Portola Serious PM2.5 Plan
Quantitative Milestone Report

California Air Resources Board

January 5, 2026

This page intentionally left blank

TABLE OF CONTENTS

Contents

Attachment: Portola Wood Stove Change-out 2025 Progress Report

BACKGROUND

On January 15, 2015, the U.S. Environmental Protection Agency (U.S. EPA) designated a portion of Plumas County as a Moderate fine particulate matter (PM2.5) nonattainment area (Portola Nonattainment Area) for the 2012 12.0 µg/m3 annual PM2.5 National Ambient Air Quality Standards (NAAQS) (12.0 µg/m3 annual PM2.5 NAAQS). After failing to meet the standard by the December 31, 2021 deadline, the area was reclassified as Serious on January 30, 2023.

On December 26, 2024, the California Air Resources Board (CARB) submitted the Portola Serious State Implementation Plan (Serious PM2.5 Plan) to U.S. EPA. Developed in partnership with the Northern Sierra Air Quality Management District (District), the Serious PM2.5 Plan projects attainment of the 12.0 µg/m³ annual PM2.5 NAAQS by the Serious area attainment deadline of December 31, 2025.

Under Section 189(c) of the Clean Air Act (CAA), nonattainment areas must meet quantitative milestones every three years to demonstrate Reasonable Further Progress (RFP). For areas reclassified as Serious, the original 7.5-year milestone from the Moderate plan remains valid and provides a basis for U.S. EPA to evaluate progress while the Serious PM2.5 Plan is developed. In addition, Serious area plans must include new milestones every three years until a milestone date falls within three years after the attainment deadline. If the area fails to attain, these post-attainment milestones help U.S. EPA monitor continued progress while a new plan is developed. The first Serious milestone is October 15, 2025, with a report due by January 13, 2026. This report certifies that:

- The Serious control strategy is being implemented.
- Emission reductions have been achieved.
- The Portola Nonattainment Area is on track to attain the standard by the deadline.

Since, as shown in Section V.K of the Serious PM2.5 Plan, all PM2.5 precursors were deemed insignificant for attainment, this report focuses solely on direct PM2.5 emissions.

CONTROL STRATEGY IMPLEMENTATION AND EMISSION REDUCTIONS

Residential wood burning has been and remains the dominant source of PM2.5 emissions in the Portola Nonattainment Area. Wood combustion for home heating contributes approximately 76% of the annual PM2.5 mass and up to 86% on days with elevated concentrations. The widespread reliance on wood burning is largely due to the lack of natural gas infrastructure and the availability of low-cost or free wood fuel. To mitigate these emissions, in 2016 the District launched the Greater Portola Wood Stove Change-out Program (Change-out Program or Program). This voluntary incentive program, funded primarily with U.S. EPA Targeted Airshed Grants, encourages residents to replace older, high-emitting wood burning devices with lower polluting and more energy-efficient

alternatives. Eligible households that use wood heaters as their primary heat source can receive incentives—often covering the full cost of purchase and installation.

To ensure these reductions are creditable for SIP purposes, they must be fully realized throughout the calendar year. Accordingly, emissions reductions from devices replaced between January 1, 2021, and December 31, 2024, were calculated and compared to the SIP commitment in the Portola Serious PM2.5 Plan. The Serious PM2.5 Plan includes an enforceable commitment to reduce direct PM2.5 emissions by 0.025 tons per day (tpd) by replacing 100 older wood heaters with lower polluting and more energy-efficient alternatives. As shown in Table 1 and Table 2, between January 1, 2021, and December 31, 2024, the District exceeded this goal by:

- Achieving 0.078 tpd in emission reductions—three times the SIP target.
- Completing 329 installations, surpassing the goal of 100 by 229 units.

Table 1. Emission Reductions (2021-2024)

Category	**Unit**	**Amount**
Emissions Reduced	tons per day	0.078
Emissions Reduction Goal	tons per day	0.025
Excess Reductions	tons per day	0.053

Table 2. Device Installations (2021-2024)

Device Type	**Count**
Wood Stoves	
Non-catalytic	24
Catalytic	121
Hybrid	4
Pellet Stoves	73
Propane/Kerosene Stoves	28
Heat Pumps	33
Heat Pump Combos	46
Total Installations	329
Goal	100
Excess	229

In addition to the Change-out Program, the District has implemented a comprehensive suite of strategies aimed at reducing woodsmoke emissions. These include:

- Mandatory curtailment of wood burning during high pollution episodes

- Public education and outreach campaigns
- Seasoned wood distribution and awareness program
- Chimney sweep assistance program
- Enforcement of visible emissions (opacity) limits

These complementary efforts support the Change-out Program by promoting the transition to non-wood heating sources and improving the operation and maintenance of existing wood burning devices to minimize emissions.

To further reduce the health impacts of woodsmoke, the District has committed to adopting a comprehensive Wood Burning and Open Burning Rule by the end of 2025. Key provisions of the proposed rule include:

- Mandatory curtailment of wood burning during high pollution episodes
- Prohibition on the sale and installation of uncertified wood stoves and fireplaces
- Restrictions on the number and type of wood burning devices allowed in new construction and major remodels
- A ban on open burning

The rule is currently under development; the proposal was published on November 22, 2025, for 30-day public review and is scheduled to be presented to the District's Board for consideration at a public meeting on January 26, 2026.

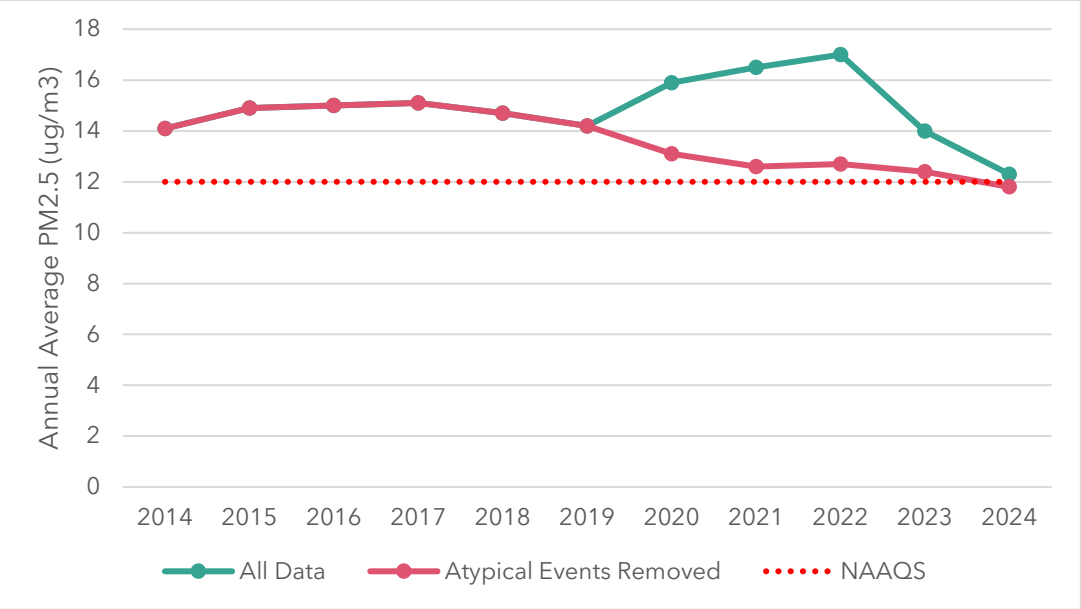
CALCULATIONS

On March 24, 2025, CARB submitted the Portola Wood Stove Change-out 2025 Progress Report (2025 Progress Report) to the U.S. EPA, fulfilling the enforceable commitment reporting requirement outlined in the Serious PM2.5 Plan. The report is publicly available on CARB's website at: *https://ww2.arb.ca.gov/sites/default/files/2025-03/portolawoodstove_2025progrpt.pdf* and is also included as an attachment. The 2025 Progress Report provides detailed calculations of emissions reductions achieved through the program.

AIR QUALITY PROGRESS

From 2020 to 2023, local air quality was significantly affected by wildfire emissions. To assess long-term air quality trends, data influenced by these atypical events were excluded from the design value calculations. Figure 1 illustrates trends in annual design values using two data sets: one that includes all measured PM2.5 concentrations, and another that excludes concentrations impacted by atypical events. After excluding data from atypical events, the analysis showed a clear downward trend, with annual design values declining by more than 20%, from 15 µg/m³ in 2016 to 11.8 µg/m³ in 2024.

Figure 1. Trends in Annual Design Values between 2014 and 2024



Despite having the 2024 design value below the 12.0 µg/m³ annual PM2.5 NAAQS (after removal of atypical events data), the District did not pursue a clean data determination due to incomplete data in 2022. During the first quarter of that year, extremely cold and snowy conditions prevented monitoring staff from accessing the filter-based sampler, resulting in data loss. In response, the District replaced the filter-based sampler with a Beta Attenuation Monitor (BAM) to reduce the need for frequent site access during severe weather. The new BAM began collecting regulatory data on October 1, 2022. Since its installation, the District has maintained over 90% data capture for each calendar quarter (Table 3).

