



# Best Practices in Wood and Pellet Stove Incentive Programs

A report prepared for the University of Maryland Extension Woodland Stewardship Education program

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As more and more states are beginning to provide incentives for modern wood and pellet stove installations, an array of criteria are being used to guide which stoves should be eligible and what other requirements should be included. This report looks at environmental, economic, energy efficiency, social equity, and consumer values and suggests ways to maximize program impact.

The federal wood and pellet stove incentive program that lasted from 2009 to 2013 is widely regarded as a particularly poor model. It allowed consumers to claim a \$300 tax credit for the purchase of any new wood or pellet stove provided it was EPA certified (non-exempt) and at least 75% energy efficient. The energy efficiency requirement was quickly rendered meaningless as stove manufacturers were allowed to self-rate efficiency using any number of available methods. The EPA certification requirement, while it eliminated the highest polluting and

most inefficient stoves, was similarly not sufficient for ensuring the best available technology was appropriately incentivized. Also, the federal program did not take important criteria such as professional installation and location into consideration. Thus, a new stove that emitted 5.5 grams of fine particulate matter (PM2.5) emissions per hour could be self-installed in a densely populated urban area and still be entitled to the tax credit.

## Summary of recommendations:

At a minimum, we believe programs should only incentivize wood and pellet stoves that are certified by the Environmental Protection Agency (EPA) and meet a stricter emission limit than the EPA's minimum requirement. Energy efficiency is another important criterion that should be considered in stove incentive programs, although lack of reliable, independent data makes accounting for efficiency too difficult as of

Fall 2014. To ensure new wood and pellet stoves work as cleanly and efficiently as they are designed, and to protect consumer safety and minimize the risk of fire, incentive programs should require subsidized stoves to be installed by certified hearth professionals. To ensure taxpayer funds for new stoves are spent in an efficient way and limit the negative environmental effects of wood smoke in urban areas, we recommend that new installs of wood stoves should be limited to rural areas, or that programs only make pellet stoves eligible for incentives. We also recommend that programs better target low- and middle-income residents.

There are several examples of state stove incentive programs that contain innovative and “best practice” features, but all programs have opportunities for improvement. We hope this report provides a resource for all programs.

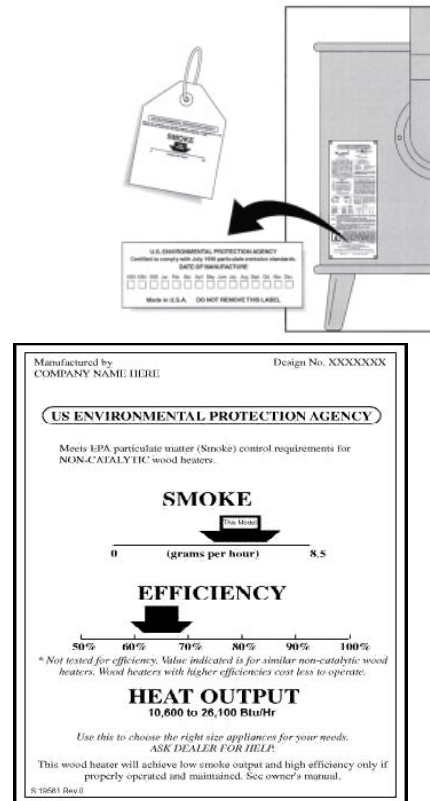
## 1. Certification of equipment

### Wood Stoves

Limiting the eligibility of wood stoves to EPA certified models is a basic feature of stove incentive programs. The federal tax credit did not mention EPA certification, as it was supposed to be primarily an efficiency incentive. Several [unregulated boilers](#) claimed to be eligible, but we are not aware of any uncertified stoves that claimed the credit.

The EPA provides a list of certified wood stoves available for download on its [website](#) with other useful information such as the stove manufacturer’s name, model name, emission rate, heat output in BTU per hour, and estimated or actual tested efficiency. Wood stoves certified by the EPA are independently tested to ensure

they meet a particulate emissions threshold, which currently is 7.5 grams per hour for non-catalytic wood stoves and 4.1 grams per hour for catalytic wood stoves. Consumers can identify EPA certified wood stoves through a label affixed to the back or side of a stove as well as a hangtag, pictured below.



EPA began certifying Phase II stoves in 1990, so some certified stoves are nearly 25 years old and need to be retired almost as much as some uncertified ones need to be. Stoves certified in the past 5 years are considered much cleaner and more effective than older, certified stoves.

