

Washington County, Oregon

WOOD STOVE EXCHANGE

Let's clear the air.

YEAR SIX REPORT

July 1, 2021
through
June 30, 2022



INTRODUCTION

In 2016, Washington County Department of Health and Human Services and the Office of Community Development partnered to develop the Washington County Wood Stove Exchange program (WSE) to provide grants (full cost) and rebates (\$1,500–\$3,500) to households that change to a cleaner heating source.

An Oregon DEQ survey of the Portland metro area determined that a major source of particulate matter (PM2.5 and PM10) pollution in Washington County is older and uncertified wood stoves. Older wood stoves produce an excessive amount of residential wood smoke, which negatively affects air quality, the local environment and residents' health. Wood stove change-out programs have proven to be an effective approach to reducing particulate matter pollution, especially in winter months.

The Wood Stove Exchange program is designed to:

- Reduce particulate matter pollution, resulting in better air quality and a healthier community.
- Potentially improve indoor air quality in homes with older wood stoves, reducing the symptoms of asthma and other respiratory conditions.
- Avoid public health and economic consequences of violating the federal Clean Air Act (i.e., nonattainment designation in Washington County).

The program's goals are to serve up to 700 households, reduce wintertime occurrences of exceeding the national particulate matter standard, and reduce the annual average particulate matter concentrations.

These long-term outcomes require monitoring of particulates and pollutants over time to assess the effectiveness of the Wood Stove Exchange program.

The program was impacted by COVID-19 and was suspended late March 2020 and then resumed operations in April of 2021. This gave the program a full year of operations for the first time in over 2 years.

Contractor visits to participating homes for installs continued to follow Oregon Construction Contractors Board (CCB) and Oregon Occupational Safety and Health Division (OSHA) guidelines for masking, social distancing, and cleaning/disinfecting.

In year six, with the county fair as the single outreach effort, the WSE still received 55 applications, a very good sign of continued interest from county residents.

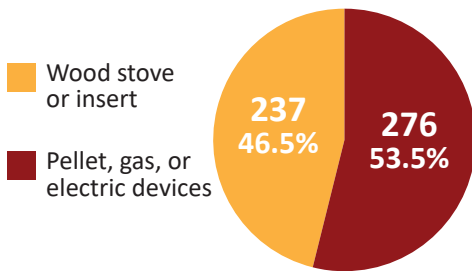
And the program completed 93 exchanges for a total to date of 606 new devices installed.

Replacement options mix of the 93 projects in year six

- Overall – 47 Pellet/Gas/Electric devices, 46 Wood stoves/inserts
- Grant – 30 Pellet/Gas/Electric, 25 Wood stoves/inserts
- Rebate – 17 Pellet/Gas/Electric, 21 Wood stoves/inserts



NEW HEAT TYPE INSTALLED



Of the 606 completed exchanges for the first six years, more than half of the participants continue to install new devices that use electric, gas or pellets (a lumber by-product). By offering electric, gas or pellet options, the program provides a greater reduction in wood smoke emissions than other wood stove change-out programs.

The average payout per completed project in the six year was \$3,898, the highest average over the six years. Project costs are higher than in previous years, as device and parts costs have continued to increase over the last 3 years due to recent metal tariffs and the global supply chain issues that continue to affect the stove/hearth and HVAC industries.

Leveraged incentives and contractor and manufacturer discounts for the first six years now totals \$123,056.

- Average leveraged dollars per replacement to date = \$506 per eligible project
- Current utility partners include the Energy Trust, NW Natural Gas, PGE, and Forest Grove Light & Power

REDUCING EMISSIONS

After six full years, the prevented emissions of particulate matter, pollutants, and gases from 606 replacements amount to over 311 tons. Using the EPA emissions calculator, the specifics are:

