate management costs.

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1. Introduction and background

Because of the metal content of CCA-treated wood, it has been relatively difficult to manage as a solid waste. Under US EPA standardized testing conditions, CCA-treated wood shows characteristics of a hazardous waste because of the leachability of arsenic and chromium (Townsend et al., 2004), yet it is exempt from federal regulation as a hazardous

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