### Pellet stoves

Pellet stoves are generally perceived to be cleaner and more efficient than wood stoves as a class, and few stove incentive programs have restricted pellet

stove eligibility to those certified by the EPA. However, [independent test data](#) shows that this widely held belief about pellet stove efficiency may be incorrect. Some pellet stoves on the market are as low as 40% efficient, and many are in the 50% and 60% range, when they easily can be in the 70s given available technologies. We believe that households should not be subsidized into unwittingly buying a low-efficiency pellet stove that will saddle them with much higher fuel costs overtime. The list of EPA certified pellet stoves can be found on the same list as certified wood stoves. EPA certified pellet stoves are [usually more efficient](#) than their uncertified (exempt) counterparts because exempt pellet stoves often use the 35 to 1 air to fuel ratio loophole to avoid certification, at the cost of lower efficiency.

This issue will be obsolete at some point in 2015, when all new pellet stoves will be required to be certified under new EPA stove regulations.

### Masonry heaters

Masonry heaters are such an expensive, niche product that they almost do not need discussion in these programs. However, we encourage programs to make certain masonry heaters eligible, even though they are not certified. The EPA is currently considering a method to certify masonry heaters that may be released in the next year. In the meantime, [Washington](#) and [Colorado](#) maintain their own lists of certified masonry heaters approved for sale. These lists can be a useful reference for designing new stove incentive programs inclusive of masonry heaters. [Colorado](#) does not set a specific emissions limit, but maintains a list of over 30 approved masonry heaters by manufacturer. Washington sets an

emissions limit of 7.3 grams per kilogram of masonry mass, which may be more useful to policymakers creating incentive programs. Washington may be setting the bar low, considering that the [EPA has proposed](#) a limit equivalent to 1.8 g/kg for future regulations.

## **2. Stricter emission limits**

While stove incentive programs in [Montana](#), [Idaho](#), and [Arizona](#) use EPA limits to set emissions criteria, several other stove incentive programs set stricter emission limits for eligible appliances than the EPA's 7.5 and 4.1 grams per hour for non-catalytic and catalytic stoves. Setting stricter emission limits for wood stoves can help identify which stoves can perform best under optimal conditions. Some of the cleanest stoves by EPA emission standards may perform better in the real world. Equally important is using dry fuel and operating the stove correctly to obtain good [real world performance](#). Pellet stoves, which operate in the field much more like they do in the testing lab as compared to wood stoves, should be held to 2 grams per hour, as in Maryland and [New York's program](#), or 2.5 grams per hour at the most, as in Oregon, Maine and the federal Housing and Urban Development (HUD)'s PowerSaver low interest loan programs.

The state of Washington has been a leader in establishing stricter state-wide limits. Currently they are 4.5 grams per hour for non-catalytic stoves and 2.5 grams per hour for catalytic stoves. Washington's list of approved wood heating technologies, including masonry stoves, provides an easy standard policy makers can build into incentive regulations.

A [state of Oregon](#) incentive program requires stricter limits of 3.5 grams per

hour for non-catalytic stoves and 2.5 grams per hour for pellet and catalytic stoves, which was adopted by [Efficiency Maine's stove incentive program](#). To take it a step farther, Maryland's current limits are 3 grams per hour for wood stoves and 2 grams for pellet stoves. As the EPA continues to refine its certification criteria, we suggest that stove incentive programs adopt [Maryland's approach](#) of limiting the eligibility of incentives to a certain grams per hour cutoff according to the data on the EPA's certified stove list.

The argument against using stricter emission limits for wood stoves has some merit, but on the whole we and many other independent experts think it's worthwhile. It's true that the test labs often know exactly how to test a stove, and can hit the stove's sweet spots to get a low number of emissions that a consumer never will. Manufacturers that hire a test lab to do R&D on a stove before testing it may be likely to get even better numbers, because the lab is that much more familiar with the stove. The new EPA stove regulations are changing the test protocol, which may require stoves to burn cleaner on all test runs instead of averaging the test runs. This could give emission numbers more relevance in the real world.

### 3. Efficiency

There is still no easy way to use efficiency in stove incentive programs, and as a result stoves are excluded from scores of state, local and utility incentive programs that are rooted in energy efficiency. Despite the benefits of having them included in incentive programs, industry has been reluctant to disclose efficiency numbers, much less agree to schemes where some stoves would get incentivized and other not.

