

# How to Implement a Wood-Burning Appliance Changeout Program

September 15, 2014



Communities across the United States have successfully implemented wood-burning appliance changeout programs to reduce ambient and indoor air pollution, help protect health and heat homes more efficiently while saving money. A wood-burning appliance changeout or retrofit program is a **voluntary** program that provides information and incentives (e.g., rebates, discounts) to encourage households to replace, retrofit, or remove old, inefficient appliances like wood stoves, fireplaces, and hydronic heaters. Changeout programs can be an effective way to reduce particle pollution, air toxics, and other harmful pollutants both indoors and outdoors.

Drawing on best practices from programs across the country, this guide focuses on ways communities can implement an effective residential wood-burning appliance changeout/retrofit program. A changeout should be just one component of a long-term community wood smoke reduction strategy.

For guidance on developing a long-term wood smoke reduction strategy, see <http://www.epa.gov/burnwise/strategies.html>.

### Create a Successful Program

To develop a successful wood-burning appliance changeout program, you'll want to:

- Demonstrate the need.
- Develop a preliminary plan.
- Identify partners.
- Secure funding.
- Modify the plan to include partners and funding.
- Initiate a wood smoke outreach and education campaign.
- Implement appliance changeouts.
- Evaluate the program.

Studies indicate that education and outreach on **cleaner burning and proper maintenance** is a vital component to improving air quality and health protection.

## Demonstrate the Need

Showing why a residential wood-burning appliance changeout program can benefit your community will help garner support from decision-makers, funders, partners, and community members. Their support is vital to encouraging homeowners to participate.

Make sure to explain the benefits of reducing residential wood smoke. In particular, less wood smoke means:

- **Cleaner air indoors and out.** Reducing wood smoke can help a community meet its air quality goals and improve the air quality for those who burn and for their neighbors. It can be very beneficial to those areas looking to reduce ambient fine particle pollution.
- **Improved health.** Addressing wood smoke can help avoid heart and lung disease and illness such as respiratory infections, chronic and acute bronchitis, asthma attacks and even premature death.
- **Warmer homes.** Many wood-burning appliances are old and inefficient. Replacing or removing these older appliances promotes better combustion through cleaner, more efficient home heating devices.

Changing out an old wood stove can save money, fuel, time and resources. New EPA-certified wood stoves can:

- Burn 50% or more efficient than uncertified stoves.
- Use 1/3 less wood for the same heat.
- Cut creosote build-up in chimneys that helps reduce the risk of fire.
- Reduce fine particle pollution, air toxics and climate gases such as methane, black carbon and CO<sub>2</sub>.

To demonstrate the need, start with the following:

- **Collect quantitative and qualitative air data, such as:**
  - **Anecdotal data:** Compile logs of citizen complaint phone calls, letters, emails, photographs, and visual inspection reports from state, tribal, and local air pollution agencies.
  - **Ambient air monitoring data:** Record and track fine particle pollution levels. This can be done with filter-based samples, continuous monitors or mobile monitoring. Some communities have used speciated data to indicate that residential wood smoke is a contributor to pollution. Levoglucosan, carbon monoxide, and black carbon are commonly known wood and coal combustion species. This can be done in partnership with governmental agencies, public health non-profits or possibly a university or college.
  - **Indoor air monitoring data:** Communities have used indoor air monitoring to record high levels of indoor particle pollution, which has encouraged wood smoke reduction initiatives.