Table 3. PM2.5 Quarterly Percent Data Capture

Year	Q1	Q2	Q3	Q4
2021	100	90	90	81
2022	57	100	90	97
2023	92	92	97	98
2024	97	99	96	100

Although fourth-quarter 2025 PM2.5 data were not yet available at the time of the development of this report, preliminary data through September 22, 2025, were used to

assess the likelihood of meeting the 12.0 µg/m³ annual PM2.5 NAAQS by the Serious area attainment deadline of December 31, 2025.

To evaluate the worst-case scenario, we calculated the highest possible 2025 annual average that would still result in a design value below the 12.0 µg/m³ standard. As shown in Table 4, even if the 2025 annual average reaches 12.9 µg/m³, the resulting design value would remain under the NAAQS threshold.

We then assessed the likelihood of reaching that level. Working backward from a 12.0 µg/m³ design value, we determined that the fourth-quarter average would need to be as high as 25 µg/m³. This is highly improbable, as the highest fourth-quarter average in the past five years was 19.6 µg/m³ in 2023 (see Figure 2).

In a second, more conservative scenario, we assumed a fourth-quarter average of 19.6 µg/m³—the highest observed in the past five years. This results in a 2025 annual average and design value of 11.6 µg/m³, well below the NAAQS threshold. Both scenarios are illustrated in Table 4 and Figure 3.

These projections based on data through September 22, 2025, strongly indicated that the area was on track to meet the PM2.5 standard by the Serious area attainment deadline of December 31, 2025. Preliminary data collected through the end of 2025 confirmed these projections and results in a design value of 11.3 µg/m³; thus, the area has met the standard.

Figure 2. Maximum 2025 Q4 Average to Yield 2025 Design Value Below Annual PM2.5 NAAQS

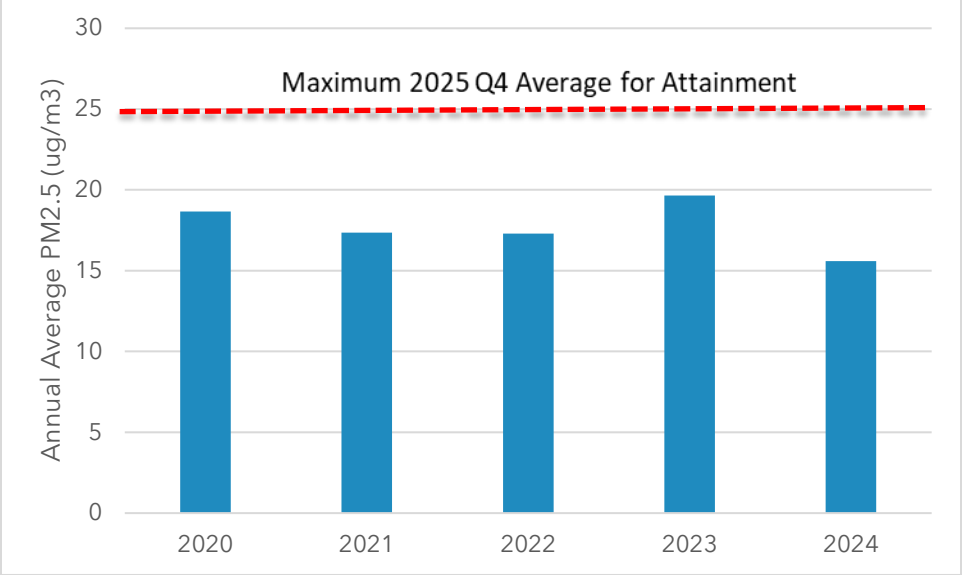
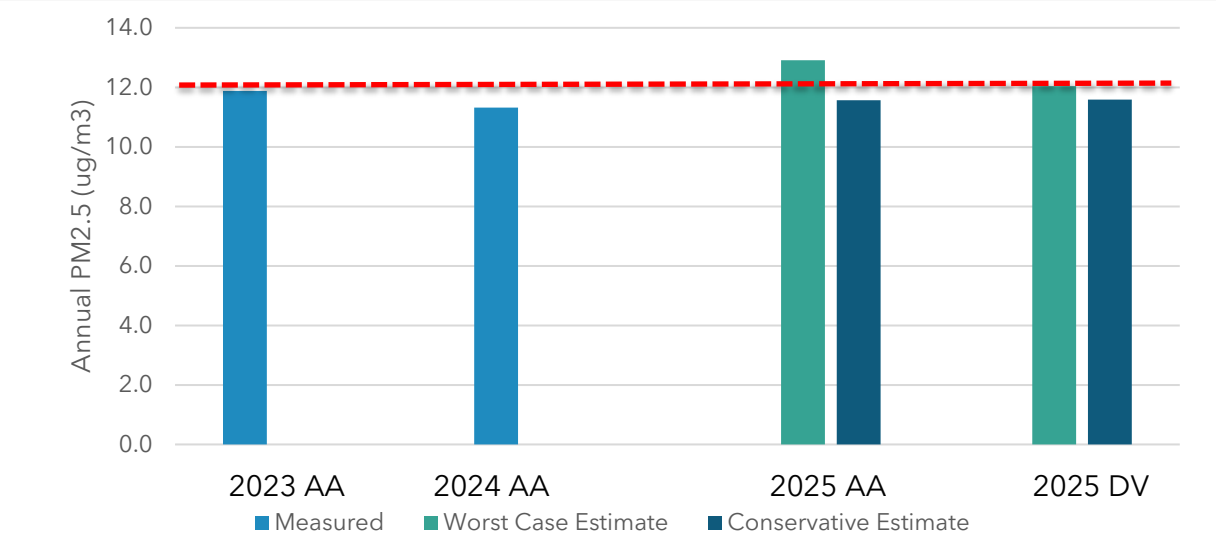


Table 4. Estimated 2025 PM2.5 Design Value

Scenario	2023 Annual Average	2024 Annual Average	2025 Annual Average	2025 Design Value
Worst Case	11.9	11.3	12.9	12.0
Conservative Estimate	11.9	11.3	11.6	11.6

Figure 3. Annual Average Scenarios for 2025 Attainment Design Value



SUMMARY AND CONCLUSIONS

The Portola Nonattainment Area has successfully attained the 12.0 µg/m³ annual PM2.5 NAAQS as of December 31, 2025, with a preliminary 2025 design value of 11.3 µg/m³. The District has:

- Implemented the Serious PM2.5 Plan control strategy effectively.
- Achieved emission reductions exceeding Serious PM2.5 Plan commitment by a factor of three.
- Demonstrated consistent air quality improvements.
- Provided robust evidence of meeting the standard with a comfortable margin.

Attachment
Portola Wood Stove Change-out 2025
Progress Report

Portola Wood Stove Change-out 2025 Progress Report

March 24, 2025

Air Quality Planning Branch

Air Quality Planning and Science Division

Table of Contents

Executive Summary

The *Portola Wood Stove Change-Out 2025 Progress Report* (2025 Progress Report) was prepared to satisfy the requirements of the enforceable commitment in the Northern Sierra Air Quality Management District (District) Portola Fine Particulate Matter (PM2.5) Serious State Implementation Plan (Portola Serious Plan). The Portola Serious Plan sets forth a strategy for attaining the 2012 annual PM2.5 National Ambient Air Quality Standard of 12 micrograms per cubic meter (µg/m^3) (12 µg/m^3 annual PM2.5 standard) by the serious attainment deadline of December 31, 2025, for the Portola Nonattainment Area. The main emissions source causing the Portola Nonattainment Area to exceed the 12 µg/m^3 annual PM2.5 standard is wood smoke from residential home heating. Wood burning from home heating is responsible for 76% of PM2.5 mass annually and 86% on a typical high concentration day. Wood heating is very popular in the area due to the lack of natural gas and the availability of cheap, or free, wood.

Since 2016, the District has been implementing a Greater Portola Wood Stove Change-out Program (Portola Change-out Program or Program) to reduce PM2.5 emissions by offering incentives for a voluntary replacement of older, high polluting wood-burning devices with cleaner and more energy efficient alternatives. The Program serves the Portola Nonattainment Area and was initially funded with a U.S. Environmental Protection Agency (U.S. EPA) 2015 Targeted Airshed Grant (TAG). Since that first grant, the Portola Change out Program received additional TAG funding in fiscal years 2018 and 2020. As of March 4, 2025, the District had about $3.5 million remaining in the 2018 and 2020 TAG funding to implement a multi-faceted program focused on reducing emissions from wood burning home heating devices by providing incentives for replacing older wood heating devices, installing woodsheds, offering vouchers for chimney cleaning, and educating the public about device operation and the benefits of using properly seasoned wood.

The Portola Serious Plan demonstrates attainment of the 12 µg/m^3 annual PM2.5 standard by the serious attainment deadline of December 31, 2025. The attainment demonstration relies fully on emission reductions projected to be achieved from the Portola Change-out Program. The District is offering incentives, up to the full cost of purchase and installation, to qualified residents of the Portola Nonattainment Area for replacing older and high emitting wood heaters, used as primary sources of heat, with lower polluting and more energy efficient alternatives. The District committed to reduce PM2.5 emissions by 0.025 tons per day (tpd) from the base year inventory through implementation of these projects or substitute measures.