Pellet stoves are ideally suited to be part of many energy efficiency incentive programs, if they would release their tested efficiency values. Their continued exclusion may contribute to the perception that this technology does not fit into the mainstream energy efficiency movement, or worse, that it is not "green" enough to be included. Since one company, Hearth & Home Technologies, makes a very large percentage of the pellet stoves sold in the US, including many very efficient ones, they could significantly move the market by taking leadership and disclosing their actual, tested efficiency numbers.

Efficiency has become a thoroughly muddled, confusing, and controversial issue as they are several ways of measuring efficiency and results can be misleading. One of the greatest problems with this approach is the lack of third party tested efficiency data. The EPA list has verified [efficiency data](#) for only about two dozen units comprising mostly of the highest performing catalytic stoves. By only using stoves that have actual third party efficiency listing, a program would be basically limiting the selection to one non-catalytic Jøtul stove and a variety of large catalytic stoves. Only one pellet stove company, Seraph, has provided real efficiency data to the EPA thus far.

Setting efficiency as an eligibility requirement would help encourage manufacturers to provide third party efficiency data to the EPA, which most have been reluctant to do in the past. The proposed new EPA stove regulations will require all stoves to be tested and listed for efficiency, but there is widespread concern that the EPA will not require, or even have the capacity to make, efficiencies available to the public within the first year or two after promulgation.

The State of Oregon's residential energy [tax credit](#) for wood and pellet stoves is the only one that has put the effort into a workable and innovative system to incentivize the purchase of more efficient stoves without excluding inefficient stoves from eligibility. The more efficient the new stove is, the higher the tax credit the consumer receives. If the stove does not have an actual measured efficiency on the EPA list, the amount of the credit varies by stove type. Non-catalytic stoves are worth the least credit, catalytic stoves the second least, and pellet stoves the most. If the stove has an actual reported efficiency, then the consumer receives a tax credit based on how much more efficient the stove is than the minimum Oregon has established. The maximum rebate is \$1,500.

Both Massachusetts and Maine have attempted to use stove efficiency as an eligibility metric but the metrics were not clear or feasible and it had to be dropped.

A local utility program in [Fort Collins, Colorado](#) offers homeowners zero-interest loans if they upgrade their wood burning appliance or fireplace to a more efficient class of heater, according to the default efficiencies provided by the EPA. For example, homeowners can upgrade an uncertified stove to a certified stove, or a wood stove to a new pellet stove, but not the other way around. This unique method of incentivizing the purchase of more efficient wood appliances has the potential to help consumers save money, but only if the EPA provided more accurate efficient data on pellet stoves.

We find it is a good practice to include efficiency in the criteria, but we must acknowledge that the managers of

these programs are struggling with some unintended barriers and consequences. Oregon is fixing one problem, which had led the tax credit calculation to favor non-catalytic stoves over the cleaner catalytic or pellet stoves. This put the agency in charge of the program, the Oregon Department of Energy, at odds with the Oregon Department of Environmental Quality. The Oregon tax credit amount is based on the efficiency improvement over the EPA's default efficiency. So a non-cat tested at 70% would have a 7% improvement over the 63% default. A pellet stove tested at 75% would not have any improvement over the 78% EPA default efficiency. The program thus unintentionally puts pellet stoves at a disadvantage because the EPA has set unrealistically high default efficiency for pellet stoves.

#### **4. Rebate amounts**

Providing a higher rebate amount for pellet stoves than wood stoves is another common "best practice." Maryland provides \$700 for pellet stoves and \$500 for wood stoves, steering households who may be on the fence towards a pellet appliance, which will be cleaner. With lower install costs for pellet stoves, the higher rebate may also be a reason more than 70% of consumers use the rebate for pellet stoves in Maryland.

Right-sizing the rebate amount is also something that all programs must grapple with. Funding that goes too quickly, or not quickly enough can sometimes cause problems. One money saving incentive that more jurisdictions are employing is bounty, or paying consumers \$200-\$400 to remove an old stove from circulation without replacing it with anything. For areas with excessive wood

smoke pollution, this may be a far more effective per dollar of investment than a change out program.

## 5. Professional Installation

Requiring professional installation is standard for virtually all incentive programs. Wood and pellet stoves are potentially dangerous appliances and must be installed with the utmost concern for safety. Hundreds of homes burn down every year due to poor installations and lack of attention to clearances.