- **Ambient air emissions sources:** EPA tracks the source emissions of the six common air pollutants, including PM 2.5. To compare wood smoke contributions to other sources in your area, visit <http://www.epa.gov/air/emissions/index.htm>
- **Identify priority zones:** Identify areas in your community that are most vulnerable and that could benefit the most from reduced particle pollution. In some communities, school zones are a priority. In others, priority zones include areas with a large proportion of children or women of child-bearing age, hospitals, nursing homes, childcare centers, low-income households, or densely populated areas. You can use EPA's EJView to create maps and generate detailed reports based on geographic areas and data sets. EJView includes data from multiple factors that may affect human and environmental health within a community or region:  
<http://www.epa.gov/environmentaljustice/mapping.html>
- **Estimate appliance inventory:** Conduct a home heating survey to get an idea of how many wood-burning appliances you have in your community. This can help you determine how many appliances are uncertified, home heating behaviors, and the types of outreach that will motivate reductions. For an example of a home heating survey:  
<http://epa.gov/burnwise/pdfs/homeheatingsurveytemplate.pdf>.
- **Estimate emission reductions:** Use the EPA Wood Stove and Fireplace Emissions Calculator to help estimate emission reductions: <http://www.epa.gov/burnwise/xls/EmissionCalculator.xls>.
- **Estimate the funds needed to implement your changeout program:**
  - **Administrative:** Set aside anywhere from 5% to 25% of the total cost of a program. On average, 10% is a good start.
  - **Outreach and education:** Set aside funding for print, radio, television, and newspaper advertisements; Web promotion; and other creative outreach strategies. Focus on earned media (news or human interest stories covered by the media). Consider placing opinion/editorials on the program's benefits authored by a well-known physician. Use internal communications channels of major employers. EPA provides free outreach materials on the Burn Wise website, <http://www.epa.gov/burnwise/burnwisekit.html>.
  - **Appliance purchase and installation:** Estimate \$3,000 to \$5,000 for wood stove to wood stove replacement costs (typically \$1,500 for appliance and \$1,500 for flue and professional installation). Some communities provide total funding to low-income households; others provide vouchers that start at \$500 to all households. Some households may require chimney or mantel rebuilds that will cost more than the \$1,500 installation estimate. Shipping costs may apply as well, particularly in remote communities. Some areas may want to replace with cleaner burning options such as HVAC (up to \$10,000). Explore the option of a bounty program that offers \$300 - \$500 just to remove an old stove, without any replacement. For more ideas on replacement costs, see Puget Sound's Heating Replacement Options.



Old Stove Changeout, Libby, Montana



- **Appliance removal:** Include the cost of removal and destruction of the old stove. Some communities have partnered with metal recycling businesses to remove appliances at no cost; others have paid up to \$250 per stove for removal and destruction.
- **Follow-up:** Include the cost of follow-up activities. For example, some communities have used funds to pay for door-to-door visits and follow-up video or brochure instruction to ensure the new stoves are operated properly and the households are burning the proper fuel (e.g. dry, seasoned wood for wood stoves). It's helpful to conduct a follow-up survey for customer satisfaction, program improvement and testimonials.

Wet wood can create excessive smoke which is wasted fuel. Properly dried wood should have a moisture reading of **20% or less**. Dry wood creates a hotter fire. Hotter fires save wood - ultimately saving you time and money.

### Develop a Preliminary Plan

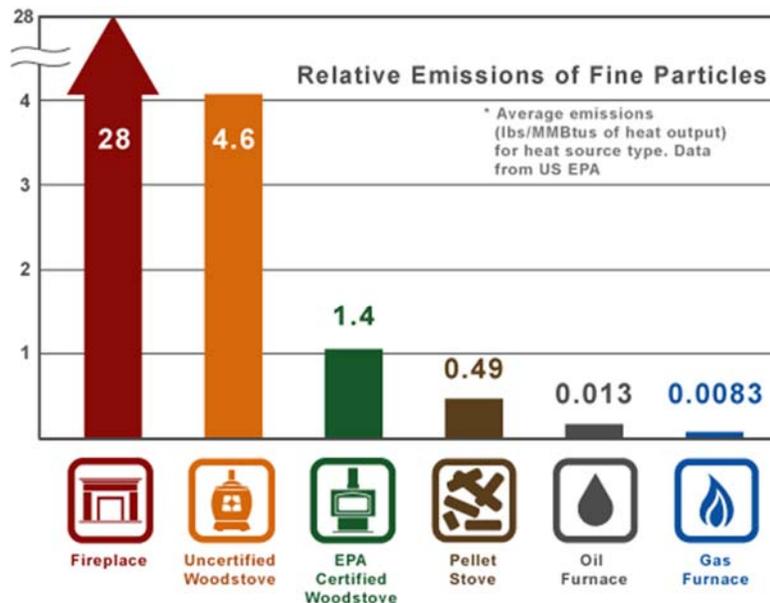
Once you have collected the data, you can begin to create your plan. Having a preliminary plan will help you organize your actions. *Note: planning is an iterative process, so you'll need to adjust your plan regularly as new information and ideas emerge.*

Include in your plan:

- Potential partners
- Potential funding mechanisms
- Whether you plan to replace, remove, or repair wood-burning appliances.
- Types of appliances needed to replace the older, inefficient ones. Consider both wood and non-wood alternatives. Promoting the cleanest appliance will provide greater reductions in particle pollution and other pollutants. Some appliances to consider:
  - EPA-certified pellet and wood stoves- <http://www.epa.gov/Compliance/resources/publications/monitoring/caa/woodstoves/certifiedwood.pdf>
  - Wood and pellet stoves that exceed the EPA New Source Performance Standards- <http://www2.epa.gov/residential-wood-heaters>
  - Pellet stoves
  - Natural gas stoves
  - Propane stoves
  - Energy Star® heat pumps
  - Other ENERGY STAR electric/gas furnaces
  - EPA-qualified hydronic heaters- <http://epa.gov/burnwise/owhhlist.html>
  - Hydronic heaters that exceed the EPA New Source Performance Standards- <http://www2.epa.gov/residential-wood-heaters>
  - EPA-qualified fireplace retrofit devices- <http://epa.gov/burnwise/fireplacelist.html#retrofits>



The chart below indicates the relative emissions of fine particles for a number of appliances. In general, hydronic heaters, wood-burning fireplaces and uncertified wood stoves contribute large amounts of fine particles each time they are used.



Source: "Consumers: Energy Efficiency and Wood-Burning Stoves and Fireplaces"  
<http://epa.gov/burnwise/energyefficiency.html>

Other items to include in your plan:

- Number of appliances you plan to replace, remove, and/or repair.
- Whether you plan to conduct air quality monitoring before and after the changeout.
- Which households you plan to target (mostly low-income?) and how much of an incentive you plan to provide. As an example, do you plan to provide the full amount for low-income? Do you plan to provide more funds for cleaner burning appliances (e.g. \$2,000 for a gas furnace, \$1,500 for a gas or pellet stove, \$750 for an EPA-certified stove)?
- Retailers you plan to use for appliance purchase.
- Professional installers you plan to use. The Chimney Safety Institute of America (CSIA) is a source for finding a certified chimney sweep. A source for certified hearth system planners and installers is the National Fireplace Institute (NFI).
- Timeline and method you plan to use to remove and destroy the old appliances. Destruction is an important part of a successful program to ensure old polluting appliances are permanently out of your air shed's inventory. Make sure to require proof of destruction (ie, photo of destroyed stove and/or "Certificate of Destruction" signed by retailer or recycler)
- Types of education and outreach you plan to provide.
- Details on how you plan to evaluate the program. Will you conduct a health-based and/or behavior change evaluation?

## Identify Partners

Creating partnerships is a critical component of a successful changeout program. Partnerships will help you leverage funding and resources, share your message, and promote change.

If it's a local changeout, meet with your **city/town council, elders, county board** or other governmental officials to gain support.

Approach partners that have a vested interest. **Let them know what's in it for them.** Although you and your potential partner may have common goals, explain what they are and convince your partner to collaborate.

Shared goals might include:

- Improving air quality
- Reducing asthma, impacts on cardiovascular health, and other health impacts of wood smoke
- Reducing patient care costs
- Promoting electricity, gas, or biomass
- Improving energy efficiency
- Improving visibility
- Reducing the number of chimney fires
- Increasing business for retailers
- Proper appliance operation and maintenance
- Lowering home heating costs
- Promoting cleaner renewable energy appliances
- Potentially reducing carbon footprint
- Potentially increasing property value
- Supporting local economy and job creation
- Enhancing education about cleaner heating

Partnering with local CSIA-certified chimney sweeps can be an effective way to reach households. EPA Burn Wise has developed outreach materials for chimney sweeps and retailers to use when talking with households.

It is important to partner with your local hearth retailer(s) and/or HVAC contractors. Once you determine how many retailers you have in the changeout area, coordinate a meeting or conference call. You will want to cover things such as the project, what they will be expected to do, how they will be paid, what the agreement includes and whether or not they plan to offer additional discounts or rebates. Some programs have conducted a formal Request for Qualifications to recruit and select reputable retailers and contractors.