To satisfy the Clean Air Act emissions reduction requirements, the District must demonstrate that the reductions achieved from discretionary incentive programs are real, enforceable, quantifiable, surplus, and permanent. Only then can these emissions reductions be relied on to demonstrate attainment. As outlined in U.S. EPA guidance*, Incorporating Emerging*

and Voluntary Measures in a State Implementation Plan (SIP)[1], the following elements are required as part of this demonstration:

1. Integrity;
2. Commitment (Federal Enforceability);
3. Technical Analyses;
4. Funding;
5. Resources;
6. Outreach and Public Disclosure; and
7. Legal Authority.

In the Portola Serious Plan, CARB and the District addressed all of these elements for the projects in the Portola Change-Out Program. As part of the federal enforceable commitment element, by March 31, 2025, CARB must submit a report to U.S. EPA that includes the elements listed below:

1. Identify each project implemented between January 1, 2021 and December 31, 2024 by program tracking number, description of both baseline and new equipment, and quantified emission reductions;
2. Provide formulas used to calculate emission reductions;
3. Describe the actions taken and documentation collected by the District and CARB to confirm each project's compliance with program requirements;
4. Determine whether the identified projects are projected to achieve the full amount of the enforceable commitment in reducing directly emitted PM2.5 by 0.025 tpd from the base year inventory; and
5. Describe any changes to relevant forms and related impacts on program integrity.

The 2025 Progress Report fulfils the requirements listed above.

Change-outs Completed Between 2021 and 2024

As part of the enforceable commitment, the District committed to reducing the annual emissions of directly emitted PM2.5 by 0.025 tpd between 2021 and 2024. The District planned to achieve these reductions by replacing 100 old, higher-emitting wood burning home heaters with lower polluting and more energy efficient alternatives. The District exceeded this goal almost three-fold. Between 2021 and 2024, the District replaced 283 old wood heaters. Among the 283 replacements, 66% of the baseline devices (old devices) were uncertified wood stoves with a default PM2.5 emission rate of 29.5 pounds of PM2.5 per ton of wood burned (pounds per ton) and an efficiency of 54%[2]. The PM2.5 emission

[1] https://www.epa.gov/sites/default/files/2016-05/documents/voluntarycontrolmeasurespolicyepa.pdf
[2] AP-42 Table 1.10-5: *https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s10.pdf*

rate was calculated as 96.3%[3] of the U.S. EPA PM10 emission rate of 30.6 pounds per ton[4]. The remaining 34% of the old devices were comprised of fireplaces (19%), old U.S. EPA -certified wood stoves (9%), and pellet stoves (6%). Figure 1 illustrates the types of home heating devices replaced between 2021 and 2024.

Figure 1. Percentages of Old Devices by Type Replaced Between 2021 and 2024

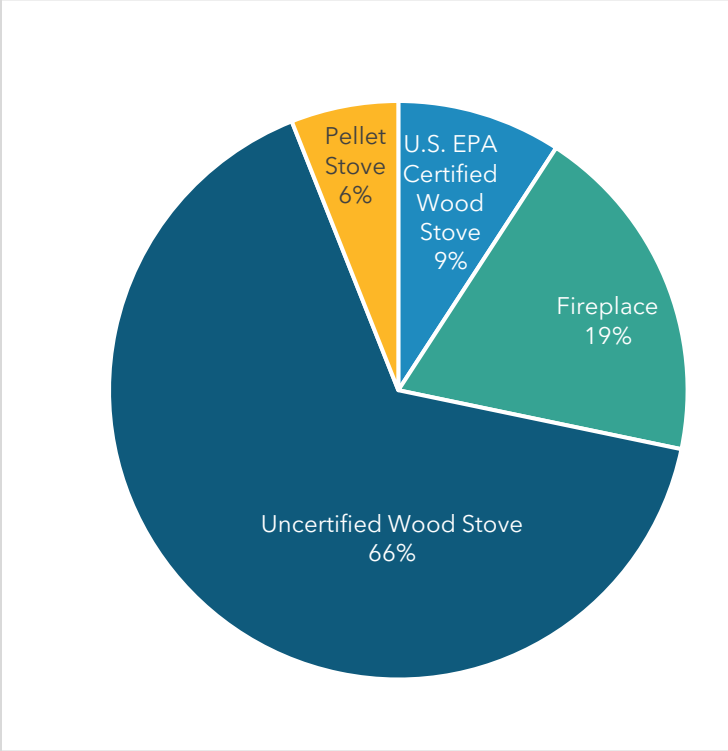


Figure 2 and Figure 3 illustrate the replacement devices installed between 2021 and 2024 by category. 149 households replaced their old wood heater with a new, U.S. EPA certified wood stove. 73 households chose pellet stoves, and 28 households chose a propane or a kerosene stove as the replacement option. In 2021, heat pumps were added to the list of eligible replacement options and by the end of 2024, 33 households replaced their old wood heaters with heat pumps. Due to ongoing concerns about PM2.5 emissions from woodburning devices, combined with Portola households' reluctance to switch to heat pumps, the removal of an existing certified wood burning device was not a prerequisite to having a heat pump installed within the City of Portola boundaries where households are subject to the mandatory woodburning curtailment. Between January 1, 2021, and December 31, 2024, in addition to 33 heat pumps installed as replacements for existing wood heaters, 46 heat pumps were installed in residences with existing U.S. EPA certified

[3] CARB Methodology for Residential Wood Combustion
[4] AP-42 Table 1.10-1: *https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s10.pdf*

wood stoves. Projects where households were allowed to retain the existing U.S. EPA certified wood burning stove to serve as emergency heat in case of a power outage or extreme cold are referred to as heat pump combos. More information about replacement devices is included in Appendix A.

There are two main categories of wood stoves depending on the construction, combustion, and emission characteristics of the device: non-catalytic and catalytic. Non catalytic wood stoves have built-in features allowing re-circulating and re-burning of the smoke to keep the devices running cleanly and efficiently. Catalytic wood stoves are equipped with a ceramic or metal honeycomb device called a combustor. The catalyst material reduces the ignition temperature of the unburned volatile organic compounds (VOC) and carbon monoxide (CO) in the smoke, thus making the smoke ignite at lower temperatures. As these gases burn, the temperature inside the catalyst increases to a point at which the ignition of the gases is self-sustaining. There are also hybrid wood stove models on the market, which combine catalytic and non-catalytic technology. Over 80% of cordwood stoves installed were catalytic (Figure 2).

Figure 2. Number of New Devices Installed Between 2021 and 2024 by Category

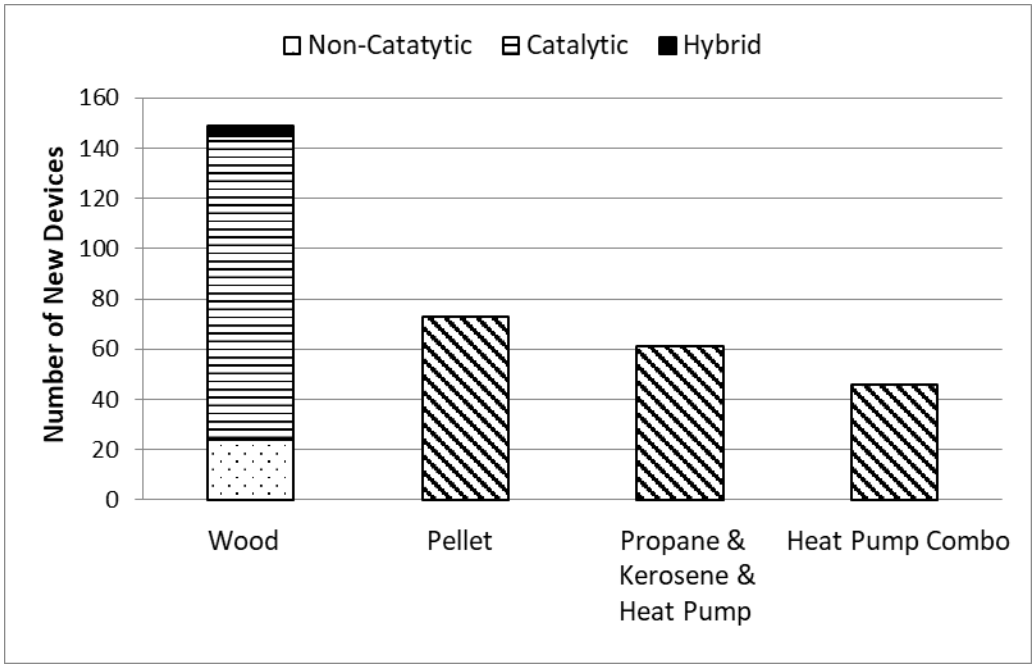
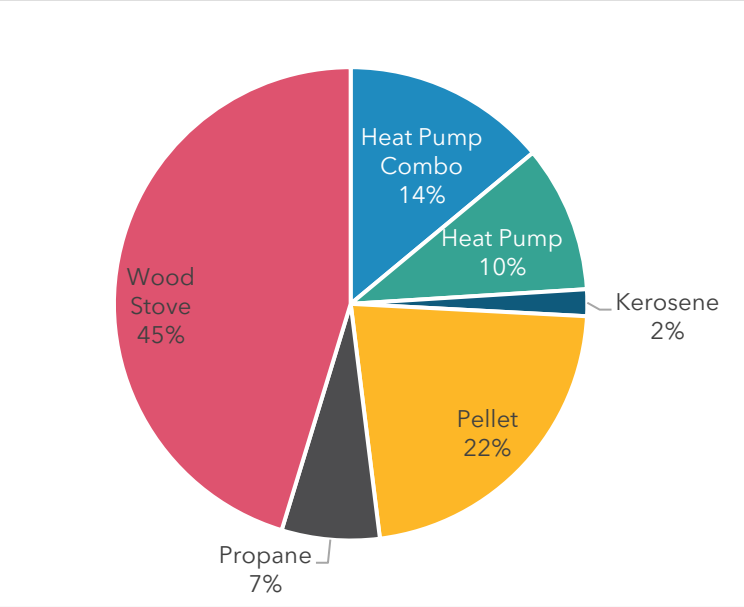


Figure 3. Devices installed between 2021 and 2024



Calculations

CARB calculated emission reductions separately for change-outs and heat pump combos. The individual calculations for each device, along with the device tracking number and new equipment type, are presented in Appendix A.