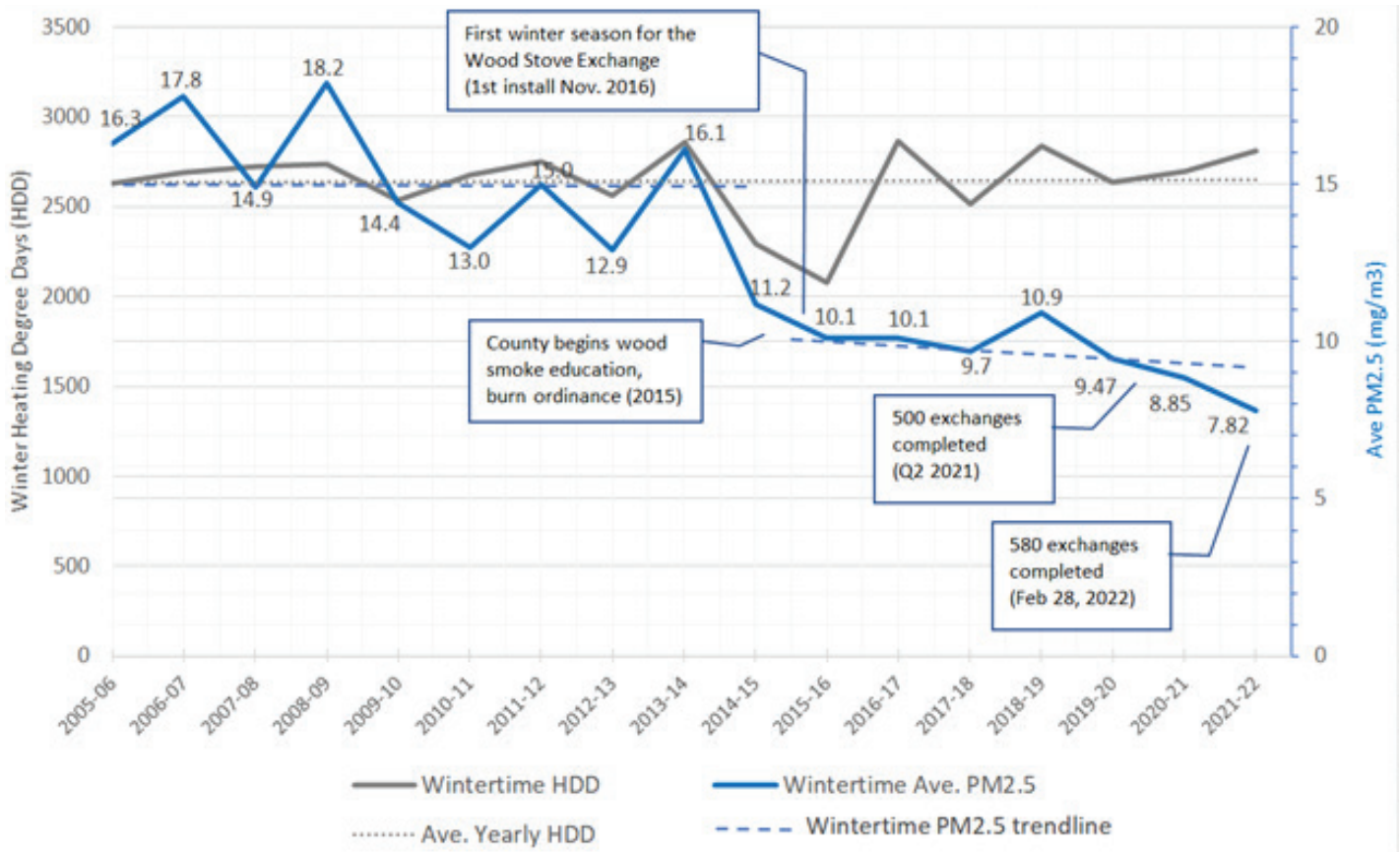
- 46.30 tons of $PM_{2.5}$ and PM_{10} emissions prevented
- 264 tons of other pollutants prevented
 - 169.6 tons of carbon monoxide
 - 47.4 tons of methane
 - 41.8 tons of volatile organic compounds
 - 6.0 tons of hazardous air pollutants

The program is also now calculating carbon dioxide emissions prevented. To date, the CO2 emissions prevented total 2,055 tons.

NOTE: See Appendix A for EPA emissions calculator chart in detail.

WINTERTIME REDUCTION IN PM

The chart below displays the reductions in average wintertime particulate matter (PM_{2.5}) since 2015 and measured at the Hillsboro Hare Field DEQ monitor station. Of significance in the chart is the continued decrease in wintertime particulate since 2015.



The solid gray line denotes the heating degree day (HDD) averages for each year. The solid blue line shows the average wintertime (Nov. – Feb.) PM_{2.5}. The gray dotted line depicts the average wintertime HDD over the last 17 seasons, consistently at about 2600 HDD. While the average each winter from 2005-06 to 2013-14 varied somewhat, the average HDD stayed constant as well as the average wintertime particulate at 15 micrograms per cubic meter (µg/m³). As the county began efforts in 2014 and 2015 to reduce smoke particulate, with the backyard burn ban ordinance, education on brush burning, seasonal limits to brush burning, and then the Wood Stove Exchange Program beginning in 2016, the wintertime particulate has dropped and continues on a downward trend through this most recent winter (2021-2022).

NOTE: A definition of degree days and heating degree days as stated by the U.S. Energy Information Administration (EIA).

Degree days are measures of how cold or warm a location is. A degree day compares the mean (the average of the high and low) outdoor temperatures recorded for a location to a standard temperature, usually 65° Fahrenheit (F) in the United States.

The more extreme the outside temperature, the higher the number of degree days. A high number of degree days generally results in higher levels of energy use for space heating or cooling.

Heating degree days (HDD) are a measure of how cold the temperature was on a given day or during a period of days. For example, a day with a mean temperature of 40°F has 25 HDD. Two such cold days in a row have a total of 50 HDD for the two-day period.

