January 17, 2017

FAMILIES FOR CLEAN AIR

Chairman Mary Nichols
California Air Resources Board
1001 I Street
Sacramento, CA 95819

Comments on the California Air Resources Board's Revised Proposed Short-Lived Climate Pollutant Reduction Strategy (November 2016)

I write today on behalf of Families for Clean Air and our supporters throughout the state. We applaud CARB's efforts to reduce Short-Lived Climate Pollutants (SLCPs) and reduce emissions due to residential wood burning. We appreciate the hard work and thought that has gone into the revised plan and are in general agreement with it. We would like to offer the following specific comments, referenced to the page number of the revised strategy document:

- **Page 54:** We would like to offer a caution regarding the statement, "If wood burning devices are used, they should be the cleanest available technologies, currently those adhering to the 2020 EPA emission standard." This may give a false sense of meaningful action. Even industry has argued that the 2020 EPA standards do not offer a tangible improvement over the previous standard, since the variability in the EPA test method is greater than the difference between the previous standard and the 2020 standard.[1]

  Regarding the prioritization of non-wood devices, if the goal of CARB is to only incentivize the cleanest devices (i.e., non-wood), then it is important for CARB to avoid offering financial incentives for wood burning devices except in very narrow circumstances, as discussed below. Wood stove changeout programs that do not include incentives for wood have proven to be successful, and they prevent limited funds from being diverted to more polluting wood devices. In a changeout program implemented by the Bay Area Air Quality Managment District in 2016, no incentive options for wood burning devices were included despite protestations from industry, yet the $3 million in available funds were all claimed within a single day. If incentives for wood burning devices had been included, it is likely that a significant portion of these funds would have gone to more polluting wood devices, reducing both the climate and public health benefits of the program.[2]

  We support the idea of incentivizing wood burning devices in areas that "may require the use of wood burning equipment for safety, especially areas that experience heavy snow which traps residents in homes, and where…electricity loss is frequent." This makes good sense as it protects public safety. But we take exception to the idea of using public funds to subsidize wood burning devices in areas "where distributed natural gas is not available." The idea that electric home heating is more expensive than natural gas home heating is outdated. Homes in areas without

natural gas can be heated with electric ductless mini-split heat pumps at a lower or comparable cost versus natural gas heaters. While traditional electric baseboard and space heaters are expensive to operate, electric ductless mini-split heat pumps are not.

Electric ductless mini-split heat pumps are ideal for changeout from wood space heaters, they emit zero local emissions, and they are the most energy efficient form of home heating—so efficient that they can be run off solar panels for a zero carbon impact home.

A study by the Bay Area Air Quality Managment District in October 2015 compared the operating costs for home heating sources in the San Francisco Bay Area and found that the operating costs for electric ductless mini-split heat pumps were lower than those for wood and propane devices and nominally higher than natural gas devices.[3]

- **Page 55:** We suggest that in addition to offering monetary incentives for the removal and replacement of wood burning devices, an incentive should also be offered for simply removing and destroying or recycling wood burning devices. This is a tactic that has been used successfully in other incentive programs.

  Regarding the statement, "Monetary incentives to stimulate removal of old wood burning devices are popular and can achieve significant emission reductions," we agree that old wood burning devices must be removed to decrease the emissions associated with residential wood burning. However, CARB should be aware that replacing old wood burning devices with new wood burning devices is unlikely to substantially reduce emissions based on data from previous large changeout programs, which have not delivered the expected benefits.

  For example, every wood stove in the Libby, Montana area was changed out to an EPA-certified wood stove at a total cost of over $2.5 million. The 28% reduction in particulate pollution, which includes black carbon, was nowhere near the expected 56% reduction (based on stove certification values). More importantly, the contribution of wood smoke to ambient PM2.5 levels had not changed several years later. Specifically, a source apportionment study reported that the contribution of wood smoke to overall PM2.5 in Libby was 81% in 2003–2004 (before the changeout) versus 81.3% in 2007–2008 (after the changeout).[4] Thus, after the changeout, the overall PM2.5 levels had dropped, but the contribution of wood smoke to the levels had not. Moreover, a study of air quality at two schools found that "...the changeout did not result in a measurable improvement on school indoor air quality."[5] And when researchers looked at air quality inside houses, 5 of 21 houses actually showed increased PM2.5 levels.[6]

  Another program, conducted in British Columbia, replaced a total of 6067 old wood stoves as part of a change-out program. An in-depth evaluation of the program several years later noted, "…there has not yet been a clear reduction in fine particulate matter pollution coming from residential wood stoves in BC."[7]

  Based on available studies, the most effective way to reduce the emissions from residential wood burning is to decrease the number of homes that burn wood.[8] We want to stress that an effective incentive program should involve no or very limited wood to wood changeouts.