To estimate PM2.5 emission reductions from the change-outs, CARB calculated the difference in PM2.5 emissions between the old and the new devices in tons per year. Two important factors determine PM2.5 emissions from a device, the emission rate and fuel usage. New devices that are cleaner-burning and more energy efficient have a lower PM2.5 emission rate and require less wood to operate, thus emitting less PM2.5 emissions. Listed below are the step-by-step instructions and formulas for calculating emission reductions achieved by replacing old wood heaters with cleaner-burning and more energy efficient alternatives.

The first step in calculating emission reductions for the change-outs required converting certification test emission rates expressed in grams per hour of operation (g/hr) to emission factors in pounds per ton of fuel (lb/ton), as described below:

1. The certification test emission rate (g/hr) of the replacement device was scaled upward by 50% to reflect the variations in in-home performance[5];
2. The scaled emission rate was divided by the average burn rate of 1.5 kilograms per hour (kg/hr) to calculate grams of PM2.5 emissions per kilogram of wood (g/kg)[6]; and
3. The result was multiplied by 2 to convert g/kg to lb/ton.

To be consistent with CARB's emissions calculations, the reported PM10 certification test emission rates were multiplied by a fraction of 0.963 to convert to PM2.5 emission rates. Table 1 provides information about the emission rates of the 222 cordwood burning devices installed between 2021 and 2024.

Table 1. Breakdown of Cordwood Burning Devices Installed between 2021 and 2024 by Emission Rate

Certification Test Emission Rate (g/hr)	Number of Devices
<=1	85
>1 and <=2	60
>2	4
Total	149

The following equation was used to calculate an emission factor in pounds per ton:

$$Equation\ 1: EF = (ER \times 1.5)/BR \times 2$$

[5] *https://www3.epa.gov/ttnchie1/conference/ei17/session4/houck.pdf*

[6] Based on information received from Gary Blais of U.S. EPA Burnwise Program on August 2, 2016, titled "Conversion Factor TB." The spreadsheet was prepared by Tom Butcher, Research Engineer; Brookhaven National Laboratory.

Where:

EF	Emission factor in pounds per ton
ER	Emission rate in grams per hour
BR	Average burn rate in kilograms per hour of operation
1.5	Factor used to scale certification test emission rate to reflect potential increase in emissions during in-home operation
2	Factor used to convert grams per kilogram to pounds per ton

Since emission factors for pellet stoves are more representative of actual in-home usage[7], a default PM2.5 emission factor of 2.95 lb/ton, 96.3% of the 2020 NEI Nonpoint Wagon Wheel PM10 emission factor of 3.06 lb/ton[8], was used for all pellet stoves.

The formulas shown in Equations 2 through 4, were used to calculate PM2.5 emissions of the old device, the new device, and the difference between them.

$$Equation\ 2: E_{old} = (EF_{old} \times AFU_{BC})/2000$$

$$Equation\ 3: E_{new} = (EF_{new} \times AFU_{AC})/2000$$

$$Equation\ 4: E_{benefit} = E_{old} - E_{new}$$

Where:

Symbol	Definition
E_{old}	Emissions of old device (ton/year)
E_{new}	Emissions of new device (ton/year)
EF_{old}	Emission factor for the old device (lb/ton)
EF_{new}	Emission factor for the replacement device (lb/ton)

[7] *https://www3.epa.gov/ttnchie1/ap42/ch01/related/woodstove.pdf*

[8] https://www.epa.gov/system/files/documents/2023-03/NEI2020_TSD_Section6_Nonpoint_Overview.pdf

AFU_{BC}	Annual fuel usage before change-out (tons/year)
AFU_{AC}	Annual fuel usage after change-out (tons/year)
$E_{benefit}$	Emission reductions from change-out (ton/year)

Portola households that use a modern pellet stove as the main source of heat are estimated to use two to three tons of pellet fuel per year[9]. To ensure a conservative approach, three tons were assumed in estimating emission reductions. Equation 5 was used to convert annual cordwood usage in cords per year to tons per year in calculating both AFU_{BC} and AFU_{AC}. Wood usage in cords per year in various types of devices and wood density are listed in Appendix A.

$$Equation\ 5: AFU = (WU \times WD)$$

Where:

Symbol	Definition
WU	Cordwood usage (cords/year)
WD	Cordwood density (ton/cord)

Consistent with *California's Short Lived Climate Pollutant Reduction Strategy*[10], propane and kerosene fueled heating devices were assumed to have negligible PM2.5 emissions. For the two change-outs where the old device was a at least 20-years old U.S. EPA-certified stove, a PM2.5 emission factor of 18.9 lb/ton (96.3% of the PM10 emission factor of 19.6 lb/ton[11]) was used. A full list of factors, constants and values used in the calculations can be found in Appendix A. Applying these factors to equations 1 through 5 could be used to calculate emission reductions associated with all types of change-outs listed in Table 2.

[9] Quincy Hot Spot personal communication
[10] *https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf*
[11] AP-42 Table 1.10-1: *https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s10.pdf*

Table 2. Count of Change-out Projects Completed between 2021 and 2024 by Type

Old Device Type	Wood Stove	Pellet	Propane	Kerosene	Heat Pump	Total
Non-certified Wood Stove	115	37	10	3	21	186
Fireplace	25	15	9	1	4	54
Certified Repair/Replacement	9	7	1	1	6	24
EPA Certified Wood Stove		1			1	2
Pellet Stove		13	2	1	1	17
Total	149	73	22	6	33	283

Emission reductions from heat pump combos were calculated by assuming that a heat pump would be used as a primary source of heat supplying 51% of the annual heat while a wood stove would supply the remaining 49%. To calculate the emission reduction associated with a heat pump combo, 3.4 cords typically used in a certified stove were used in equation 2 and 1.7 cords (49% of 3.4) were used in equation 3 while the emission factor remained the same in both equations. To qualify for a heat pump combo, the applicant had to sign an agreement to use a heat pump as a primary source of heat and use a wood heater only during power outages and extreme cold. Of the 46 residences with heat pump combos, 35 obtained their U.S. EPA certified wood stove from the Program while 11 purchased on their own.

Estimated Emission Reductions

The District made an enforceable commitment to achieve PM2.5 emission reductions of 0.025 tpd per year by replacing old, high polluting wood stoves with cleaner burning and more efficient home heating devices in the Portola Nonattainment Area. The emission reductions can only be used for SIP purposes if they are fully realized throughout the calendar year. Therefore, the reductions associated with devices replaced between January 1, 2021 and December 31, 2024 were calculated and compared to the SIP

commitment. As shown in Table 3, the reductions achieved were three-fold the level of commitment.

Table 3. Summary of Change-outs Completed between 2021 and 2024

New Device Type	**Count**
Non-catalytic Stoves	24
Catalytic	121
Hybrids	4
Pellet Stoves	73
Propane/Kerosene Stoves	28
Heat Pumps	33
Heat Pump Combos	46
Total Installations from 2021 to 2024	329
PM2.5 Emission Reductions	**Amount**
Total PM2.5 Emissions Saved (tons per year)	28.593
Total PM2.5 Emissions Saved (tons per day)	0.078
Emission Reductions Goal (tons per day)	0.025
Excess Emission Reduced (tons per day)	0.053

Documentation Collected to Confirm Project Compliance with Program Requirements

On a monthly basis, CARB receives reports from the District listing each installation and the associated expenditures by tracking number. Every quarter the District submits progress reports to CARB summarizing change-outs accomplished during the quarter.

Per the Program requirements, wood stove installers are not reimbursed prior to completing the installation and submit the following documentation to the District:

- Completed Application;
- Owner/Tenant Agreement, if applicable;
- Cost estimate approved by the District;
- Exceeds maximum invoice, if applicable;
- Photo of the old device installed in the residence before removal;
- Photo of the replacement device installed in the residence;
- Program Tracking Form;
- Acknowledgement of Training Form;
- Verification of surrendering the device to the City of Portola Public Works Yard;

- Copy of Permit; and
- Final Invoice.

One of the important aspects of the Program is to ensure that the old wood stoves removed from homes are destroyed so they cannot be used at a different location. The District partnered with the City of Portola to assist with the temporary storage, destruction and removal of old wood stoves. The wood stove installers deliver old wood heaters to the City of Portola Public Works Yard with the Program Tracking Number written on each stove. City staff destroy the stove, generally by cutting a hole in at least one panel with a plasma torch. The inoperable stove is then recycled. City staff sign the Program Tracking Form, taking responsibility for the old stove from the wood stove installer, and sign the Verification of Destruction Form when the old stove has been destroyed.