EPA REDUCTION IN EMISSION THRESHOLD COMING IN SPRING 2023

In the development of the Wood Stove Exchange Program, the DEQ assumed the level at the Hare Field monitor was 31.3 ug/m³, the 3-year average from 2011-2013 (and what the PM2.5 standard is based on to determine if an area is in compliance with the EPA standard). Because the EPA attainment level was 35 ug/m³ in 2014, and to reduce wintertime particulate, specifically particulate matter of 2.5 microns or less (PM2.5), the DEQ initially set targets during this program development at 30 ug/m³ and 25 ug/m³ for estimating purposes.

In the original program proposal by the county, a target of 25 ug/m³ was selected in order to create the most efficient and effective strategy to address PM2.5. The DEQ proposed that changing out wood stoves county-wide would be necessary to reduce the average to 25.0 ug/m³.

The EPA has recently stated that the PM National Ambient Air Quality Standards (NAAQS) attainment level will be reduced in the spring of 2023. In a preliminary vote by EPA staff in early 2022, the majority of internal voters on this matter have indicated the level to be 25 ug/m³.

To effectively reduce the amount of wintertime particulate to amounts that protect the public's health throughout the County and reduce levels of PM 2.5 to the original acceptable concentration of 25 ug/m³, and given the lower level lower attainment level coming in 2023, staff has assessed a benefit to continuing the program to ensure we are sufficiently below the new threshold.

The implications of this tighter standard could be that the county will be closer to the non-attainment status that brings strict requirements on existing industry in the region. This may include restrictions on facilities' potential to expand production or requirements to install expensive emission control technology.

The chart below illustrates the number of days the Hillsboro Hare Field monitor tracked PM2.5 over 25 ug/m³ and 35 ug/m³ in the months of November through February in years 2010 - 2020.

The column on the right shows only 3 exceedances of the current design value of 35.5 ug/m³ in the last 6 winters (county efforts on local particulate reduction). The middle column shows 26 exceedances in the last 6 winters of the expected new 2023 design value of 25 ug/m³. It will soon be that the county has a significant challenge to remain in attainment of the clean air standard.

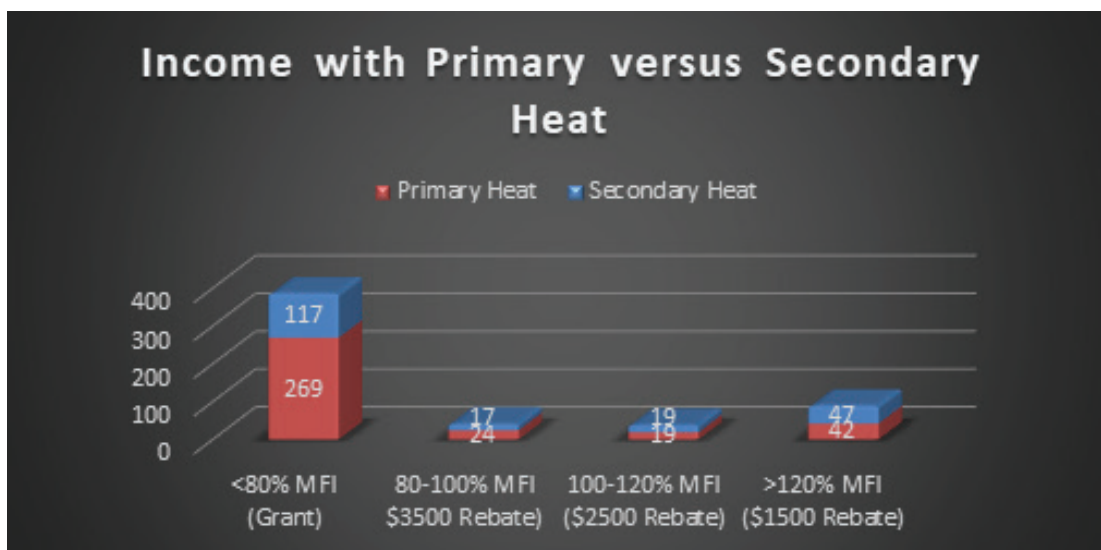
HHF PM2.5 Nov-Feb days	≥25 to 35.4 (µg/m3)	≥35.5 (µg/m3)
2010	1	1
2011	9	7
2012	3	1
2013	9	9
2014	4	1
2015	8	0
2016	2	0
2017	6	1
2018	3	1
2019	5	1
2020	2	0



OLD WOOD STOVE AS A PRIMARY OR SECONDARY HEAT SOURCE

As part of the data collected from each household, participants provide income and other documentation for the household and are asked 3 questions to determine the amount of wood burned per season and if the old stove is a primary or secondary heat source.