Homeowners seeking to avoid the added cost of a stove installation are often tempted to self-install. In some cases, installation can be greater than the cost of a stove itself. State codes vary about permits and installation requirements for wood stoves, so state incentive programs that require professional installation can play a large role in helping to address this safety issue. Pellet stoves, which do not require a full chimney system, tend to entail less problematic, unsafe installs. However, with any appliance that presents a fire hazard, a professional installation by a hearth professional is a good practice.

Options for incentive programs include requiring that stoves be installed by hearth professionals that have Chimney Safety Institute of America (CSIA) <http://www.csia.org> or National Fireplace Institute (NFI) <http://www.nficertified.org> certifications. Another option is simply to require a certified contractor, or someone who has been approved to do specialty energy efficiency or weatherization work, install the stove. An added benefit of requiring hearth professional stove installation is that CSIA, NFI, and MHA would also be more likely to help advertise the incentive program if they are involved.

Most current state incentive programs, if they require professional installation at all, do not limit the eligible installers to hearth professionals. For example, Maine's program initially required stoves to be installed by contractors with a solid fuel license, but did not provide for hearth professionals to do installations. In [New York](#), a Energy Star professional is required.

Maryland's program also initially required professional installation, but later waived the requirement after receiving a number of consumer complaints. Maryland began accepting self-installations provided that the owners provided documentation that the stove has been inspected post-install by either a county inspector or an insurance adjuster. While we believe requiring professional installation is the best practice, requiring inspection at a minimum can be a good compromise.

## 6. Low-income considerations

Some incentive programs offer higher rebate amounts to low-income families. This tends to be very common in change-out programs, and less common in non-trade out incentive programs. In [New York](#), however, change-out of an old one stove is required to receive a rebate for a new one, unless the household is low-income, when the rebate is offered without a change out.

Change out programs tend to have limited budgets, but are usually very popular among consumers. Whether it's a change out, or a straight incentive program, it is best if taxpayer funds are spent on consumer who need it most and not wasted on "free riders" who would make the purchase anyway without the incentive. When rebates disappear in a few hours or

even a few weeks, it likely means the rebate was too generous and a lesser rebate could have resulted in a more installs.

To ensure stove change-out program funds benefit low-income consumers, the programs can be opened to them first and heavily advertised in low-income regions.

Maryland considered a higher rebate for low-income families, but was dissuaded by added bureaucracy it involves and lack of data to demonstrate that it would be successful.

The use of income to qualify households for incentives or subsidies has had little support in renewable energy programs, even though it could be done relatively easily. Incentive programs for solar or geothermal rarely, if ever, disqualify families with high household incomes of \$250,000 per year or more. Wealthy people like subsidies as much as low and middle-income people and it's often very unpopular to steer taxpayer subsidies away from the richest families, who often have oversized homes.

As long as professional installation is required, incentivizing more affordable stoves from big box stores can make funding go much further and enable more low-income households to participate. Good quality EPA-certified stoves start at \$700 and one of the most popular stoves in the country sells for \$900. If stoves could be bought at a deep discount in bulk, program administrators may also get CSIA professionals to establish a discounted fixed price for a certain type of installation. Professional installation can be done by CSIA accredited chimney sweeps if local NFI trained staff at specialty hearth stores

will only install their own products. Such a fixed price would be possible for pellet stoves and for wood stoves on single or two story homes where the pipe is mounted on the exterior of the house. If larger rebates are not provided to low-income families, this is a vital way to help them overcome high upfront costs.

## **7. Minimizing Free-Riders**

A perennial problem with all rebate and incentive programs is that some people who take the rebate or the incentive would have made the purchase anyway, and so the funds serve little purpose. Determining whether a program has a high or low number of "free-riders" is also difficult.

This is regarded as a cost of doing business for many rebate programs, such as those for purchase of Energy Star appliances. For stoves, the number of "free-riders" is far higher if consumers don't learn about the incentive until they are making a purchase in a showroom. However, if only the cleanest stoves are incentivized, and professional installation is required, programs can have the impact of resulting in cleaner, safer installs. They can also reward those manufacturers who invest more in R&D and produce cleaner stoves, spurring more innovation.

## **8. Household/area eligibility:**

While pellet stoves can be acceptable in rural and more densely populated neighborhoods due to their more consistent low emissions, there are legitimate concerns about programs that encourage or subsidize the installation of wood stoves in densely inhabited or urban areas from a health and nuisance perspectives. Maryland's program, for

instance, is only available to homes that do not have access to natural gas, a backdoor way of limiting installs to more rural, sparsely inhabited areas where available heating fuels are expensive and residents can benefit the most from energy cost relief. Initial data from the program shows there have been more wood and pellet stove grants awarded per capita in the more rural and less affluent counties than the more populated central region of the state, indicating there has been some success in this method.