After the installation is complete and residents have been using the new wood stove for at least one winter, the District will follow up with a survey to verify that the installation has been satisfactorily completed and that the resident is following the installer's recommendations on proper burning techniques and wood storage. The follow-up is conducted by an in-home visit, phone call, and/or mail survey.

Changes to Relevant Forms

There were no updates to the forms submitted as part of the Portola Serious Plan, Appendix F, Guidance Document for the Greater Portola Wood Stove Change-out Program.

Conclusion

The control strategy included in the Portola Serious Plan was projected to reduce direct PM2.5 emission by 0.025 tpd by the 2025 attainment date. CARB staff has estimated that the emissions reductions achieved from the implementation of the Portola Change out Program between 2021 and 2024 exceeded that target by three-fold.

APPENDIX A

Greater Portola Wood Stove Change-out Program
Emission Benefit Calculator

PM2.5 Emission Factors

Constants & Conversions	Value	Unit	Source
PM2.5 Emission Fraction of PM10	96.30	%	CARB Methodology for Residential Wood Combustion
Wood Stove Uncertified PM10 Emission Factor	30.60	lb PM10/ton wood	AP-42, Table 1.10.-1 *
Wood Stove Phase I and II Certified PM10 Emission Factor	19.60	lb PM10/ton wood	AP-42, Table 1.10.-1
Fireplace PM10 Emission Factor	34.60	lb PM10/ton wood	AP-42, Table 1.9.-1 **
Pellet Stove Uncertified PM10 Emission Factor	8.80	lb PM10/ton pellets	AP-42, Table 1.10.-1
Pellet Stove Certified PM10 Emission Factor	3.06	lb PM10/ton pellets	2020 NEI Nonpoint Wagon Wheel***
Propane, Electric, or Kerosene	0.00		California Short-Lived Pollutant Reduction Strategy****

Efficiency

Constants & Conversions	Value	Unit	Source
Uncertified Stove Efficiency	54	%	AP-42, Table 1.10-5
Certified Stove Efficiency	68	%	AP-42, Table 1.10-5
Pellet Exempt Efficiency	56	%	AP-42, Table 1.10-5
Pellet Certified Efficiency	70	%	https://www.epa.gov/burnwise/pellet-stoves

Other Constants & Conversions

Constants & Conversions	Value	Unit	Source
Wood Use in Uncertified Wood Stove	4.3	cords/year	District Survey
Wood Use in Certified Wood Stove	3.4	cords/year	4.3 cords *54%/68% difference in efficiency
Wood Use in Fireplace	6	cords/year	District Survey
Wood Use in Heat Pump & Wood Stove Combo	1.7	cords/year	Assuming 51%/49% heat demand split between heat pump and Wood Stove
Pellet Exempt Use	3.75	tons/year	3 tons * 70% /56% difference in efficiency
Pellet Certified Use	3	tons/year	Quincy Hot Spots Personal Communication
Pellet Use in Heat Pump & Pellet Combo	1.5	tons/year	Assuming 51%/49% heat demand split between heat pump and pellet stove
Wood Density	1.54	ton/cord	U.S. EPA Burnwise Emission Calculator
Average Burn Rate	1.5	kg/hour	Gary Blais Personal Communications
Emission Rate Scaling Factor	1.5		
Conversion from lb to ton	2000		
Conversion from g/kg to lb/ton	2		

* https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s10.pdf
**https://www3.epa.gov/ttnchie1/ap42/ch01/final/c01s09.pdf
***https://www.epa.gov/system/files/documents/2023-
**** https://www.arb.ca.gov/cc/shortlived/meetings/03142017/final_slcp_report.pdf

Program Tracking # (YYYY-XXX)	Old Device Type	Install Date	Emission Rate (g/hr)	Replacement Device Type	Emission Factor (lb/ton)	Emissions (ton/year) Before	Emissions (ton/year) After	Emissions (ton/year) Difference
2020-0482	Certified Repair/Replacement	3/4/21	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0512	Certified Repair/Replacement	5/17/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0513	Certified Repair/Replacement	6/15/21	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0527	Certified Repair/Replacement	7/13/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2020-0468	Fireplace	5/4/21	1.2519	CAT	2.5038	0.1539	0.0066	0.1474
2021-0502	Fireplace	3/26/21	0.69336	CAT	1.38672	0.1539	0.0036	0.1503
2021-0507	Fireplace	5/13/21	0.69336	CAT	1.38672	0.1539	0.0036	0.1503
2021-0514	Fireplace	5/6/21	0.69336	CAT	1.38672	0.1539	0.0036	0.1503
2021-0531	Fireplace	8/24/21	0.69336	CAT	1.38672	0.1539	0.0036	0.1503
2021-0535	Fireplace	9/7/21	0.69336	CAT	1.38672	0.1539	0.0036	0.1503
2021-0540	Fireplace	11/12/21	1.08819	CAT	2.17638	0.1539	0.0057	0.1482
2021-0543	Fireplace	1/7/22	0.70299	CAT	1.40598	0.1539	0.0037	0.1502
2021-0554	Fireplace	9/17/22	1.08819	CAT	2.17638	0.1539	0.0057	0.1482
2021-0556	Fireplace	12/2/21	0.70299	CAT	1.40598	0.1539	0.0037	0.1502
2021-0557	Fireplace	7/19/22	0.6741	CAT	1.3482	0.1539	0.0035	0.1504
2021-0565	Fireplace	11/14/22	0.72225	CAT	1.4445	0.1539	0.0038	0.1501
2021-0573	Fireplace	7/16/22	1.08819	CAT	2.17638	0.1539	0.0057	0.1482
2021-0576	Fireplace	10/5/22	1.2519	CAT	2.5038	0.1539	0.0066	0.1474
2021-0589	Fireplace	9/14/22	0.69336	CAT	1.38672	0.1539	0.0036	0.1503
EPA2018-0046	Fireplace	10/24/23	1.21338	CAT	2.42676	0.1539	0.0064	0.1476
EPA2018-0117	Fireplace	10/9/24	1.21338	CAT	2.42676	0.1539	0.0064	0.1476
EPA2018-0118	Fireplace	10/10/24	1.04004	CAT	2.08008	0.1539	0.0055	0.1485
2016-0142	Non-certified Wood Stove	6/15/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2017-0180	Non-certified Wood Stove	4/20/21	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2017-0189	Non-certified Wood Stove	7/15/21	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2018-0240	Non-certified Wood Stove	8/5/22	0.71262	CAT	1.42524	0.0975	0.0037	0.0938
2018-0306	Non-certified Wood Stove	9/28/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2019-0355	Non-certified Wood Stove	2/5/21	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2019-0411	Non-certified Wood Stove	12/13/22	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2019-0425	Non-certified Wood Stove	4/14/21	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2020-0455	Non-certified Wood Stove	3/23/21	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2020-0469	Non-certified Wood Stove	3/26/21	0.42372	CAT	0.84744	0.0975	0.0022	0.0953
2020-0481	Non-certified Wood Stove	2/9/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2020-0485	Non-certified Wood Stove	3/31/21	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2020-0487	Non-certified Wood Stove	2/11/21	0.42372	CAT	0.84744	0.0975	0.0022	0.0953
2020-0496	Non-certified Wood Stove	2/24/21	0.42372	CAT	0.84744	0.0975	0.0022	0.0953
2021-0500	Non-certified Wood Stove	3/19/21	2.4075	CAT	4.815	0.0975	0.0127	0.0849
2021-0508	Non-certified Wood Stove	1/14/22	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0511	Non-certified Wood Stove	9/21/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0518	Non-certified Wood Stove	3/1/22	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0521	Non-certified Wood Stove	5/17/21	1.03041	CAT	2.06082	0.0975	0.0054	0.0921
2021-0523	Non-certified Wood Stove	9/30/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0524	Non-certified Wood Stove	7/20/21	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0526	Non-certified Wood Stove	7/15/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0534	Non-certified Wood Stove	9/15/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0539	Non-certified Wood Stove	12/9/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0545	Non-certified Wood Stove	1/13/22	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2021-0546	Non-certified Wood Stove	8/10/22	1.7334	CAT	3.4668	0.0975	0.0091	0.0884
2021-0547	Non-certified Wood Stove	3/17/22	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0552	Non-certified Wood Stove	12/2/21	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0553	Non-certified Wood Stove	2/1/22	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0555	Non-certified Wood Stove	11/17/22	0.73188	CAT	1.46376	0.0975	0.0038	0.0937
2021-0558	Non-certified Wood Stove	5/9/22	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0572	Non-certified Wood Stove	7/19/22	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
2021-0580	Non-certified Wood Stove	5/2/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0586	Non-certified Wood Stove	5/26/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0587	Non-certified Wood Stove	11/30/22	0.73188	CAT	1.46376	0.0975	0.0038	0.0937
2021-0588	Non-certified Wood Stove	9/9/22	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2021-0593	Non-certified Wood Stove	9/12/22	0.71262	CAT	1.42524	0.0975	0.0037	0.0938
2021-0594	Non-certified Wood Stove	7/11/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2021-0596	Non-certified Wood Stove	9/21/22	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
2021-0598	Non-certified Wood Stove	9/16/22	0.71262	CAT	1.42524	0.0975	0.0037	0.0938
2021-0599	Non-certified Wood Stove	12/6/22	1.7334	CAT	3.4668	0.0975	0.0091	0.0884
2021-0603	Non-certified Wood Stove	12/15/22	1.7334	CAT	3.4668	0.0975	0.0091	0.0884
2021-0604	Non-certified Wood Stove	9/5/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
2021-0605	Non-certified Wood Stove	11/4/22	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0613	Non-certified Wood Stove	9/28/23	1.0593	CAT	2.1186	0.0975	0.0056	0.0920
2021-0614	Non-certified Wood Stove	3/20/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2021-0615	Non-certified Wood Stove	2/28/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0617	Non-certified Wood Stove	3/30/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0620	Non-certified Wood Stove	11/7/22	0.7704	CAT	1.5408	0.0975	0.0041	0.0935
2021-0621	Non-certified Wood Stove	12/23/22	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2021-0622	Non-certified Wood Stove	5/5/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2021-0626	Non-certified Wood Stove	11/30/22	0.73188	CAT	1.46376	0.0975	0.0038	0.0937
2021-0628	Non-certified Wood Stove	2/21/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
2021-0632	Non-certified Wood Stove	6/5/23	0.71262	CAT	1.42524	0.0975	0.0037	0.0938
2021-0636	Non-certified Wood Stove	4/28/23	1.3482	CAT	2.6964	0.0975	0.0071	0.0904
2021-0638	Non-certified Wood Stove	4/18/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2023-0641	Non-certified Wood Stove	4/28/23	0.73188	CAT	1.46376	0.0975	0.0038	0.0937
2023-0643	Non-certified Wood Stove	7/27/23	1.21338	CAT	2.42676	0.0975	0.0064	0.0912
2023-0644	Non-certified Wood Stove	6/23/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2023-0645	Non-certified Wood Stove	5/25/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
2023-0648	Non-certified Wood Stove	6/6/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918