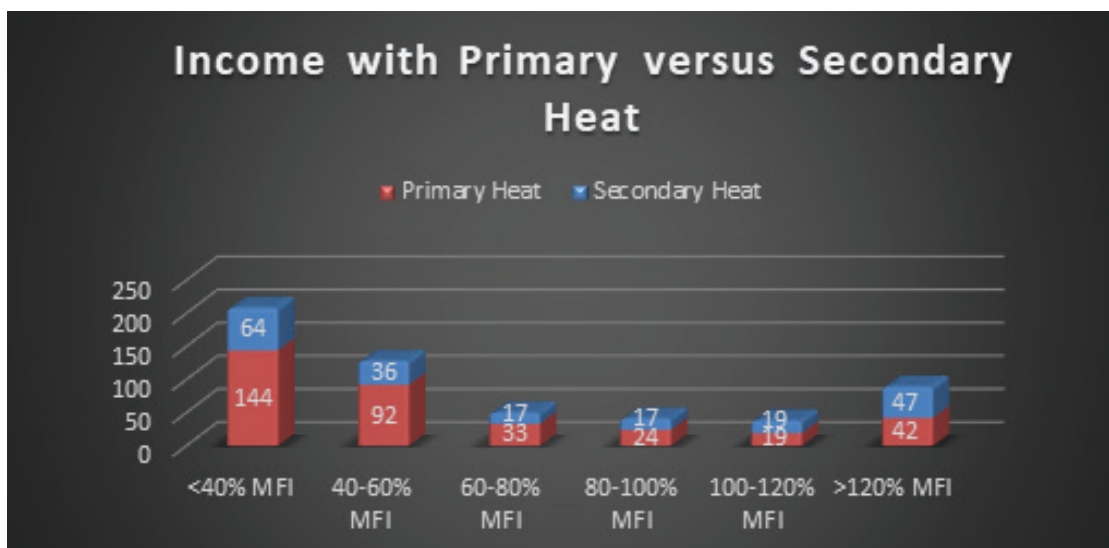
Each column in this chart corresponds with the four income categories the program uses to provides a grant or level of rebate to participating households. 69.7% of households receiving the grant in the program (<80% MFI) use their old woodstove at the primary heat source and burn an average of 3 cords of wood per season. The 269 primary wood burners represent almost half (48.5%) of the program participants and burn the largest average amount of wood per season.



MFI denotes the current yearly area Median Family Income as determined each year by HUD.

Splitting out the Grant level (those households below 80% of MFI) into more specific income categories below, displays the importance of inexpensive* wood heat as primary heat for lower income households.

** 66% of all program applicants get their wood for free*



This displays the importance of continuing to offer cleaner, more efficient devices to all county residents, especially those using their old stoves as primary heat sources and producing more wood smoke particulate.

SENATE BILL 1536

Collaboration is needed on complicated housing problems, and complicated solutions to home repair, heating, cooling, and safety issues that utility-based energy efficiency programs do not typically address. And because the manufactured housing, publicly supported housing, and low-income communities are at risk of displacement and the people that live there are so vulnerable.

The program was asked to provide input and assist with language for Oregon Senate Bill 1536 (SB1536). SB1536 passed in February and provides over \$15 million in funds for emergency air conditioner deployment, cooling spaces funding for local governments and landlords, portable HEPA air filter deployment, two heat pump incentive programs, removes barriers on renters installing cooling units, and requires new rentals to include cooling.

The assistance is targeted to groups that the program works with routinely---people with wood stoves, manufactured housing residents, households in older housing, with electric resistance heating, etc.

SUPPLY CHAIN AND OTHER ISSUES

Tariffs added to metal and other goods in recent years caused continued increases in device, parts, and materials costs. And now with fluctuations in the level of the COVID-19 pandemic, a war in Europe, inflation, etc., the supply chain has been greatly affected for most materials and products.

In previous years in the program, new devices and materials had lead times of 2-4 weeks. Now many products or parts are taking 2-6 months and costs continue to rise. The program has seen a rise in the average payout of over \$200 in just this last year.

For these reasons, the program has increased the \$3,500 rebate to \$4,000 and the grant from \$5,000 to \$5,500. This rebate increase assists those households with incomes below 100% MFI to 80% MFI. And the grant increase assists all households below 80% MFI. The rebates of \$2,500 (>100% MFI) and \$1,500 (>120% of MFI) will remain the same.

HILLSBORO AS A STAKEHOLDER AND PARTNER

Since program inception, the City of Hillsboro has been a funder of the Wood Stove Exchange Program. Over the 5 previous years with Hillsboro funding of \$75,000 each year, 154 Hillsboro residents have applied to the program with 119 completing projects. Payouts from the program to those 119 completed exchanges total \$496,500.

This 2021-2022 fiscal year included 16 projects completed in the city limits of Hillsboro, with payouts totaling \$68K. Also included in the last 2 years is funding for the Old Stove Turn-In Event up to \$10K per event.

Hillsboro has also been a partner in promoting the WSE program through the sustainability division, fire department, at the city administration building, summertime events including the Tuesday Night Market, and others.

SECOND ANNUAL OLD STOVE TURN-IN EVENT

The Washington County Wood Stove Exchange Program and Solid Waste and Recycling (SW & R) again conducted the Old Stove Turn-in Event May 1 with a reward (\$250) for the turn-in and recycling of old, uncertified free standing wood stoves or inserts or those certified from 1986 to 1992.