A [Woodstove Change-out Program](#) in parts of Connecticut, Massachusetts and Rhode Island provided a \$3,000 voucher to households who receive Medicaid, Low-income heating assistance, or the Women's Infant and Children's Nutrition Program.

Incentive programs can also work closely with low-income heating assistance (LIHEAP) programs, to ensure that families who receive LIHEAP are aware of the program and can access it.

Instead of using access to natural gas as an indicator of housing density, zip codes or counties could be designated as areas where an incentive may be appropriate.

Another option would be to limit wood stove installs in more densely populated areas to only when an old, uncertified wood stove is being removed and recycled.

## **8. Energy Audit:**

Energy audits are rarely used even in programs to incentivize modern, bulk fed pellet boilers, much less stove programs. But increasingly, incentives for stoves are available as part of a deeper

energy retrofit that starts with an energy audit. Auditors can educate homeowners about the importance of upgrading to safer, more efficient equipment, spot dangerous installations, and assist in removing dangerous stoves. The Building Performance Institute (BPI) is taking the lead in developing [guidelines for energy auditors](#) to inspect wood stoves. Requiring energy audits in conjunction with professional installation would assist in states providing a more holistic energy service to consumers when incentivizing wood stoves. The Alliance for Green Heat and University of Maryland Extension produced a draft of [steps to inspect a wood stove](#) as a resource.

## **9. Dedicated outside air:**

Several incentive programs in Oregon, Maine and in some HUD Power Saver programs require a dedicated outside air supply, but the requirement is far from accepted in hearth professional circles. In very tight homes, which are still relatively rare in the United States, outside air supply is important, but to require it for all homes not only adds a potentially unnecessary cost, it could even be a drawback. If a home were found to be very tight, and has competing venting needs, such as a vented kitchen hood, a wood stove may compete for indoor air which could even reverse the flow of air down the chimney. In such a case, a dedicated outside air vent may be recommended for the stove. In Oregon, the requirement could mean simply a \$35 vent that provides air within several feet of the stove. Many leading experts [question the use of outside air](#).



## **10. Education:**

Any program incentivizing new wood burning appliances should be coupled with educational materials on correct stove use and efficient burning practices. New appliances used incorrectly can negate the benefits of a new stove, contribute to more air pollution, and turn public opinion against wood burning and the program. It is well known that in terms of achieving ideal efficiency and cleanliness, choosing the right stove is only half the battle; the other half is the fuel and the operator. No matter how modern or clean a wood stove is, it is crucial that the operator use dry, split wood and give their stove enough air to maintain a clean burn. The [EPA Burn Wise program](#), is a great resource for consumers that should be promoted by incentive programs. Consumers could even be asked when they receive an incentive to sign a pledge promising to only burn dry wood.

## **11. Partners and Outreach**

A “best practice” for virtually any incentive program is building a network of engaged partners who are committed to the particular goals of the program. For instance, if benefitting lower income populations is a goal, partnering with a local or state low-income heating assistance program can help get the word out to that population. Conversely, we found one incentive program in Alabama, where even the local hearth retail stores did not know it existed.

If the program is run by a state energy office, bringing in the expertise of the state air quality office is also important to ensure that agencies aren’t working at cross-purposes, as what happened in Oregon.

## **12. Reducing emissions**

Using a rebate or incentive to steer consumers toward the cleanest wood or pellet stove has some positive emission benefits on its own. Some states, such as Idaho, have for years required people to turn in an old, uncertified stove to get an incentive for a new one. This resembles an ongoing, state-wide change-out, more than a stand alone incentive program, as it is not open to people who do not already have an old stove. Possibly the oldest continuously operating stove incentive program is in Arizona, where the state gives an incentive to put a EPA certified stove in a fireplace, to reduce the use of fireplaces for heating. And, in New York, the return of an old stove is waived for lower income families who want to buy a new pellet stove and do not have access to natural gas.

## **14. Providing moisture meters and subsidizing wood sheds:**

Moisture meters are effective yet inexpensive tools for ensuring homeowners only burn dry wood. One option is to provide a free (\$10) moisture meter to every home that has a stove installed. One major woodstove manufacturer has begun to include a free moisture meter with each purchase of one of its wood stoves. States have the option of teaming up with the EPA’s Burn Wise program, which is promoting voluntary efforts like this to help wood stove owners burn cleaner and more efficiently.