Changeout programs across the United States have successfully partnered with one or more of the following:

- State, tribal and local air agencies
- Local planning offices and mayors



- Local chapters of the American Lung Association
- Local low-income service providers (e.g. Women, Infant and Children's Nutrition Program, Low-Income Home Energy Assistance Program, Medicaid)
- Health clinics or health departments
- Gas and/or electric utilities
- Individual stove retailers and chimney sweeps
- Natural gas, propane, and/or wood pellet manufactures and dealers
- Individual HVAC contractors
- Housing authorities
- U.S. or state forestry departments
- Colleges or universities
- Fire departments
- Local Indian Health Service clinics
- Green energy organizations
- Facilities that dispose of old stoves so they cannot be resold or reused
- Hearth, Patio & Barbecue Association
- Chimney Safety Institute of America

### Secure Funding

Funding a changeout program may be the biggest challenge you face. It will take **creativity and perseverance** to secure resources for a successful program. In the past, programs have used creative strategies to hire staff, purchase equipment, and market the program.

**Weatherization** and other **housing assistance programs** are good places to start when looking for home heating resources.

Agencies, organizations, and groups that may make grants, loans, or other funds available to support a changeout program include:

- Local, state, and federal agency Supplemental Environmental Projects from settlement and mitigation agreements
- U.S. Department of Housing and Urban Development Block Grant program
- U.S. Department of Agriculture (USDA) Rural Development funds/loans
- USDA Rural Utilities Service loans
- U.S. Department of Energy Weatherization Assistance Program
- U.S. Department of Health and Human Services Low Income Home Energy Assistance Program
- Bureau of Indian Affairs Housing Improvement Program
- EPA pilot projects; Indoor Air, Community Grants



- Foundation grants or loans
- Campaign partners via signed agreement
- Heating appliance manufacturers' and retailers' discounts, rebates & in-kind donations
- State and Federal Government tax credits on the sale of biomass stoves and high efficiency HVAC equipment
- Town managers
- State legislatures
- Zero- or low-interest financing
- Power company on-bill utility financing and equipment rebates
- Direct tribal funds

For more detailed information on funding opportunities, see *EPA's Guide to Financing Options for Wood-burning Appliance Changeouts*-  
<http://www.epa.gov/burnwise/pdfs/financing.pdf>.

## Funding Sources

- Grants
- Loans
- Bonds
- SEPs
- Tax Credits
- Rebates

## Modify the Plan to Include Partners and Funding

Periodically review and modify your plan as your goals may change, depending on funding sources and partners.

## Initiate a Wood Smoke Outreach and Education Campaign

Timing your wood smoke outreach and education can be tricky. You want to begin as early as possible to promote cleaner burning. Provide wood smoke facts and figures **3 to 6 months before launching** your changeout program to help households understand the benefits of changing from an old wood stove to a cleaner home heating device.

### Town/City/Tribal Meeting

- Conduct informational seminars on wood smoke and cleaner-burning heating appliances and promote participation in the upcoming changeout program.
- Start your campaign at such trusted locations as **fire departments, churches, or schools**.

### Door-to-door

- Send influential individuals to homes located in priority zones.
- Provide Burn Wise brochures and fact sheets like **Dirty Little Secrets** and **Wet Wood is a Waste**.
- Provide local contact information to households indicating where they can obtain detailed information.

### Social Media

- Link to best burn tips on Facebook (<https://www.facebook.com/EPABurnWise>), Twitter (@epaburnwise), blogs, and other social media outlets.



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- Ask partners to send additional best burn tips.
- Link to video **public service announcements (PSAs)** (<http://epa.gov/burnwise/psas.html>).

## Website

- Identify wood smoke as an issue and include best burn tips.
- Post Burn Wise widgets (<http://epa.gov/burnwise/widgets.html>).
- Post video PSAs (<http://epa.gov/burnwise/psas.html>).

## Media

- Provide articles for print and online distribution (<http://epa.gov/burnwise/pdfs/kitarticle.pdf>).
- Distribute radio PSAs (<http://epa.gov/burnwise/psas.html#live>).
- Distribute video PSAs (<http://epa.gov/burnwise/psas.html>).

## Other

- Post “Best Burn Tips” or “**Wood Smoke Campaign**” signs and posters on buses, taxis, town/city/tribal government buildings, schools, health departments, hospitals, libraries, retailers, and other visible locations. Also offer videos to these important community information resources.