Of these old stoves, the worst offenders are those still in use that were made before 1993 – before manufacturers were required to increase efficiency to acceptable levels. Uncertified wood stoves and those certified (pre-1993) typically produced 30 to 90 grams of particulate pollution per hour; The U.S. EPA and Oregon DEQ now requires such emissions to be 2.0 to 2.5 grams per hour or less.

This event offers a solution to one major challenge – the selling and trading of old uncertified stoves. The event and the funds to be distributed were available only to homes in Washington County (one per household/address). Owner names and addresses were confirmed by the WSE through the County Assessment and Taxation database.

The device was required to be intact and in working order to be eligible for the recycling reward. Funds were allocated by the City of Hillsboro from a yearly grant to the Wood Stove Exchange Program.

19 applications were received, and 13 households turned in their old stoves.

The event also offered the opportunity to build and raise awareness in the community of the Oregon wood stove rules, promote the Wood Stove Exchange program, and through the registration and survey, learn even more about how Washington County residents are using their old stoves, and how concerned they may be of air quality, and health and safety aspects of their stove and of their home. Those that went through the registration and survey but wanted to replace their old wood stove with a new heating device, were redirected to the Wood Stove Exchange Program website and application page.

Outcomes of the 2022 Old Stove Turn-in Event:

- 13 old wood stoves were turned in by county residents
- 10 stoves were still in use
 - 6 using the old stove as a primary heat source
 - 4 using the old stove as a secondary heat source
- Emissions prevented from stoves still in use amounted to more than 74 tons
 - Over 7 tons of harmful pollutants and gases, including over 1 ton of particulate matter, and nearly 4 tons of carbon monoxide
 - Over 67 tons of carbon dioxide (CO₂) emissions prevented
- More than half (58%) of the attendees turned their stoves in based on concerns about outdoor and indoor air quality/health and safety
- Without the turn-in event, up to 77% of the stoves turned in could have continued to be used
- 47% of the respondents were unaware of Oregon's law against selling, offering to sell, advertise to sell or give away any used uncertified solid fuel burning device
- 5 carbon monoxide monitors were given to those respondents that did not have CO monitors in the home

Registrants stated a total of 33 cords of wood used in their old stove per heating season. Using the EPA emissions calculator for wood stoves, emissions prevented from the Old Stove Turn-In total over 7 tons of harmful pollutants & gases, including over 1 ton of particulate matter, nearly 4 tons of carbon monoxide, and over 2 tons of methane, compounds and pollutants.

Old Stove Turn-in Event May 7, 2022		TONS
Pollutant Emissions Prevented		13
PM2.5 + PM 10		2.74
Carbon Monoxide (CO)		10.34
Methane		2.87
Volatile Organic Compounds (VOCs)		2.37
Total HAPS (Hazardous Air Pollutants)		0.25
Sulfur Dioxide (SO ₂)		0.02
Nitrogen Oxides (NO _x)		0.13



IN-HOME OR “VIRTUAL” ASSESSMENTS

When the program was suspended in March 2020, in-home assessments by staff were halted, and many building jurisdictions were not performing in-home inspections. The program shifted to develop procedures for “virtual” assessments in preparation for when jurisdictions would be performing inspections again, and when some restrictions might be lifted. The virtual assessment consists of sending the assessment document to the applicant to complete and requesting pictures of the old stove and other required documents.

The virtual assessments were implemented very successfully when the program “re-opened” in April 2021. Program applicants now are offered the option of an in-home assessment or a virtual assessment.

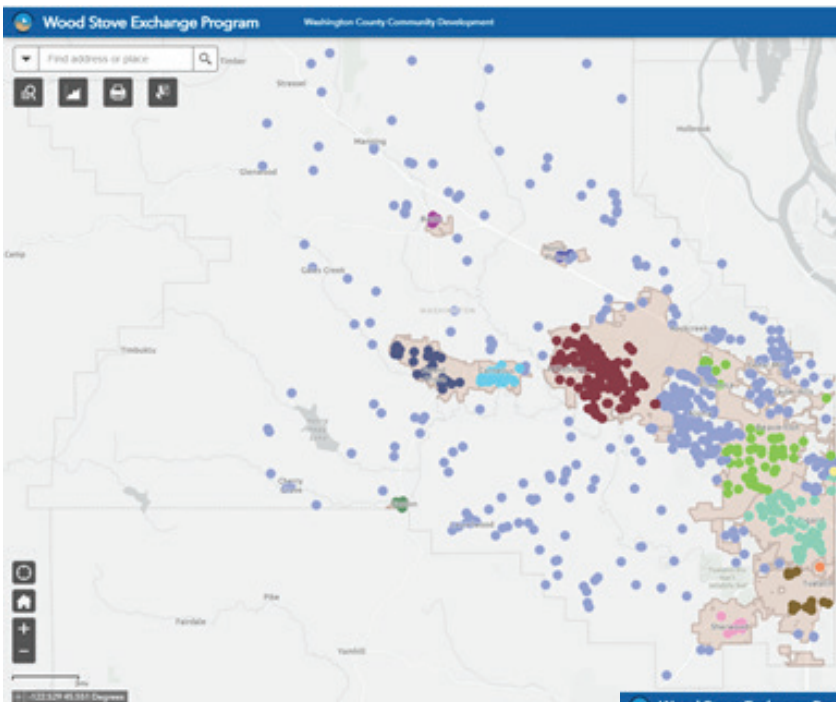
PROGRAM ENHANCEMENT FOR HOUSEHOLD SAFETY