- **Page 110:** Table 12 summarizes the projected changes in emissions when old wood burning devices are changed out to either new wood burning devices or to gas or electric devices. We agree with the calculations showing reduced emissions when wood burning devices are removed and replaced with gas or electric devices. We challenge the calculations for emission reductions for wood to wood changeouts. In fact, the table shows reductions in the wood to wood column that are just 12% lower than changeouts to gas or electric devices. This seems very unlikely.

  These calculations are not meaningful because they are based on figures from the EPA that are derived from laboratory test scenarios; they are not supported by real life data. Notably, many variables affect emissions from wood burning stoves in the real world (fuel moisture content, oxygen supply, temperature, the type of wood, etc.), making it difficult to determine what numbers to use in such calculations. However, the extensively documented results of wood to wood changeout programs in Montana and British Columbia, described above, have shown that wood to wood changeouts are an inefficient strategy for reducing emissions. We are concerned that the (unreliable) data in this table could be used to inappropriately justify incentives for wood to wood changeouts, despite the data showing that such changeouts are ineffective in the real world.

- **Page 111:** "U.S. EPA estimates that EPA-certified devices burn a third less wood for the same heat output." This efficiency is unlikely to be realized in actual use, especially in temperate climates such as California. A more efficient EPA-certified wood stove may indeed generate more heat per unit of wood burned, but because wood stoves do not have thermostats, they continue to heat the home even after it has reached a comfortable temperature. When a home becomes too warm, the wood stove will be operated at less efficient settings as the user reduces the combustion air to the device. Even worse, the fire may be allowed to die when the house warms up, only to be restarted at a later time, thereby generating massive start up emissions.

  A recent study conducted in multiple Australian climates found that 74% of the energy generated from burning fuel in a woodstove is wasted—only 26% is actually used to heat the home.[9] Most of the waste is not due to the efficiency of the stove but rather to the efficiency of use. The relatively small differences in burning efficiency between EPA-certified wood stoves and conventional stoves are thus insignificant compared to the efficiency of use.

- **Page 112:** We assume that the cost comparison in Table 14 was based on conversion to electric baseboard heating. Recalculating the comparison using the operating costs for electric ductless mini-split heat pumps would result in net fuel savings versus wood to wood changeouts.

In closing, based on the evidence presented above, we urge CARB to subsidize very limited or no wood to wood conversions in its Short-Lived Climate Pollutant Reduction Strategy.

We appreciate the opportunity to comment. Please feel free to contact us with any questions or for further information.

Sincerely,

Susan K. Goldsborough, Executive Director

References

1. **EPA Wood Heater Test Method Variability Study: Analysis of Uncertainty, Repeatability and Reproducibility based on the EPA Accredited Laboratory Proficiency Test Database**. 2010. Curkeet (Intertek Testing Services) and Ferguson (Ferguson, Andors & Company).

2. **Bay Area fireplace replacement rebates snapped up in a day.** August 29, 2016. D. Cuff. The Mercury News. http://www.mercurynews.com/2016/08/29/bay-area-fireplace-replacement-rebates-snapped-up-in-a-day/.

3. **Public Hearing on Proposed Amendments to Regulation 6, Rule 3: Wood Burning Devices.** October 21, 2015. T. Lee. Bay Area Air Quality Management District. http://www.baaqmd.gov/~/media/files/board-of-directors/2015/bod_102115_presentation-pdf.pdf?la=en)

4. **Fine Particulate Matter Source Apportionment Following a Large Woodstove Changeout Program in Libby, Montana**. Ward TJ et al. 2012. *Air & Waste Manage Assoc* 60:688–93.

5. **The Impact of a Community-Wide Woodstove Changeout Intervention on Air Quality Within Two Schools**. Ward TJ et al. 2013. *Atmosph Poll Res* 4:238–44.

6. **Results of a Residential Indoor PM2.5 Sampling Program Before and After a Woodstove Changeout**. Ward TJ et al. 2008. *Indoor Air* 18:408–15.

7. **BC Wood Stove Exchange Program. Program Evaluation (2008 to 2014). Final Report (August 18, 2015)**. Pinna Sustainability Inc. http://www.bcairquality.ca/reports/pdfs/WSEP_evaluation.pdf.

8. **Evaluation of Interventions to Reduce Air Pollution From Biomass Smoke on Mortality in Launceston, Australia: Retrospective Analysis of Daily Mortality, 1994-2007**. Johnston FH et al. 2013. *BMJ* 346:e8446.

9. **Australian wood heaters currently increase global warming and health costs**. 2011. Robinson. *Atmos Poll Res* **2**:267–274.