## Implement Appliance Changeout

You can implement your appliance changeout program in a variety of ways:

- Hold a kickoff event. Involve key partners (e.g., local health department; EPA; Hearth, Patio and Barbecue Association) in planning the event. Invite the press, town/city/tribal management, state government officials, and the **EPA Regional Administrator** or other staff.
  - Provide a press release to local media.
  - Consider doing a press conference by telephone. This can attract reporters who may not have the time or ability to go to an in person event.
  - Invite retailers, installers, and other partners to exhibit and participate.
  - Invite community members to participate. Hold the kickoff event at a fire department, farmers’ market, retailer’s parking lot, town square, or other popular and high-traffic areas.
- Issue vouchers and perform weekly program follow-ups.
- Monitor how many vouchers are used week to week.
- Continue outreach and education, especially to promote burning dry, seasoned wood.
- Record and share success stories as the program continues. Spotlight households that see a remarkable difference, such as less smoke in the home, reduced respiratory illness, lower heating



bills or other positive effects. Share these stories to encourage other households to participate. **Take photographs**, make videos, or include testimonials on your website or offer to radio and television.

- Monitor and evaluate your program. Check in with partners and households to adjust parts of the program plan as needed.

In July 2014, New York launched **Renewable Heat NY**, a program that includes outdoor/in-door wood boiler and wood stove retirement with advanced system replacements. See more: <http://www.nyserda.ny.gov/renewableheatny>

### Evaluate the Program

Many programs have found that conducting pre- and post-program analyses can help them determine how their activities influenced wood smoke reduction. You might partner with a university or environmental research group to monitor and track pollution before and after the changeout.

Request permission to follow up with households 2 to 3 weeks after the changeout to make sure each household is adjusting to its new appliance. (This may need to be adjusted based on when the stove is installed) There may be questions related to fuel type, flue, doors, or proper venting. A few months later, a complete program evaluation can help provide a better assessment on whether or not the air quality indoors or out has improved. An evaluation also can be used to make program improvements to secure additional funding, guide a future changeout, or design a continuation of the wood smoke reduction program without appliance changeouts. It is also critical to obtain feedback from the retailers in order to improve program operation.



Puget Sound Clean Air Agency community event

Read program evaluations from **Libby, Montana, and Makah Nation, Washington**:

- [http://www.woodstovechangeout.org/fileadmin/PDF/Libby\\_Report-Final.pdf](http://www.woodstovechangeout.org/fileadmin/PDF/Libby_Report-Final.pdf)
- <http://epa.gov/burnwise/pdfs/MakahTribeReport2011.pdf>

More wood-burning appliance changeout program **case studies** are available at <http://www.epa.gov/burnwise/casestudies.html>.



The **Seeley Lake Woodstove Changeout** exceeded its initial goal and changed out 164 wood stoves in less than a year. See how they did it: <http://www.seeleylakewoodstoves.com/index.php>

### Other Considerations

Only allow appliances that **exceed the EPA New Source Performance Standard limits**.

Provide changeout incentives to only those moving from wood to an electric or gas appliance or wood pellet stove. At a minimum, provide a much **larger cash incentive** (twice the amount) for electric, gas or pellet stoves.

Do not allow more second-hand uncertified stoves or hydronic heaters to be installed in your area. Long-term smoke reductions can be better protected when these appliances are **no longer permitted** in the community.

Offer to **repair non-wood devices** in the home (e.g. broken furnaces). This can help the homeowner avoid using the wood-burning appliance for primary heat.

Consider providing financial assistance for more than just appliances. **Wood sheds** are an inexpensive and simple way to help ensure low-moisture fuels and, therefore, reduce wood smoke and improve efficiency and air quality. Your program can provide vouchers or assistance to households that are willing to install and use wood sheds to properly dry firewood. You could also provide a higher incentive or give preference to those who have a wood shed

The **Makah Nation in Washington State** partnered with a summer youth program to build affordable wood sheds for elders in their community. For a diagram and list of supplies, see <http://epa.gov/burnwise/pdfs/WoodShedDiagram.pdf>

Partner with an organization, hearth store or fuel provider to provide a fuel subsidy. As an example, **free pellets** or other low-moisture, compressed wood products for a year may help incentivize cleaner burning.

Think about creating an incentive for consumers to **attend a mandatory class or training** on how to use their new appliance, the importance of burning dry seasoned wood and how to test wood moisture. You could do this at least one month after installation so that they will be ready to talk about how it works. Or you can require the retailer (as part of signing up for the program) to spend at least 15 minutes with the purchaser to go over these issues – a checklist could be developed and then the purchaser signs it saying that cleaner burning and proper operation and maintenance were talked about. You may want to require the program participant to bring in a piece of 'dry' wood to gauge



whether or not the consumer is truly burning with seasoned firewood. One idea is to hold back 10% of the incentive until the class or training has been completed. You could also offer the training online.