The program continues to emphasize air quality and safety in the home. Over 40% of the homes assessed in the program do not have carbon monoxide (CO) monitors in the home. All Oregon contractors are required to install CO monitors, if not already present in the home, during any remodeling or repair of a home. In the course of the Wood Stove Exchange program process and dependent upon the participant’s motivation for the exchange, timelines from the initial assessment by program staff to the installation of a new device, and a CO monitor, if necessary, is regularly 2 to 6 months. If a CO monitor is not present in the home at the time of the initial assessment, the new process includes program staff providing a CO monitor at the initial assessment, rather than that household go without a CO monitor during that time.

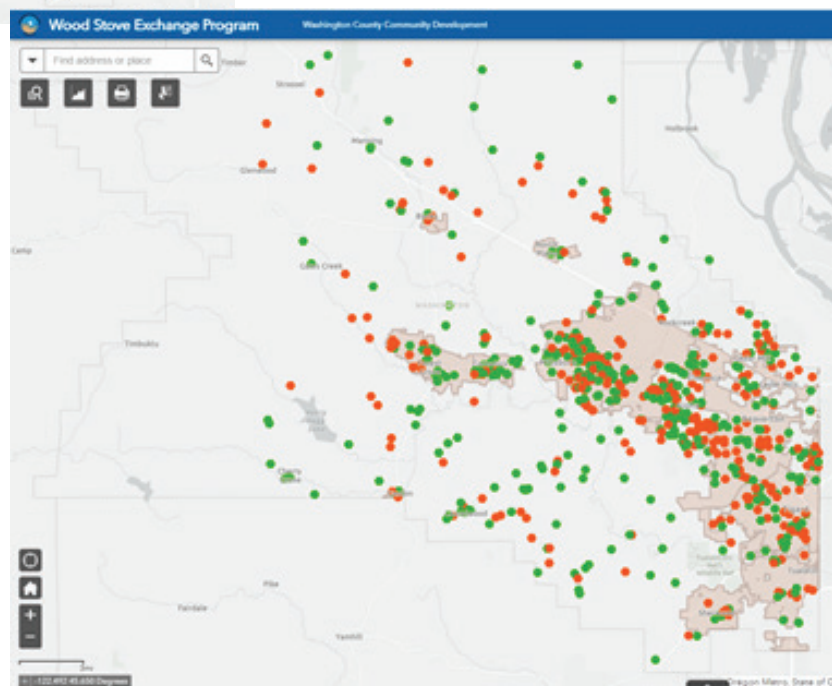
NEW GIS MAPPING AND DATA TOOL

Created by the county IT Mapping team specifically for this program, the program is currently utilizing a GIS map of data from program participant homes and households and county land data. The data includes information on grant or rebate, wood use, type of heating source, utility service, some demographics, age of the home, etc. Using multiple layers and combining various layers for charting data and reporting provides the program a more accurate assessment of program participation and specifics that can enhance future outreach and education efforts.

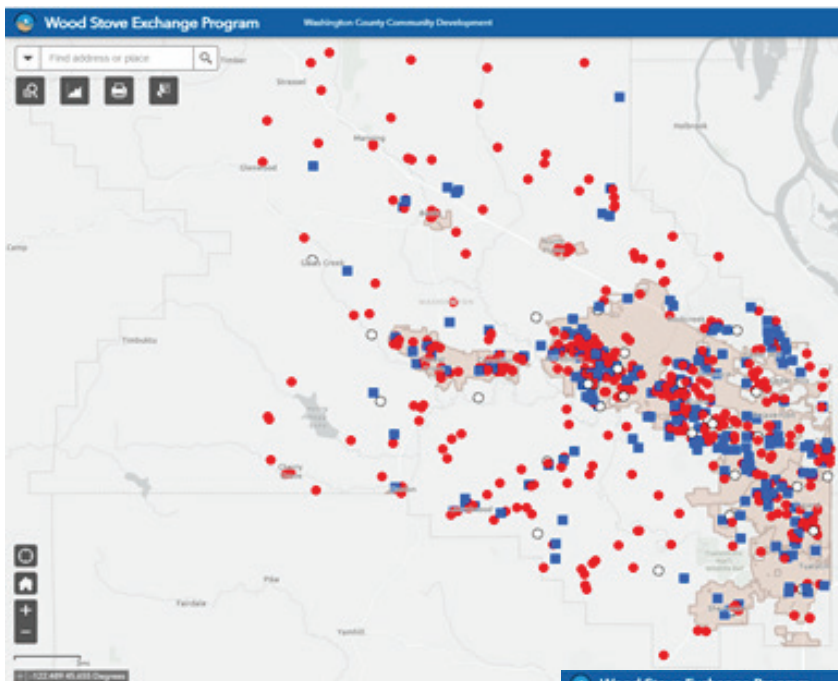
Some examples



Projects by Jurisdiction – light Blue = Unincorporated Washington County and the other colors are distinct to cities and towns