Incentive programs could subsidize, prioritize or even require homes to have or build woodsheds. This would help ensure that subsidizing a new stove will result in reduced smoke from the home, or homes with woodsheds could receive a higher rebate, which incentivizes proper storage

and educates people about its importance. An even more ambitious and more innovative concept would be to provide a firewood shed with every project. The EPA Burn Wise has a [modular woodshed plan](#) that cost \$217 in materials and can be built off site or onsite. Some experts question if a \$150 rebate to help build a wood shed to keep wood dry may produce similar or more air quality benefits as a \$1,000 rebate for a stove. The logistics of this is not necessarily easy, but it is something worth considering.



### 13. Monitoring and Evaluation

Assessing the effectiveness of the program using agreed upon method is important. Many renewable energy incentive programs, including those that involve solar and geothermal, struggle with accurate and meaningful assessment often because the agency in charge of the programs wants to show it as a success. Meaningful third party assessments can be expensive and may not be worthwhile unless the program is ongoing and there is an opportunity to change the program, something that outside interest groups may oppose. But tweaking program requirements is almost always necessary, and key stakeholders play a vital role in this.

For wood and pellet stoves, assessing the success of a program can be

especially difficult because there is no easy way to meter heat output or fossil fuels avoidance. Particulate emission testing can be done in smaller, valley settings, but is difficult to monitor in state-wide settings. Surveys of all participants via mail and email could be very useful and are an underutilized tool for gaining insights into program results. Surveys of hearth retailers can also be important.

### Conclusion:

“Best practices” in stove incentive programs are likely to be increasingly important as more options for smart deployment become possible. States with more expertise and more background in wood heat are more likely to have ability to incorporate more best practices into their programs. Trying to include too many best practices can make programs too complicated for both consumers and the implementing agency, so it’s important for program designers to tailor the requirements to the program goals. Using a state’s program requirements for a solar incentive program is often a good starting place when developing wood and pellet stove incentive programs.

At this point in the evolution of stove technology, we feel that pellet stoves are particularly ready to be part of more incentive programs. However, public disclosure of efficiencies by manufacturers will make this process much quicker.

Almost all programs have had to make adjustments after establishing requirements that did not work as planned. While this is a normal part of the learning curve of establishing a program for any appliance or technology, we hope this short report may lead agencies to ask the right questions and consider effective options.

## A Comparison of Eligibility Requirements for Stoves Incentive Programs

October 31, 2014

Program	Professional installation	Outside air	Efficiency req.	EPA certified pellet stove	Non-cat g/hr	Cat g/hr	Pellet g/hr	Pellet amount	Wood amount	Low income
<a href="#">Federal (expired)</a>	no	no	75% LHV *	no	7.5	4.1	none	\$300 tax credit	\$300 tax cr.	
HUD Power Saver	suggested	yes	no	no	4.5	2.5	2.5	low interest loan program	n/a	
<a href="#">Alabama tax deduction</a>	no	no	no	no	n/a	n/a	n/a	100% tax deduction	100%	
<a href="#">Arizona</a>	no	no	no	yes	7.5	4.1	n/a	\$500 tax deduction	\$500	
<a href="#">CO Utility</a>	yes	no	72% **	yes	n/a	4.1	none	low interest loan program		
<a href="#">Idaho tax deduction</a>	no	no	no	no	7.5	4.1	n/a	100% tax deduction over 4 yrs	100% tax ded.	
<a href="#">Maine rebate program</a>	yes***	yes	no	yes	3.5	2.5	2.5	\$500 rebate	\$500 rebate	yes
<a href="#">MD rebate program</a>	yes***	no	no	no	3	3	2	\$700 rebate	\$500 rebate	
<a href="#">Montana tax credit</a>	no	no	75% LHV	no	7.5	4.1	none	\$500 personal tax credit	\$500	
<a href="#">New York rebate</a>	yes	no	no	yes	n/a	n/a	2	\$1,000 /with stove trade-in	n/a	yes
<a href="#">Oregon tax credit</a>	no	yes	depends****	no	3.5	3.5	2.5	\$288 - 1,000	\$144 - 1,000	

\* This efficiency level was not measured or enforced in any meaningful way.

\*\* This program only allows upgrades from lower to higher efficiency using the EPA default numbers.

\*\*\* MD and ME allow for professional inspection in lieu of professional installation.

\*\*\*\* No efficiency minimum; higher efficiency stoves get higher rebate amounts.



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