Distribute **moisture meters and/or stovepipe thermometers**. Moisture meters test the moisture level in firewood and can cost as little as \$20. Stovepipe thermometers detect whether or not the temperature in the firebox is at the optimum combustion temperature - is it too hot or not hot enough. Have retailers or manufacturers include moisture meters and/or chimney thermometers with every new purchase. If not, include funding for these items in your budget.

Partner with the local community action agency to use Department of Energy and Health and Human Service funds to **weatherize** homes before or during the changeout to improve energy efficiency. Home audits and weatherization can help determine the proper sizing of an appliance and ensure the home is properly sealed to keep heat in and smoke out.

If hydronic heaters are permitted, only allow **properly sized units** and require appropriate **setbacks**. See NESCAUM's model rule- <http://epa.gov/burnwise/ordinances.html#model>

Consider a **bounty program** that provides funds to households that remove and destroy an appliance from their home without replacement. These programs can be cheaper and provide greater emission reductions. The Washington State Department of Ecology sponsored a “**woodstove roundup**” near Winthrop, Washington. Stove owners were offered up to \$250 for turning in an old wood stove. In the Tacoma-Pierce County PM2.5 Nonattainment Area, the Puget Sound Clean Air Agency offered a \$200 reward for households wanting the program's contractor to pick up their stove, and a \$350 reward if the stove owner delivered the old stove to a designated recycle yard open six days a week.

### Additional Resources

- EPA Burn Wise Outreach Tools and Health Information: <http://epa.gov/burnwise/>
- Strategies for Reducing Residential Wood Smoke: <http://epa.gov/burnwise/pdfs/strategies.pdf>
- Guidance for Using State Supplemental Environmental Projects to Implement Wood Stove Changeout Programs: [http://www.epa.gov/ttn/oarpg/t1/memoranda/wschangoutguide\\_042807.pdf](http://www.epa.gov/ttn/oarpg/t1/memoranda/wschangoutguide_042807.pdf)
- Training module for State, tribal, and local governments to learn more about EPA's residential wood smoke program (video): <http://www.epa.gov/apti/video/Larry%20Brockman%20Revised%20051410.wmv>
- Reducing Residential Wood Smoke: EPA Programs and Tools Available to State, Tribal and Local Agencies (webinar): <https://epa.connectsolutions.com/p1iy05vz7ii/>
- EPA EJView: <http://www.epa.gov/environmentaljustice/mapping.html>
- Residential Indoor PM2.5 in Wood Stove Homes: Follow-up of the Libby Changeout Homes, Noonan et al., Indoor Air (2012). <http://www.ncbi.nlm.nih.gov/pubmed/22607315>
- Renewable Heat NY, Outdoor/Indoor Replacement Program: <http://www.nyserda.ny.gov/renewableheatny>



- Keene, New Hampshire, Woodstove Changeout Campaign, 2009–2010, Final Report: <http://epa.gov/burnwise/pdfs/Keenecasestudyreport2011.pdf>
- Lessons Learned from a Wood Stove Changeout on the Nez Perce Reservation, Ward, Boulafentis, et al. (2011): <http://www.sciencedirect.com/science/article/pii/S004896971001212X>
- Puget Sound Clean Air Agency Wood Smoke Behavior Change Campaigns: <http://epa.gov/burnwise/workshop2011/PugetSound-WoodSmokeCampaigns-Warren.pdf>
- Sacramento Metropolitan Air Quality Management District Wood Smoke Program: <http://epa.gov/burnwise/workshop2011/SMAQMD-WoodSmokeProgram-Kennard.pdf>
- Vermont's Outdoor Wood-fired Boiler Change-out Program: <http://epa.gov/burnwise/workshop2011/VT-WoodBoilerChangeout-Valentinetti.pdf>
- National Fireplace Institute: <http://nficertified.org/>
- Chimney Safety Institute of America: <http://www.csia.org/>
- Hearth Patio and Barbecue Association: <http://www.hpba.org/>
- Additional training, webinars, and presentations: <http://epa.gov/burnwise/resources.html>
- Additional case studies and reports: <http://epa.gov/burnwise/casestudies.html>

**To discuss details of your changeout program, contact:**

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