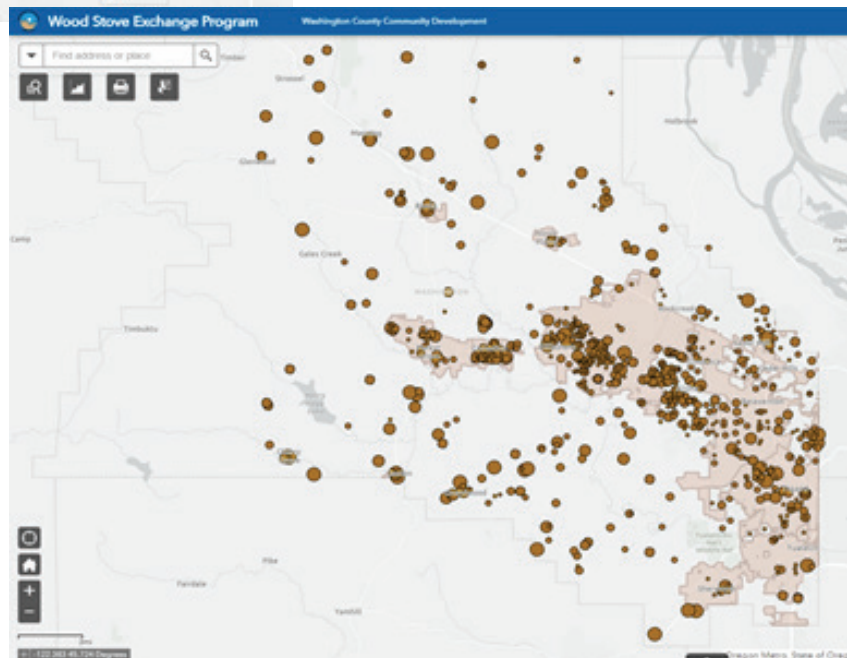


Grant (green) or rebate (orange) participants



*Red = Old wood stove as the Primary heat source
(50% - 100% of heat)*

*Blue = Old wood stove as the Secondary heat source
(1% - 49% of heat)*



*Wood burned per season with the old stove, the size of the dot
is representative of the amount of wood burned in cords*

ENERGY TRUST - PROGRAM PARTNER

The Wood Stove Exchange program and Housing Rehabilitation have partnered with the Energy Trust and their Community Partner Funding program. This program offers increased incentives for customers of PGE and NW Natural Gas, in partnership with programs such as the WSE and Housing Rehabilitation. The Energy Trust also offers Energy Saver Kits and LED light bulbs for eligible households in the program. The additional incentive dollars will likely allow the Housing Rehab program to include more repair and rehab elements to each project, and other incentives used for each eligible project will extend the funding of the WSE and Housing Rehabilitation programs, possibly providing for more projects to be completed each year.

NEW FEDERAL TAX CREDIT FOR EFFICIENT WOOD AND PELLET STOVES

Beginning in 2021, households buying and installing highly efficient wood or pellet stoves (biomass heating systems) may be eligible to claim a 26% tax credit. Households installing new wood or pellets stoves (with the minimum 75% efficiency level) – can claim this credit for any out-of-pocket costs above the program grant or rebate.

The program informs each possible eligible project of the tax credit at the initial assessment. Once the project is completed, the program provides details of the tax credit, including how to check efficiencies on the [EPA database](#), and a link to the [IRS Form 5695](#) for their next federal tax return.



To date, participants were eligible for \$20,860 in total tax credits.

CONTINUED COLLABORATION AND KNOWLEDGE SHARING

The program participates in the Residential Wood Smoke Work Group (RWS). This work group is comprised of a network of federal, state, local and tribal agencies, and other partners. The purpose of this working group is to share information, expertise, and materials to mitigate residential wood smoke from old wood stoves and wildfires.

The WSE has also been a member of the Northwest Air Quality Coordinators group (NWAQC), sharing information, best practices, and materials to inform and educate the public on residential wood smoke from old wood stoves and wildfires.

COLLABORATION WITH MULTNOMAH COUNTY IN AIR QUALITY EFFORTS

This program and staff from the County Health & Human Services team continue to collaborate with Multnomah County on their Wood Stove Replacement Program and air quality efforts relative to a wood burning curtailment ordinance, and revisions to the air quality alert system. Staff have participated in Multnomah County public meetings and hearings on the impacts air quality, health, and climate change.

COMMUNITY OUTREACH EFFORTS

Outreach efforts of face-to-face type events are increasing somewhat but still limited according to COVID-19 protocols at the time, however cities and their departments continue to promote the program in various ways.