Program Tracking # (YYYY-XXX)	Old Device Type	Install Date	Emission Rate (g/hr)	Replacement Device Type	Emission Factor (lb/ton)	Emissions (ton/year) Before	Emissions (ton/year) After	Emissions (ton/year) Difference
2023-0650	Non-certified Wood Stove	9/25/23	0.3852	CAT	0.7704	0.0975	0.0020	0.0955
2023-0654	Non-certified Wood Stove	10/4/23	0.3852	CAT	0.7704	0.0975	0.0020	0.0955
EPA2018-0015	Non-certified Wood Stove	6/27/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
EPA2018-0020	Non-certified Wood Stove	11/30/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0022	Non-certified Wood Stove	8/17/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0025	Non-certified Wood Stove	10/18/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0027	Non-certified Wood Stove	6/5/23	0.71262	CAT	1.42524	0.0975	0.0037	0.0938
EPA2018-0029	Non-certified Wood Stove	10/31/23	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
EPA2018-0037	Non-certified Wood Stove	9/28/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0039	Non-certified Wood Stove	7/12/23	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
EPA2018-0040	Non-certified Wood Stove	6/5/23	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
EPA2018-0041	Non-certified Wood Stove	9/29/23	0.3852	CAT	0.7704	0.0975	0.0020	0.0955
EPA2018-0042	Non-certified Wood Stove	6/5/23	0.71262	CAT	1.42524	0.0975	0.0037	0.0938
EPA2018-0044	Non-certified Wood Stove	11/28/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0045	Non-certified Wood Stove	9/19/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0048	Non-certified Wood Stove	7/12/23	1.01115	CAT	2.0223	0.0975	0.0053	0.0922
EPA2018-0049	Non-certified Wood Stove	11/3/23	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0051	Non-certified Wood Stove	8/22/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0053	Non-certified Wood Stove	5/18/24	0.7704	CAT	1.5408	0.0975	0.0041	0.0935
EPA2018-0054	Non-certified Wood Stove	1/16/24	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
EPA2018-0058	Non-certified Wood Stove	9/29/23	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0063	Non-certified Wood Stove	1/23/24	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0072	Non-certified Wood Stove	1/23/24	1.04004	CAT	2.08008	0.0975	0.0055	0.0921
EPA2018-0080	Non-certified Wood Stove	9/11/24	1.04004	CAT	2.08008	0.0975	0.0055	0.0921
EPA2018-0081	Non-certified Wood Stove	1/4/24	0.70299	CAT	1.40598	0.0975	0.0037	0.0938
EPA2018-0090	Non-certified Wood Stove	7/10/24	1.1556	CAT	2.3112	0.0975	0.0061	0.0915
EPA2018-0095	Non-certified Wood Stove	11/5/24	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0096	Non-certified Wood Stove	3/14/24	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0099	Non-certified Wood Stove	4/24/24	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0101	Non-certified Wood Stove	5/9/24	1.0593	CAT	2.1186	0.0975	0.0056	0.0920
EPA2018-0104	Non-certified Wood Stove	5/6/24	0.3852	CAT	0.7704	0.0975	0.0020	0.0955
EPA2018-0106	Non-certified Wood Stove	9/3/24	1.08819	CAT	2.17638	0.0975	0.0057	0.0918
EPA2018-0108	Non-certified Wood Stove	7/11/24	0.69336	CAT	1.38672	0.0975	0.0036	0.0939
EPA2018-0111	Non-certified Wood Stove	10/29/24	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0112	Non-certified Wood Stove	10/23/24	1.04004	CAT	2.08008	0.0975	0.0055	0.0921
EPA2018-0113	Non-certified Wood Stove	10/24/24	0.98226	CAT	1.96452	0.0975	0.0052	0.0924
EPA2018-0116	Non-certified Wood Stove	10/14/24	0.6741	CAT	1.3482	0.0975	0.0035	0.0940
EPA2018-0125	Non-certified Wood Stove	12/3/24	1.04004	CAT	2.08008	0.0975	0.0055	0.0921
2018-0252	Certified Repair/Replacement	10/10/23	3.1779	NC	6.3558	0.0975	0.0167	0.0808
2020-0471	Certified Repair/Replacement	9/28/21	0.4815	NC	0.963	0.0975	0.0025	0.0950
2020-0476	Certified Repair/Replacement	2/23/21	1.6371	NC	3.2742	0.0975	0.0086	0.0889
2021-0499	Certified Repair/Replacement	3/30/21	1.48302	NC	2.96604	0.0975	0.0078	0.0897
2020-0491	Fireplace	1/5/21	1.3482	NC	2.6964	0.1539	0.0071	0.1468
2021-0501	Fireplace	4/15/21	1.8297	NC	3.6594	0.1539	0.0096	0.1443
2021-0530	Fireplace	8/3/21	1.6371	NC	3.2742	0.1539	0.0086	0.1453
2021-0592	Fireplace	1/27/23	1.6371	NC	3.2742	0.1539	0.0086	0.1453
2021-0618	Fireplace	1/20/23	2.3112	NC	4.6224	0.1539	0.0122	0.1418
2021-0635	Fireplace	9/26/23	1.6371	NC	3.2742	0.1539	0.0086	0.1453
EPA2018-0064	Fireplace	1/30/24	1.1556	NC	2.3112	0.1539	0.0061	0.1479
2018-0249	Non-certified Wood Stove	2/10/23	0.4815	NC	0.963	0.0975	0.0025	0.0950
2021-0533	Non-certified Wood Stove	3/10/22	1.4445	NC	2.889	0.0975	0.0076	0.0899
2021-0571	Non-certified Wood Stove	5/18/22	1.926	NC	3.852	0.0975	0.0101	0.0874
2021-0578	Non-certified Wood Stove	9/7/23	1.1556	NC	2.3112	0.0975	0.0061	0.0915
2021-0584	Non-certified Wood Stove	10/20/22	1.6371	NC	3.2742	0.0975	0.0086	0.0889
2021-0611	Non-certified Wood Stove	11/15/22	1.4445	NC	2.889	0.0975	0.0076	0.0899
2021-0616	Non-certified Wood Stove	11/8/22	0.1926	NC	0.3852	0.0975	0.0010	0.0965
2023-0660	Non-certified Wood Stove	8/23/23	2.2149	NC	4.4298	0.0975	0.0116	0.0859
EPA2018-0024	Non-certified Wood Stove	3/13/24	0.4815	NC	0.963	0.0975	0.0025	0.0950
EPA2018-0050	Non-certified Wood Stove	11/22/23	1.1556	NC	2.3112	0.0975	0.0061	0.0915
EPA2018-0094	Non-certified Wood Stove	7/23/24	1.1556	NC	2.3112	0.0975	0.0061	0.0915
EPA2018-0105	Non-certified Wood Stove	8/13/24	1.1556	NC	2.3112	0.0975	0.0061	0.0915
EPA2018-0109	Non-certified Wood Stove	10/8/24	0.56817	NC	1.13634	0.0975	0.0030	0.0946
2021-0503	Certified Repair/Replacement	7/14/21	1.08819	Hybrid	2.17638	0.0975	0.0057	0.0918
2021-0602	Non-certified Wood Stove	4/20/23	1.6371	Hybrid	3.2742	0.0975	0.0086	0.0889
EPA2018-0093	Non-certified Wood Stove	3/6/24	1.6371	Hybrid	3.2742	0.0975	0.0086	0.0889
EPA2018-0103	Non-certified Wood Stove	6/27/24	1.3482	Hybrid	2.6964	0.0975	0.0071	0.0904
2021-0505	Certified Repair/Replacement	5/20/21	0.7704	Pellet	2.94678	0.0975	0.0044	0.0931
2020-0498	Certified Repair/Replacement	1/11/21	0.59706	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0006	Certified Repair/Replacement	2/1/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0016	Certified Repair/Replacement	9/13/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0018	Certified Repair/Replacement	12/26/23	1.0593	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0019	Certified Repair/Replacement	8/22/23	0.47187	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0028	Certified Repair/Replacement	12/19/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0039	EPA Certified Wood Stove	11/6/24	1.4445	Pellet	2.94678	0.0625	0.0044	0.0581
2020-0472	Fireplace	1/13/21	0.91485	Pellet	2.94678	0.1539	0.0044	0.1495
2020-0484	Fireplace	1/21/21	0.59706	Pellet	2.94678	0.1539	0.0044	0.1495
2020-0490	Fireplace	6/20/23	0.95337	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0510	Fireplace	5/21/21	0.95337	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0515	Fireplace	6/8/21	0.95337	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0520	Fireplace	10/7/21	1.88748	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0538	Fireplace	3/22/22	1.4445	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0574	Fireplace	10/28/22	0.85707	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0590	Fireplace	10/27/22	1.4445	Pellet	2.94678	0.1539	0.0044	0.1495

