



# **Assessment of Residential Wood Burning Activity across the Maricopa County PM10 Non-Attainment Area**

**An executive summary  
prepared for:**



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Air Quality Department

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# Executive Summary

The goal of this project is to assist in improving estimates of residential wood combustion in Maricopa County to meet the County's Clean Air Act obligations. There is a constant need to review methodologies used to estimate emission sources with the goal to improve the emission inventory. Specifically, Maricopa County is still officially designated as a Non-Attainment Area for the National Ambient Air Quality Standard for PM10, and there is concern that the residential wood smoke emission inventory may not accurately reflect local emissions.

## Methodology

The current project executed the following:

- Reviewed relevant literature to identify alternative approaches to inventory emissions from residential wood combustion.
- Developed an updated inventory of houses with fireplaces.
- Used year of construction for residences with fireplaces to determine the type of fireplace technology used in each residence.
- Updated the methodology used to estimate the amount of wood combusted in Maricopa County by using climatic data.
- Surveyed local wood suppliers to quantify the amount, seasoning and type of wood sold in Maricopa County.
- Estimated annual PM10 emissions by incorporating the wood combustion technology (i.e. an EPA-certified device or a non-EPA-certified device) as well as the type of wood burned (softwood, hardwood or manufactured log).

## Key Findings

The Maricopa County Air Quality Department (MCAQD) Rule 314 adopted in 1999 required all new homes to be constructed with fireplaces equipped with EPA-certified devices. Results of this work find 71% of the residential fireplaces in the Maricopa County PM10 Non-Attainment Area (NAA) use conventional fireplaces and 29 percent of the fireplaces contain EPA-certified catalytic inserts.

This project also updates emissions factors for various wood burning devices used for home heating purposes to report the mass of PM10 emitted per unit of energy delivered. The use of an emissions factor based on energy delivered requires the identification of wood species used in residential wood combustion. To identify the species of wood used for home heating purposes, a telephone survey was conducted of commercial firewood distributors in Maricopa County. Using an estimation for residential fireplace use of manufactured logs and the results of the survey, we estimate that 30 percent of residential wood combustion in Maricopa County uses manufactured logs, 44.6 percent uses softwood, and 25.6 percent uses hardwood. Using information on average wood properties by species and updated EPA emissions factors, we generate emissions factors for softwood, hardwood, and manufactured logs. The calculated emissions factors resulted in decreased mass of PM10 emitted per mass of fuel emissions factor for both the hardwood and softwood and an increased emissions factor for manufactured logs.

This updated analysis estimated that 59,030 cords of wood are burned annually in the Maricopa County PM10 NAA generating 861.86 tons of PM10 emissions per year. The 2008 Periodic Emission Inventory (PEI) (1), inventoried significantly lower annual wood combustion in Maricopa County at 21,397 cords and lower annual PM10 emissions at 461.59 tons. The

increase in wood combustion in the current project compared to the PEI(1) is attributed to the inclusion of climatic data in apportioning wood combustion in Arizona to different counties. Also, the increase of PM10 emissions calculated in the current study does not directly scale compared to the 2008 PEI as the current study bases emission factors on both the wood variety burned and the wood combustion technology.

## **Conclusions and Next Steps**

Despite the improvements noted, not all possible improvements in the approach to estimate emissions from residential wood combustion were accomplished in this project. Specifically, there is significant evidence that in the mild climate of Phoenix, recreational wood combustion – for ambience indoors or outdoors in backyards – is a significant contributor to local emissions. Inherent in the approach used here is the assumption that the motivation for wood combustion is home heating. Despite the literature review, we could find no suitable data to estimate recreational wood combustion compared to wood combustion for home heating. For further work, it is suggested that a survey of resident behavior be undertaken to understand this important aspect of residential wood combustion.

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