Multiple cities provide funding, materials, and announcements through their networks and local media. Hillsboro includes a scrolling PSA on the electronic boards in the Civic Center outdoor space and in their elevators and promotes the program in their City Views newsletter. Banks, Gaston, Hillsboro, North Plains, and Tigard all provide information on their websites, newsletters, utility bills, offered program presentations, and displayed rack cards in multiple locations.

Staff continues to monitor the methods of outreach and identify the most impactful and cost-effective elements of the outreach strategy and make enhancements to the strategy when necessary.

Events already planned for year seven include 2 evenings at the Washington County Fair, Hillsboro Tuesday Night Market in August, and presentations to County CPOs (Community Participation Organizations) this fall.

COMMUNITY EDUCATION EFFORTS

Outreach efforts always include education on the effects of air quality on health, clean burning methods, program options, and safety.

In addition to social media efforts and in-person events, the program brochure reaches more people with education on improving air quality and associated health benefits, encourages the use of clean wood burning practices, offers safety tips, and encourages participation in the Wood Stove Exchange.

The brochure provides info on overall air quality issues this program is working to address, and why wood stove owners should use only dry wood and not use starter material from garbage, chemically treated paper, mail including plastic, or color-printed items.



The brochure describes the benefits of using moisture meters, provided by the program to participants, to ensure dry wood is used to burn most efficiently and to produce less smoke. It includes safety tips on maintaining a wood stove and keeping the chimney clear and safe every heating season.

Additionally, the brochure lists helpful resources such as Oregon Heat Smart, the OregonAir app, EPA Burnwise, and how to access air quality alerts at www.publicalerts.org.

ANNUAL SURVEY

Due to the low number of installs after January 2020 and through July 2021, participants will not have significant time to evaluate the usage and effectiveness of their new device. The yearly survey will be distributed in the spring of 2023.

YEAR SIX REPORT SUMMARY

Awareness of the program remains strong, evidenced by the continued interest during the past program suspension and minimal promotion and outreach.

The current pipeline includes 24 previously released projects, and a waitlist of 38 projects. The current pipeline of 62 current and potential projects bodes well for a significant start to year seven.

The major successes of the Wood Stove Exchange program in the sixth year include:

- 93 completed exchanges increased the total exchanges to date to 606
- 606 exchanges have prevented emissions of over 311 tons of particulate matter, pollutants, and gases
- The program has also prevented 2055 tons of carbon dioxide emissions (CO2)
- The Old Stove Turn-in Event removed an additional 13 stoves from use or potential resale and re-use in the community and prevented an additional 7 tons of particulate matter, pollutants, and gases from being emitted
- Staff provided input and assisted with language for Oregon Senate Bill 1536 (SB1536)
- Informed 36 program participants they were eligible for \$20,860 in total from the Federal Biomass Stove Tax Credit
- Applications arrive to the program at an average of one per week with very minimal outreach proves the consistent word-of-mouth from participants and residents and the promotion of the program by our partners continues to increase awareness
- The commitment of community organizations, business, industry, utilities, and funders to spread awareness of the program and air quality issues continues to be vital to the success in implementing the program

A growing, diverse mix of supporters and partners is essential to raising awareness and educating the public. Partners that have been instrumental in the program’s progress include City of Hillsboro (project funder), Intel (project funder), the cities of Banks, Beaverton, Cornelius, Forest Grove, Gaston, North Plains, and Tigard, Washington County Community Action, and Oregon DEQ.

NOTE: A comprehensive partner list is included ion the next page.

APPENDIX A

EPA Emissions Calculator Chart

Pollutant Emissions Prevented (tons)	TONS
PM2.5 + PM 10	46.30
Carbon Monoxide (CO)	169.64
Methane	47.42
Volatile Organic Compounds (VOCs)	41.85
Total HAPS (Hazardous Air Pollutants)	3.95
Sulfur Dioxide (SO2)	0.23
Nitrogen Oxides (NOX)	1.85
Total emissions prevented	311.24

from U.S. EPA Emissions Calculator

PARTNERING ORGANIZATIONS

- Alliance for Green Heat
- American Lung Association
- Boy Scouts of America
- breatheOregon
- Cedar Mills News
- Centro Cultural
- City of Banks
- City of Beaverton
- City of Cornelius
- City of Forest Grove
- City of Gaston
- City of Hillsboro
- City of North Plains
- City of Tigard
- Community Action of Washington County
- Energy Trust of Oregon
- Environmental Protection Agency
- Habitat for Humanity
- Hillsboro Fire & Police Department
- Intel
- National Hearth, Patio and Barbecue Association
- NW Natural
- Neighbors for Clean Air
- Oregon Department of Energy
- Oregon Department of Environmental Quality
- Oregon Department of Forestry
- Oregon Health Authority
- Oregon Hearth, Patio and Barbecue Association
- Oregon Real Estate Inspectors Association
- Portland General Electric
- Remax
- 350.org
- Washington County Community Participation Organizations
- Washington County Solid Waste & Recycling
- WCCCA 911
- Westside Economic Alliance





Washington County, Oregon

**WOOD STOVE
EXCHANGE**

Let's clear the air.

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