Program Tracking # (YYYY-XXX)	Old Device Type	Install Date	Emission Rate (g/hr)	Replacement Device Type	Emission Factor (lb/ton)	Emissions (ton/year) Before	Emissions (ton/year) After	Emissions (ton/year) Difference
2021-0591	Fireplace	10/28/22	0.85707	Pellet	2.94678	0.1539	0.0044	0.1495
2021-0610	Fireplace	7/27/23	0.963	Pellet	2.94678	0.1539	0.0044	0.1495
2023-0655	Fireplace	1/9/24	0.91485	Pellet	2.94678	0.1539	0.0044	0.1495
EPA2018-0089	Fireplace	4/12/24	0.8667	Pellet	2.94678	0.1539	0.0044	0.1495
EPA2018-0092	Fireplace	6/6/24	0.963	Pellet	2.94678	0.1539	0.0044	0.1495
EPA2020-0025	Fireplace	1/18/24	1.0593	Pellet	2.94678	0.1539	0.0044	0.1495
2017-0219	Non-certified Wood Stove	7/19/22	0.85707	Pellet	2.94678	0.0975	0.0044	0.0931
2017-0226	Non-certified Wood Stove	7/22/21	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2020-0465	Non-certified Wood Stove	1/22/21	1.4445	Pellet	2.94678	0.0975	0.0044	0.0931
2020-0473	Non-certified Wood Stove	2/12/21	0.85707	Pellet	2.94678	0.0975	0.0044	0.0931
2020-0478	Non-certified Wood Stove	3/2/21	1.68525	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0519	Non-certified Wood Stove	8/17/21	0.95337	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0536	Non-certified Wood Stove	11/17/21	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0560	Non-certified Wood Stove	8/3/22	1.68525	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0562	Non-certified Wood Stove	3/29/22	1.43487	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0564	Non-certified Wood Stove	8/23/22	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0597	Non-certified Wood Stove	11/22/22	0.64521	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0606	Non-certified Wood Stove	12/19/22	0.85707	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0607	Non-certified Wood Stove	11/28/22	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0612	Non-certified Wood Stove	12/6/22	0.74151	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0623	Non-certified Wood Stove	4/2/24	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0624	Non-certified Wood Stove	5/19/23	1.4445	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0640	Non-certified Wood Stove	3/23/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2023-0649	Non-certified Wood Stove	12/15/23	0.95337	Pellet	2.94678	0.0975	0.0044	0.0931
2023-0652	Non-certified Wood Stove	6/15/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2023-0653	Non-certified Wood Stove	4/13/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
2023-0656	Non-certified Wood Stove	6/6/23	1.4445	Pellet	2.94678	0.0975	0.0044	0.0931
2023-0658	Non-certified Wood Stove	9/8/23	1.4445	Pellet	2.94678	0.0975	0.0044	0.0931
2023-0659	Non-certified Wood Stove	9/5/23	0.0963	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0012	Non-certified Wood Stove	7/17/23	0.85707	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0016	Non-certified Wood Stove	10/25/23	1.68525	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0018	Non-certified Wood Stove	8/24/23	0.41409	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0023	Non-certified Wood Stove	11/15/23	0.95337	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0030	Non-certified Wood Stove	7/13/23	0.95337	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0032	Non-certified Wood Stove	9/21/23	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0036	Non-certified Wood Stove	10/10/23	1.0593	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0082	Non-certified Wood Stove	4/9/24	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0083	Non-certified Wood Stove	2/20/24	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0091	Non-certified Wood Stove	5/16/24	0.95337	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0100	Non-certified Wood Stove	5/15/24	0.91485	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2018-0102	Non-certified Wood Stove	5/30/24	0.95337	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0022	Non-certified Wood Stove	11/22/23	1.0593	Pellet	2.94678	0.0975	0.0044	0.0931
EPA2020-0030	Non-certified Wood Stove	4/3/24	0.80892	Pellet	2.94678	0.0975	0.0044	0.0931
2021-0532	Pellet Stove	3/16/22	0.91485	Pellet	2.94678	0.0159	0.0044	0.0115
2021-0608	Pellet Stove	10/3/23	1.7334	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2018-0002	Pellet Stove	8/23/21	0	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0001	Pellet Stove	4/13/22	0.95337	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0003	Pellet Stove	5/26/22	0.95337	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0005	Pellet Stove	12/20/22	1.4445	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0007	Pellet Stove	7/5/23	1.42524	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0015	Pellet Stove	11/14/23	0.0963	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0017	Pellet Stove	7/10/23	0.85707	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0020	Pellet Stove	10/3/23	1.3482	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0021	Pellet Stove	8/8/23	0.95337	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0023	Pellet Stove	2/2/24	0.0963	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0029	Pellet Stove	2/15/24	0.91485	Pellet	2.94678	0.0159	0.0044	0.0115
EPA2020-0004	Certified Repair/Replacement	10/20/22	0	Kerosene	0	0.0975	0.0000	0.0975
2021-0570	Fireplace	5/31/22	0	Kerosene	0	0.1539	0.0000	0.1539
2021-0577	Non-certified Wood Stove	8/11/22	0	Kerosene	0	0.0975	0.0000	0.0975
2021-0600	Non-certified Wood Stove	5/31/23	0	Kerosene	0	0.0975	0.0000	0.0975
2021-0601	Non-certified Wood Stove	12/20/22	0	Kerosene	0	0.0975	0.0000	0.0975
EPA2018-0001	Pellet Stove	7/7/21	0	Kerosene	0	0.0159	0.0000	0.0159
2020-0488	Certified Repair/Replacement	1/10/21	0	Propane	0	0.0975	0.0000	0.0975
2020-0495	Fireplace	2/23/21	0	Propane	0	0.1539	0.0000	0.1539
2021-0509	Fireplace	5/19/21	0	Propane	0	0.1539	0.0000	0.1539
2021-0537	Fireplace	12/8/21	0	Propane	0	0.1539	0.0000	0.1539
2021-0544	Fireplace	10/27/22	0	Propane	0	0.1539	0.0000	0.1539
2021-0559	Fireplace	1/11/22	0	Propane	0	0.1539	0.0000	0.1539
2021-0563	Fireplace	5/18/23	0	Propane	0	0.1539	0.0000	0.1539
2021-0581	Fireplace	7/14/22	0	Propane	0	0.1539	0.0000	0.1539
2021-0585	Fireplace	10/13/22	0	Propane	0	0.1539	0.0000	0.1539
2023-0642	Fireplace	4/14/23	0	Propane	0	0.1539	0.0000	0.1539
2020-0467	Non-certified Wood Stove	2/17/21	0	Propane	0	0.0975	0.0000	0.0975
2020-0493	Non-certified Wood Stove	3/10/21	0	Propane	0	0.0975	0.0000	0.0975
2021-0504	Non-certified Wood Stove	8/25/21	0	Propane	0	0.0975	0.0000	0.0975
2021-0528	Non-certified Wood Stove	8/12/21	0	Propane	0	0.0975	0.0000	0.0975
2021-0550	Non-certified Wood Stove	6/29/23	0	Propane	0	0.0975	0.0000	0.0975
2021-0575	Non-certified Wood Stove	10/4/22	0	Propane	0	0.0975	0.0000	0.0975
2021-0579	Non-certified Wood Stove	8/18/22	0	Propane	0	0.0975	0.0000	0.0975
2021-0583	Non-certified Wood Stove	11/29/22	0	Propane	0	0.0975	0.0000	0.0975
EPA2018-0043	Non-certified Wood Stove	10/24/23	0	Propane	0	0.0975	0.0000	0.0975
EPA2018-0087	Non-certified Wood Stove	5/18/24	0	Propane	0	0.0975	0.0000	0.0975
EPA2020-0002	Pellet Stove	9/1/22	0	Propane	0	0.0159	0.0000	0.0159

Program Tracking # (YYYY-XXX)	Old Device Type	Install Date	Emission Rate (g/hr)	Replacement Device Type	Emission Factor (lb/ton)	Emissions (ton/year) Before	Emissions (ton/year) After	Emissions (ton/year) Difference
EPA2020-0012	Pellet Stove	8/31/23	0	Propane	0	0.0159	0.0000	0.0159
2020-0474	Certified Repair/Replacement	7/8/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2020-0009	Certified Repair/Replacement	4/18/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2020-0014	Certified Repair/Replacement	7/11/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2020-0026	Certified Repair/Replacement	10/17/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2020-0031	Certified Repair/Replacement	5/1/24	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2020-0036	Certified Repair/Replacement	9/6/24	0	Heat Pump	0	0.0975	0.0000	0.0975
2024-0056	EPA Certified Wood Stove	7/30/24	0	Heat Pump	0	0.0625	0.0000	0.0625
EPA2018-0009	Fireplace	1/31/22	0	Heat Pump	0	0.1539	0.0000	0.1539
EPA2018-0011	Fireplace	2/23/22	0	Heat Pump	0	0.1539	0.0000	0.1539
EPA2018-0074	Fireplace	7/20/24	0	Heat Pump	0	0.1539	0.0000	0.1539
EPA2018-0075	Fireplace	11/30/23	0	Heat Pump	0	0.1539	0.0000	0.1539
2021-0561	Non-certified Wood Stove	7/6/22	0	Heat Pump	0	0.0975	0.0000	0.0975
2021-0595	Non-certified Wood Stove	11/10/22	0	Heat Pump	0	0.0975	0.0000	0.0975
2021-0629	Non-certified Wood Stove	2/15/23	0	Heat Pump	0	0.0975	0.0000	0.0975
2023-0646	Non-certified Wood Stove	6/6/23	0	Heat Pump	0	0.0975	0.0000	0.0975
2023-0651	Non-certified Wood Stove	5/3/23	0	Heat Pump	0	0.0975	0.0000	0.0975
2023-0657	Non-certified Wood Stove	5/18/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0003	Non-certified Wood Stove	6/17/21	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0004	Non-certified Wood Stove	7/19/21	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0008	Non-certified Wood Stove	10/18/21	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0013	Non-certified Wood Stove	8/17/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0026	Non-certified Wood Stove	7/19/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0028	Non-certified Wood Stove	8/7/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0031	Non-certified Wood Stove	9/20/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0038	Non-certified Wood Stove	7/18/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0056	Non-certified Wood Stove	12/19/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0057	Non-certified Wood Stove	10/10/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0062	Non-certified Wood Stove	11/8/23	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0077	Non-certified Wood Stove	4/10/24	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0107	Non-certified Wood Stove	10/25/24	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0110	Non-certified Wood Stove	10/7/24	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2018-0115	Non-certified Wood Stove	10/17/24	0	Heat Pump	0	0.0975	0.0000	0.0975
EPA2020-0032	Pellet Stove	6/27/24	0	Heat Pump	0	0.0159	0.0000	0.0159
2021-0518HP	EPA Certified Wood Stove	3/1/22	0.69336	Heat Pump Combo	1.38672	0.0036	0.0018	0.0018
2022-0001	EPA Certified Wood Stove	5/23/23	2.9853	Heat Pump Combo	5.9706	0.0157	0.0078	0.0079
2022-0003	EPA Certified Wood Stove	1/24/23	2.33046	Heat Pump Combo	4.66092	0.0123	0.0061	0.0062
2022-0004	EPA Certified Wood Stove	1/19/23	1.69488	Heat Pump Combo	3.38976	0.0089	0.0044	0.0045
2022-0005	EPA Certified Wood Stove	5/29/23	0.43335	Heat Pump Combo	0.8667	0.0023	0.0011	0.0011
2022-0006	EPA Certified Wood Stove	6/10/23	4.2372	Heat Pump Combo	8.4744	0.0223	0.0111	0.0112
2023-0008	EPA Certified Wood Stove	3/16/23	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2023-0009	EPA Certified Wood Stove	2/16/24	3.45717	Heat Pump Combo	6.91434	0.0182	0.0091	0.0091
2023-0011	EPA Certified Wood Stove	4/3/23	3.0816	Heat Pump Combo	6.1632	0.0162	0.0081	0.0081
2023-0012	EPA Certified Wood Stove	6/21/23	0.6741	Heat Pump Combo	1.3482	0.0035	0.0018	0.0018
2023-0013	EPA Certified Wood Stove	6/12/23	4.2372	Heat Pump Combo	8.4744	0.0223	0.0111	0.0112
2023-0016	EPA Certified Wood Stove	4/11/23	1.926	Heat Pump Combo	3.852	0.0101	0.0050	0.0051
2023-0018	EPA Certified Wood Stove	5/30/23	2.889	Heat Pump Combo	5.778	0.0152	0.0076	0.0076
2023-0019	EPA Certified Wood Stove	3/10/23	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2023-0020	EPA Certified Wood Stove	8/2/23	4.2372	Heat Pump Combo	8.4744	0.0223	0.0111	0.0112
2023-0023	EPA Certified Wood Stove	6/22/23	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2023-0024	EPA Certified Wood Stove	6/14/23	0.6741	Heat Pump Combo	1.3482	0.0035	0.0018	0.0018
2023-0025	EPA Certified Wood Stove	7/12/23	1.2519	Heat Pump Combo	2.5038	0.0066	0.0033	0.0033
2023-0027	EPA Certified Wood Stove	8/16/23	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2023-0029	EPA Certified Wood Stove	8/2/23	3.4668	Heat Pump Combo	6.9336	0.0182	0.0091	0.0092
2023-0030	EPA Certified Wood Stove	8/30/23	1.08819	Heat Pump Combo	2.17638	0.0057	0.0028	0.0029
2023-0031	EPA Certified Wood Stove	7/25/23	0.42372	Heat Pump Combo	0.84744	0.0022	0.0011	0.0011
2023-0032	EPA Certified Wood Stove	8/2/23	3.7557	Heat Pump Combo	7.5114	0.0197	0.0098	0.0099
2023-0033	EPA Certified Wood Stove	5/6/24	0.70299	Heat Pump Combo	1.40598	0.0037	0.0018	0.0019
2023-0034	EPA Certified Wood Stove	1/23/24	2.4075	Heat Pump Combo	4.815	0.0127	0.0063	0.0064
2023-0035	EPA Certified Wood Stove	9/7/23	0.71262	Heat Pump Combo	1.42524	0.0037	0.0019	0.0019
2023-0036	EPA Certified Wood Stove	8/23/23	1.69488	Heat Pump Combo	3.38976	0.0089	0.0044	0.0045
2023-0039	EPA Certified Wood Stove	11/14/23	2.4075	Heat Pump Combo	4.815	0.0127	0.0063	0.0064
2023-0043	EPA Certified Wood Stove	1/17/24	4.2372	Heat Pump Combo	8.4744	0.0223	0.0111	0.0112
2023-0045	EPA Certified Wood Stove	2/19/24	3.0816	Heat Pump Combo	6.1632	0.0162	0.0081	0.0081
2023-0046	EPA Certified Wood Stove	12/5/23	4.2372	Heat Pump Combo	8.4744	0.0223	0.0111	0.0112
2024-0049	EPA Certified Wood Stove	3/21/24	0.42372	Heat Pump Combo	0.84744	0.0022	0.0011	0.0011
2024-0051	EPA Certified Wood Stove	5/7/24	4.2372	Heat Pump Combo	8.4744	0.0223	0.0111	0.0112
2024-0052	EPA Certified Wood Stove	5/1/24	0.70299	Heat Pump Combo	1.40598	0.0037	0.0018	0.0019
2024-0053	EPA Certified Wood Stove	9/10/24	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2024-0062	EPA Certified Wood Stove	8/22/24	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2024-0063	EPA Certified Wood Stove	8/22/24	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2024-0060	Pellet	7/2/24	0.47187	Heat Pump Combo	2.94678	0.0044	0.0022	0.0022
2023-0037	EPA Certified Wood Stove	5/14/24	0.4815	Heat Pump Combo	0.963	0.0025	0.0013	0.0013
2023-0010	EPA Certified Wood Stove	3/22/23	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2024-0050	EPA Certified Wood Stove	7/19/24	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2024-0058	EPA Certified Wood Stove	8/7/24	1.69488	Heat Pump Combo	3.38976	0.0089	0.0044	0.0045
2023-0028	EPA Certified Wood Stove	10/4/23	0.43335	Heat Pump Combo	0.8667	0.0023	0.0011	0.0011
2024-0064	EPA Certified Wood Stove	10/1/24	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249
2023-0007	EPA Certified Wood Stove	5/12/23	0.70299	Heat Pump Combo	1.40598	0.0037	0.0018	0.0019
2023-0026	EPA Certified Wood Stove	6/30/23	9.4374	Heat Pump Combo	18.8748	0.0496	0.0247	0.0249

Total Installations

Total Installations as of 12/31/2021	329
Wood Stoves Total	149
Noncatalytic Stoves	24
Catalytic	121
Hybrids	4
Pellet Stoves	73
Propane Stoves	22
Kerosene Stoves	6
Heat Pumps	33
Heat Pump Combos	46
Total PM2.5 Emissions Saved (tons per year)	28.5911
Total PM2.5 Emissions Saved (tons per day)	0.0783